



C.P.T. Studio s.r.l.

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2022



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## COMPANY PROFILE

C.P.T. Studio provides services in the surveying, documentation and planning sector for the conservation of cultural heritage, urban planning and architectural design.

In recent years the activities of the studio have been focused within the cultural heritage sector, exploiting the consolidated experience matured by our technicians both in the national and international environment.

The endowment of the most modern and advanced technologies and the constant experimentation and research activities allow us to provide our clients with optimal solutions, always guaranteeing the best result in terms of quality, cost and working times.

## SERVICES

The main area of activity of the firm is the protection, survey and rehabilitation of cultural heritage.

Our work has been carried out in some of the most important sites all over the world:

- *archaeological sites* - Roman Forum and Palatine hill, Pompeii, Ostia Antica and Villa Adriana in Italy; Arslantepe in Turkey; Leptis Magna, Villa Silin in Libia; Mut Temple at Gebel Barkal, Sudan; Cyrus the Great Tomb and Private Palace, Pasargadae, Iran, Khonsu Temple in the archaeological complex of Karnak, Luxor, Egypt ;
- *main Italian architectural heritage complexes* - Upper Basilica of St. Francesco in Assisi, St. Maria in Aracoeli in Rome; St. Clemente, St. Francesca Romana and St. Cecilia in Trastevere in Rome; St. Michele and Collegio Romano Complexes in Rome; Gardens of Villa d'Este in Tivoli;
- *several foreign cultural heritage sites*: Erbil Citadel, Iraqi Kurdistan; Zhalan Cemetery, China; Gesher Bridge on Jordan river, Jordan, Israel; Red Monastery and White Monastery, Egypt;
- *main Kosovo and Serbian orthodox complexes* – Decani Monastery, Prizren, Church of Bogorodica Ljeviska, Patriarchate of Pec/Peja, Gracanica Monastery in Kosovo, UNESCO World Heritage sites; Bojani Monastery and Bac Monastery in Serbia.

Our services are financed by national and international companies, organizations and donors, e.g.: Central Institute of Conservation and Restoration (ISCR); Ministry of Interior; Italian Development Cooperation (DGCS – Ministry of Foreign Affairs); Central Institute for Catalogue and Documentation (ICCD); Italian Ministry of Cultural Heritage; ARCE - American Research Center in Egypt; Yale University in Egypt; UNESCO; U.S. Department of State (Embassy of the United States, Kosovo); Save Venice inc., Soprintendenza per i Beni Artistici e Storici del Lazio (BSAE); ARS Progetti S.p.A; Fintecna S.p.A; INTERSOS ong; Sorgente R.E.M. S.p.A.; Qatar Foundation, Abu Dhabi Tourism and Culture Authority (TCA), CBC Conservazione Beni Culturali s.c..

## CULTURAL HERITAGE

Clients: private clients, cultural institutions and international organizations in Italy and abroad.

Countries of experience: Serbia, Albania, Kosovo, Iraq, Iran, Lebanon, Jordan, Israel, China, Libya, Sudan, Qatar, United Arab Emirates, Turkey, Egypt, Poland.

Our sound field experience and the use of the most up-to-date technologies, guarantee a highly advanced approach to the analysis and surveying of the heritage, indispensable basis for thematic studies and any further action (condition surveys, work planning and cost estimate, structural investigations etc.).

Moreover, an accurate survey helps achieving a proper knowledge of the cultural site/monument, increasing its possibilities of interpretation, conservation and presentation to the public.

Since 2000 our activity focuses on the research of solutions for surveying and documentation, contributing to the development of a number of highly innovative technical systems, currently utilized in the cultural heritage sector. Below, the list of our works in the field of Cultural Heritage.

### 2021 – on going

- **Karnak, Luxor – Egypt – Khonsu Temple** – 3D and orthophotographic survey of the Khonsu Temple and of the whole area of the Khonsu Temple, Opet Temple and Euergetes Gate .

Client: ARCE American Research Center in Egypt

- **Palazzo M – Latina – Italy** – Laser scanner survey and restitution of plans, sections and elevations.

Client: Ministry of infrastructures and transport – Provveditorato interregionale alle opere pubbliche per il Lazio, l'Abruzzo e la Sardegna

- **Church of Sant'Eusebio - Rome - Italy** – Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of plans, sections and elevations.

Client: Ministry of Culture – Soprint. Spec. Archeologia Belle Arti e Paesaggio di Roma

- **Reggia di Caserta - Caserta – Italy** – Consultancy for the execution of the “Combined survey of the Parco Reale and the Giardino Inglese” of the Reggia di Caserta park.

Client: Ministry of Culture - Reggia di Caserta

- **Epiphanius abbot's crypt in the archaeological area of the San Vincenzo al Volturno monastery – Castel San Vincenzo (IS) – Italy** - Three-dimensional and orthophotographic survey with the purpose of the securing and restoration of the frescoes of the crypt.

Client: Ministry of Culture – Soprint. Archeologia Belle Arti e Paesaggio del Molise

- **Buildings in via Cesati, 94-98 - Rome – Italy** – Survey of the external elevations and roof with laser scanner technology and restitution of cad elevations.

Client: Private

- **Building in via Isole Figi, 37 – Lido di Ostia (RM) – Italy** – Survey of the external elevations and roof with laser scanner technology and drone photogrammetry.

Client: Private

- **Palazzo Ruspoli – Flat in via della Fontanella di Borghese, 56 – Rome – Italy** – Laser scanner survey and restitution of plans, sections and elevations.

Client: Private

- **Building in via Clitunno, 32 – Rome – Italy** – Survey of the external elevations and roof with laser scanner technology and restitution of cad elevations.

Client: Private

- **Palatine Hill and Roman Forum - Domus Tiberiana – Rome - Italy** - Neronian area. Laser scanner survey of new excavations and integration of the existing drawings.

Client: Ministry of Culture - Parco Archeologico del Colosseo

- **Building in via dei Condotti, 61A – Rome - Italy** – Three-dimensional survey and orthophotographic and cad restitution of the courtyard elevations of the building.

Client: Private

- **Ex INPS building in piazza Augusto Imperatore – Rome – Italy** – Three-dimensional survey and cad restitution of the external elevations of the building.

Client: Private

- **Palazzo Nardini – Rome - Italy** – Topographic and three-dimensional survey and architectural detailed restitution of the building called Palazzo Nardini in via del Governo Vecchio.

Client: Private

- **Museo Nazionale Romano – Crypta Balbi – Rome – Italy** – Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of orthophotographic and cad elevations, sections and plans.

Client: Ministry of Culture - Museo Nazionale Romano

- **Al Tahira Church - Mosul – IRAQ** – Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of orthophotographic and cad drawings.

Client: A.R.S. Progetti S.p.A. for UNESCO

- **Al Aghawat and minaret - Mosul – IRAQ** - Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of orthophotographic and cad drawings.

Client: A.R.S. Progetti S.p.A. for UNESCO

- **Doria Pamphilj Palace in Valmontone – Rome - Italy** – Seismic Risk Assessment by three-dimensional laser scanning and topographic survey and restitution of cad elevations, sections and plans and cracking pattern.

Client: Soprintendenza Archeologica Belle Arti e Paesaggio per l'Area Metropolitana di Roma, la provincia di Viterbo e l'Etruria Meridionale

## 2020

- **Palatine Hill and Roman Forum - Domus Tiberiana – Rome - Italy** - Three-dimensional laser scanning survey and restitution of orthophotographic and cad elevations, sections and plans of the Hadrian complex

Client: Parco Archeologico del Colosseo

- **Capitoline Museums – Palazzo dei Conservatori, Hall of the Captains – Rome - Italy** – Three-dimensional survey of the room and painted surfaces

Client: CBC Coop – Capitoline Museum

- **Torre Maggiore – Medieval tower – Pomezia, Rome - Italy** – Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of orthophotographic and cad elevations, sections and plans.

Client: Private for Soprintendenza Archeologia, Belle Arti e Paesaggio per l'area metropolitana di Roma, la provincia di Viterbo e l'Etruria meridionale

- **School “A. Cadlolo” - Lungotevere Tor di Nona - Rome - Italy** – Three-dimensional survey of the external and courtyard facades.

Client: Urban Vision S.p.A. and Sorgente REM S.p.A. for Comune di Roma, Municipio I

- **Sacred area of the Tempio di Ercole e dell'Ara Rotonda - Ostia Antica, Rome - Italy** – Three-dimensional laser scanning survey and restitution of orthophotographic and cad elevations, sections and plans.

Client: Parco Archeologico di Ostia Antica

- **Roman Theatre - Ostia Antica, Rome – Italy** - Three-dimensional laser scanning survey and restitution of orthophotographic and cad elevations, sections and plans.

Client: Parco Archeologico di Ostia Antica

- **Roman Forum – Arch of Septimius Severus – Rome - Italy** - Three-dimensional laser scanning survey, restitution of orthophotographic and cad elevations, sections and plans and condition mapping drawings.

Client: Parco Archeologico del Colosseo

- **Chigi Chapel – Church of Santa Maria della Pace - Rome - Italy** – Three-dimensional laser scanning and photogrammetric survey of the chapel and of Sibyls paintings by Raphael.

Client: Antonio Forcellino Restauri



- **San Carlino alle Quattro Fontane complex – Rome - Italy** – Three-dimensional laser scanning and topographic survey and restitution of cad elevations, sections, plans and cracking pattern.

Client: Soprintendenza Speciale Archeologia Belle Arti e Paesaggio di Roma

## 2019

- **Red Monastery – Sohag – Egypt** – Three-dimensional laser scanning, topographic and photogrammetric survey of the Monastery after the restoration works and survey of the surrounding archaeological areas.

Client: ARCE - American Research Center in Egypt

- **Hercules' statue in the Galleria Borghese Museum - Rome – Italy** – Three-dimensional laser scanning, topographic and photogrammetric detailed survey of the Hercules' statue.

Client: Galleria Borghese

- **Jacobello del Fiore's polyptych in the Teramo's Cathedral - Teramo – Italy** - Photogrammetric survey of the structure.

Client: CBC Coop - Restauro e Conservazione Beni Culturali

- **Church of San Salvatore in Campi - Norcia, Perugia – Italy** - Three-dimensional laser scanning, topographic and photogrammetric survey of the iconostasis.

Client: Istituto Superiore per la Conservazione ed il Restauro

- **Palazzo Massimo - National Roman Museum - Rome - Italy** - Three-dimensional laser scanning and topographic survey of the ground and underground floor of the palace.

Client: Museo Nazionale Romano

- **Bisentina Island in Bolsena Lake - Viterbo - Italy** – Three-dimensional laser scanning and topographic survey of some buildings and archaeological remains.

Client: Fidim s.r.l.

- **Church of Sant'Anna - Borbona, Rieti – Italy** - Three-dimensional laser scanning, topographic and photogrammetric survey of the structures and of the ceiling coffer.

Client: Private for Segretariato Regionale del MIBAC del Lazio

- **Palazzo del Capitano del Popolo - Perugia – Italy** - Three-dimensional laser scanning and photogrammetric survey of the palace's facades.

Client: Private for MIBACT

- **Reggia di Caserta – Caserta – Italy** – Consultancy for the tendering of the “Combined survey of the Parco Reale and the Giardino Inglese” of the Reggia di Caserta park: terms of reference, bill of quantities.

Client: Reggia di Caserta

- **Mausoleum in Via Appia Antica n. 139 – Rome – Italy** – Three-dimensional laser scanning and photogrammetric survey and restitution of orthophotographic and cad elevations, sections and plans.

Client: Private

- **Church of St. Peter and Palazzo dei Canonici - Tuscania, Viterbo – Italy** – Consultancy for the design of the new museal setting of the room of the painting fragments in Palazzo dei Canonici. Three-dimensional survey of the palace, church's apse and painting's fragments. Execution design.

Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro

- **White Monastery and archaeological sites – Sohag – Egypt** – Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of general and detailed elevations, sections and plans of the complex and four archaeological areas.

Client: Yale University, White Monastery Conservation Project – ARCE American Research Center in Egypt

- **Red Monastery – New shelter project – Sohag – Egypt** - Rendering of different solutions for the roof of the aisles of the church.

Client: ARCE American Research Center in Egypt

- **Hospitalia Complex - Villa Adriana - Tivoli (Rome) – Italy** – Three-dimensional and orthophotographic survey of the mosaic floors of three rooms and of the walls of the main room.

Client: Private for Villa d'Este and Villa Adriana

- **Sheikh Mohammed Bin Khalifa's palace - Al Ain - United Arab Emirates** –Three-dimensional laser scanning and topographic survey and restitution of orthophotographic and cad elevations and sections.

Client: A.R.S. Progetti S.p.A.

- **Palatine Hill and Roman Forum - Sacred area of the temple of the Magna Mater and the archaic huts - Rome – Italy** – Three-dimensional survey and restitution of orthophotographic and cad elevations, sections and plans.

Client: Parco Archeologico del Colosseo

- **Terme di Diocleziano complex – Magazzino Laurentino – Rome – Italy** – Three-dimensional laser scanning and restitution of orthophotographic and cad drawings of the pottery stored in the warehouse.

Client: Private

## 2018

- **Monastery and church of Saint James and Saint Christopher, The Rocchina of Saint Catherine and The Malta dei Papi in Bisentina Island in Bolsena Lake - Viterbo - Italy** - Three-dimensional laser scanning, terrestrial and aerial imaging and mapping and topographic survey of the complex and restitution of all elevations, sections and plans.<sup>7</sup>

Client: Fidim S.r.l. Rovati Fondation

- **Church of Santa Maria della Misericordia – Accumuli, Rieti – Italy** - Three -dimensional laser scanning and orthophotographic survey of the paintings in the church of St. Maria della Misericordia.

Client: Ministero per i Beni e le Attività Culturali - Segretariato Regionale del MIBAC del Lazio

- **Church of Santa Marta at Collegio Romano – Rome – Italy** – Three-dimensional laser scanning and orthophotographic survey of the paintings in the lab

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Building in via Dandolo – Rome – Italy** – Three -dimensional laser scanning and restitution of all the elevations, sections and plans of the buildings in the complex.

Client: Paolo Rocchi Architetto s.r.l. f Sorgente Group.

- **Church of Santi Andrea e Claudio dei Borgognoni – Rome – Italy** - Three-dimensional laser scanning, terrestrial and aerial imaging and mapping and topographic survey of church.

Client: Embassy of France in Italy.

- **Front Aventine to the Tiber River, at the Giardino degli Aranci and Clivo Rocca Savella - Lungotevere Aventino n. 5-6 - Rome – Italy** - Three-dimensional laser scanning and orthophotographic survey of the wall and buildings on the top.

Client: Sorgente Group - Paolo Rocchi Architetto s.r.l.

- **Accumuli, Cassino - Rieti - Italy** - three-dimensional survey with integrated technologies, laser scanning and terrestrial and aerial imaging and mapping, and advanced post processing.

Client: Private - Paolo Rocchi Architetto s.r.l.

- **Statue of St. Bibiana by Gian Lorenzo Bernini in the Church of St. Bibiana - Rome - Italy** - three-dimensional survey of the sculpture and 3D modelling of the niche for the new positioning of the statue.

Client: Associazione di promozione sociale - "Piazza Vittorio" APS.

- **Architectural Complex in Via Margutta n. 51 - Rome - Italy** - three-dimensional laser scanning and topographic survey of the historical complex.

Client: Sorgente SGR S.p.A. – Sorgente Group.

- **Historical building in Lungotevere Raffaello Sanzio n. 15 - Rome - Italy** - three-dimensional laser scanning, topographic survey and orthophotos of the complex.

Client: Sorgente SGR S.p.A. - Sorgente Group.

- **Church of San Salvatore – Campi di Norcia - Perugia – Italy** – Three-dimensional laser scanning, photogrammetric and topographic survey of the church after the earthquake security measures.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR.

## 2017

– **Architectural Complex of the Archaeological Museum in Corso Vittorio Emanuele - L'Aquila - Italy** – 3D laser scanning, architectural measured survey and orthophotos of the Palace.

Client: Private for L'Aquila Municipality

– **Colonna-Sordi Gallery Palace, Head Quarter of the Italian Presidency of the Council of Ministers - Rome - Italy** – 3D laser scanning, architectural measured survey and orthophotos of the Palace.

Client: Sorgente REM S.p.A. – Sorgente Group.

– **Palatine Hill and Roman Forum – Rome – Italy** - 3D survey and consultant services for the study and conservation of the archaeological site.

Client: Soprintendenza Speciale per il Colosseo, il Museo Nazionale Romano e l'Area Archeologica di Roma.

– **Ceva Palace in Via IV Novembre - Rome - Italy** – Topographical and measured survey of the south wing of the palace

Client: Sorgente REM S.p.A. – Sorgente Group.

– **Baths of Diocletian - Rome - Italy** - Detailed survey of the Aula n. I, II, III, VI and deformation analysis of the walls and vaults.

Client: Archedim s.r.l. for Soprintendenza Speciale per il Colosseo e l'Area Archeologica Centrale di Roma.

– **Church of San Sebastiano - Venice - Italy** - Three-dimensional laser scanning and photogrammetric survey of the dome lunettes and paintings.

Client: CBC Conservazione Beni Culturali

– **Convicinio di San Antonio Complex - Matera - Italy** - three-dimensional laser scanning, photogrammetric and topographic survey of the four rupestrian churches.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR.

– **Church of Santa Maria Assunta - Amatrice - Italy** - Earthquake of August 2016 -, three-dimensional laser scanning, photogrammetric and topographic survey of the church.

Client: Segretariato Regionale del Ministero dei Beni e delle Attività Culturali e del Turismo per il Lazio.

– **Museum Cola Filotesio Church of Sant'Emidio - Amatrice - Italy** – Earthquake of August 2016 -, three-dimensional laser scanning, photogrammetric and topographic survey of the ruins of the tower and Museum.

Client: Soprintendenza Archeologia Belle Arti e Paesaggio per le provincie di Frosinone, Latina e Rieti

– **Church of San Salvatore a Campi di Norcia - Norcia - Italy** – Earthquake of October 2016, three-dimensional laser scanning, photogrammetric and topographic survey of the ruins of the church and analysis of the documentation methodologies.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

– **Sacred area of the temple of the Magna Mater and the archaic huts - Palatine Hill and Roman Forum - Rome - Italy.** three-dimensional model of the site and 3d Printing of archaeological ruins.

Client: Soprintendenza Speciale per il Colosseo e l'Area Centrale di Roma.

– **Vicus Tuscus and Basilica Julia in the Roman Forum - Roma - Italy** – Three-dimensional survey for the new entrance design of the archaeological site.

Client: Soprintendenza Speciale per il Colosseo e l'Area Centrale di Roma.

## 2016

– **Vittore Carpaccio's Saint Ursula Cycle - Venice - Italy** - 3D survey and high definition orthophotos of the paintings.

Client: Save Venice Inc.

– **Arch of Janus in the Forum Boarium - Rome - Italy** - 3D survey of the site and restitution of all elevations, sections and plans of the arch and surrounding areas.

Client: Private for World Monuments Fund and Soprintendenza Speciale per il Colosseo e l'Area Archeologica Centrale di Roma (funding: World Monuments Fund, American Express)

- **Palazzo Maccarani Stati - Senate of the Italian Republic - Rome - Italy** – 3D laser scanning, architectural measured survey and orthophotos of the Palace.

Client: Private for the Italian Ministry of Infrastructure

- **Church of San Pietro Apostolo, Tramonti - Salerno - Italy** – 3D survey and orthophoto of the floor of the church.

Client: Private

- **Garden of Oranges (Parco Savello) – Rome – Italy.** Topographic and 3D survey of the medieval walls of Rocca Savelli along the walkway Clivo di Rocca Savella and inside the Garden of Oranges, finalized to the archaeological survey of the area.

Client: Sorgente Group SpA

- **Schola of Trajan (seat of the shipwrights guild) - Ostia Antica, Rome – Italy.** 3D survey and orthophoto of ancient Roman mosaics.

Client: Archires Architettura e Restauro srl (a Sorgente Group SpA Company)

- **Villa Adriana – Tivoli – Italy.** 3D survey and orthophoto of the main elevation and two cross sections of the northern side of the archaeological complex.

Client: Private

- **Memorial to the Italian victims of Nazi Concentration Camp, Block 21 – Auschwitz – Poland.** 3D survey and execution drawings for reassembling the memorial in a different site.

Client: CBC s.c. for the Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Mausoleum of Emperor Gallienus, Appia Antica – Rome – Italy.** General measured survey, ortho-photographic survey and graphic reconstruction of the geometry of the structures preserved.

Client: Private for Soprintendenza Speciale per i Beni Archeologici di Roma.

## 2015

- **Conservation works, Trevi Fountain – Rome – Italy.** 3D survey and restitution of the Statue of Oceanus and of the area around the fountain; video extracted from the tridimensional model

Client: Sovrintendenza Capitolina ai Beni Culturali

- **Domus Tiberiana Complex on Palatine Hill – Rome – Italy.** Topographical, measured and orthophoto survey and restitution of all the elevations, sections and plans of the archaeological site.

Client: Soprintendenza Speciale per il Colosseo, il Museo Nazionale Romano e l'Area Archeologica di Roma.

- **Complex on Palatine Hill and Roman Forum – Rome – Italy.** - Topographical, measured and ortho-photographic survey and restitution of all the elevations, sections and plans of the Clivo Palatino area, west from the Arch of Titus.

Client: Soprintendenza Speciale per il Colosseo, il Museo Nazionale Romano e l'Area Archeologica di Roma.

- **Palazzo Orlandi – Busseto (Parma) – Italy.** 3D laser scanning, architectural measured survey and orthophotos of the building.

Client: Archires Architettura e Restauro srl (a Sorgente Group SpA Company)

- **Measures for the conservation of Pasargadae World Heritage Site and of Cyrus' Tomb – Pasargadae – Iran.** Laser scanning and orthophoto of the Tomb of Cyrus the Great and Palace "P"; video extracted from the tridimensional model of Cyrus' Tomb.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Red Monastery – Sohag – Egypt.** 3D survey of the site and restitution of all elevations, sections and plans of the complex; video extracted from the tridimensional model

Client: ARCE - American Research Center in Egypt

- **White Monastery – Sohag – Egypt.** 3D scanning of the north wall of church and deformation analysis of the structures of the facade

Client: White Monastery Conservation Project - Yale University - ARCE - American Research Center in Egypt

- **Villa of Silin – Leptis Magna – Libya.** Studies and 3D reconstruction of the Villa at the time of the archaeological excavation; video extracted from the tridimensional model

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

## 2014

- **Domus Tiberiana Complex on Palatine Hill and Roman Forum – Rome – Italy.** 3D survey of 17,000 square meters of structures and restitution of all the elevations, sections and plans of the archaeological site; video extracted from the tridimensional model

Client: Soprintendenza Speciale per i Beni Archeologici di Roma.

- **Scrovegni Chapel – Padova – Italy.** Three-dimensional measurement of the complex and orthophotographic reproduction of the wall paintings of the crypt.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Conservation Services for the Al Ain Souks and National Museum– Al Ain – United Arab Emirates.** Survey of the National Museum, Sultan Fort and Souks.

Client: ARS Progetti SPA for TCA Abu Dhabi

- **Conservation works, Trevi Fountain – Rome – Italy.** 3D survey and restitution of all the elevations, sections and plans of the fountain; video extracted from the tridimensional model

Client: CBC s.c. for the Sovrintendenza Capitolina ai Beni Culturali

- **Statue of Christ Deposed in the Museum of the Opera Primaziale Pisana – Pisa – Italy.**

Detailed survey of the statue.

Client: Opera della Primaziale Pisana

- **Baptistery of S. Giovanni in Fonte in the Cathedral of Naples – Italy.** 3D survey and restitution of all the elevations, sections and plans of the baptistery.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Church of S. Aspreno – Naples – Italy.** 3D survey and restitution of all the elevations, sections and plans of the hypogeum.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Palazzo Sacchetti - Rome – Italy** – 3D laser scanning of decorated surfaces finalized to their geometrical studies.

Client: Unione Internazionale degli Istituti di Archeologia, Storia e Storia dell'Arte in Roma;

- **Temple of Mut at Gebel Barkal – Karima – Sudan.** 3D laser scanning of collapsing parts and of the new supporting structures at the entrance, after excavation and debris removal.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Restoration of Historical Structures in Education City – Doha – Qatar.** Topographical and 3D laser scanner survey of 20 historical buildings in the premises of the new College.

Client: ARS Progetti SPA for Qatar Foundation

- **Jaser Almaima'ah Gesher Bridge on Jordan River - Israel/Jordan.** Final conservation design of the main arch of the bridge and structural design of the supporting beam of the arch.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Collegio Romano (Headquarter of the Italian Ministry of Cultural Heritage and Activities)- Rome – Italy.** Topographical and measured survey (by laser scanning) of the complex; video extracted from the tridimensional model

Client: Italian Ministry of Cultural Heritage – Direzione Generale

- **Jaser Almaima'ah Gesher Bridge on Jordan River - Israel/Jordan.** Final conservation design of the main arch of the bridge and structural design of the main arch rib.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

## 2013

- **Temple of Mut at Gebel Barkal – Karima – Sudan.** 3D laser scanning of the archaeological site.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **San Michele a Ripa Grande (Headquarter of the Italian Ministry of Cultural Heritage and Activities) - Rome – Italy.** Topographical and measured survey of the eastern wing of the complex.

Client: Istituto Centrale per il Catalogo e la Documentazione – ICCD

- **Villa of Silin – Leptis Magna – Libya.** Laser scanning and photogrammetric survey of the painted surfaces and mosaics of the Villa and generation of sections, elevations and plan in ortho-photographic and vector format.



Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Archaeological complex of the furnaces of Vetriolo - Bagnoregio (VT) – Italy.** Laser scanning of the archaeological site and generation of sections, elevations and plan in RGB color format.

Client: Archeomedia s.c.

- **Church of St. Cecilia in Trastevere – Rome – Italy.** Three-dimensional survey of the tomb of Niccolò Forteguerri.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Church of St. Francesca Romana, Church of St. Clemente, Church of St. Cecilia in Trastevere – Rome – Italy.** Three-dimensional survey of the mosaics of the apses and flat restitution of the surfaces in ortho-photographic format.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Roman Villa of Gneo Pompeo Magno and Villa Doria Park – Albano Laziale (RM) – Italy.** Topographic survey and laser scanning of the roman structures.

Client: Dott. Laurenza for Municipality of Albano Laziale

- **Crypt of the Church of Santa Prisca In Rome - Italy.** 3D photogrammetric survey of wall paintings after conservation works.

Client: Soprintendenza per il Patrimonio Storico Artistico ed Etnoantropologico per il Lazio

## 2012

- **Wall paintings in Bojani Monastery – Bojani – Serbia.** 3D Laser scanning; video extracted from the tridimensional model

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Bac Monastery – Bac – Serbia.** General survey (Laser scanner and total station) ; video extracted from the tridimensional model

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **San Michele a Ripa Grande Complex – Rome.** General survey (Laser scanner, GPS and total station).

Client: Istituto Centrale per il Catalogo e la Documentazione - ICCD

- **Archaeological site in Viterbo – Rome.** 3D Laser scanning.

Client: Archeomedia sc

- **Archaeological Site of S. Clemente – Rome.** 3D Laser scanning.

Client: Istituto Superiore per la Conservazione – ISCR

- **Residential block in the historic town - L'Aquila – Italy -** Rilievo 3D photogrammetric survey of the external elevations and the inner court façades

Client: private

- **Gracanica Monastery – Kosovo.** 3D Laser scanning and photogrammetric survey.

Client: Intersos NGO for US Embassy

## 2011

- **Flavian Amphitheater (Colosseo) – Rome – Italy.** Methodological proposal for the bid "Flavian Amphitheatre - Colosseo: Detailed design and implementation of the conservation of the north and south facades, design and construction of the gates of the fornix of the first order." Proposal for survey methodology and sample of three-dimensional survey of the north side of the façades.

Client: ARS Progetti SPA

- **Studies for the stabilization of the Erbil Citadel slope and the perimeter facades - Erbil – Iraq.** General topographic survey of the Citadel Slope, three-dimensional survey of the Citadel, generation of sections, elevations and plan in ortho-photographic and vector format (Laser scanner, GPS, total station and photogrammetric systems).

Client: ARS Progetti S.P.A. for UNESCO

- **Kahn El Echle - Saida – Lebanon.** Topographic and three-dimensional photogrammetric survey of the Khan.

Client: ARS Progetti S.P.A. for Council for Development and Reconstruction (CDR), Lebanon

- **Church of S. Eligio degli Orefici – Rome - Italy.** 3D Laser scanning and photogrammetric survey.

Client: R.O.M.A. Consorzio

- **Church of S. Maria della Strada – Matrice (Campobasso) - Italy.** 3D Laser scanning and photogrammetric survey.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Jaser Almaima'ah Gesher Bridge on Jordan River (Israel/Jordan).** 3D photogrammetric survey.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Vigna la Piazza Necropolis - Grotte di Castro (Viterbo) – Italy.** N° Vlp 31 Tomb: 3D photogrammetric survey.

Client: Archeomedia sc for Soprintendenza per i Beni Archeologici per l'Etruria meridionale

#### **2010**

- **Zhalan Cemetery and Tomb of Fr. Matteo Ricci – Beijing – China.** 3D photogrammetric survey.

Client: Istituto Superiore per la Conservazione ed il Restauro – Italian Ministry of Foreign Affairs

- **Domus e Mitreo delle Pareti Dipinte - Ostia Antica – Rome – Italy.** 3D photogrammetric survey.

Client: Istituto Superiore per la Conservazione ed il Restauro – ISCR

- **Crypt of the Church of Santa Prisca In Rome - Italy.** 3D photogrammetric survey of wall paintings.

Client: Soprintendenza per il Patrimonio Storico Artistico ed Etnoantropologico per il Lazio

- **Etruscans Water Channel System (*cunicula*) in Veio, Santa Cornelia, Rome - Italy.** General topographic survey.

Client: Tecnoconsult International srl

#### **2009-2008**

- **Church of Bogorodica Ljeviska – Prizren – Kosovo.** 3D survey of wall paintings.

Client: Istituto Centrale per il Restauro (ISCR) – Intersos ONG for UNESCO

- **Patriarchate of Pec-Peja – Pec/Peja – Kosovo.** Photogrammetric survey for the project “Study and investigations about the structural conditions of Patriarchate of Pec-Peja.

Client: Istituto Centrale per il Restauro (ISCR) – Intersos ONG for UNESCO

- **Decani Monastery – Decani – Kosovo.** 3D survey of wall paintings.

Client: Unesco - Istituto Centrale per il Restauro – ISCR – Intersos ONG for UNESCO

#### **2007-2005**

- **Pec Patriarchate – Kosovo.** Coordinator of documentation works for the restoration of wall paintings.

Client: Istituto Centrale per il Restauro (ISCR) – Intersos ONG for Italian Ministry of Foreign Affairs

- **Pec Patriarchate – Kosovo.** Photogrammetric survey of orthodox and byzantine frescoes of the monastery.

Client: Istituto Centrale per il Restauro (ISCR) – Intersos ONG for Italian Ministry of Foreign Affairs

#### **2004**

- **Industrial archaeology site in Viale Fulvio Testi – Milan - Italy.** Survey of the complex and calculation of interior areas of each building.

Client: FINTECNA S.p.A

- **Palazzo Rivaldi at Fori Imperiali – Rome - Italy.** Photogrammetric and measured survey of ground floor rooms finalized to plan the conservation interventions on the XVI century frescoed surfaces.

Client: Istituto Centrale per il Restauro – ISCR

#### **2003**

- **Casa dei Vettii - Pompeii – Italy.** Technical drawings for the design of the new roofing system of the *domus*.

Client: Istituto Centrale per il Restauro – ISCR

- **Villa D'Este – Tivoli (RM)– Italy.** Restoration of the fountain “della Rometta”- Survey of the panoramic viewpoint and hydraulic system of the architectural complex

Client: Istituto Centrale per il Restauro – ISCR

#### **2002**

- **Broadcasting Offices of Bloomberg at Poli Palace, Fontana di Trevi, Rome – Italy.**

Measured survey of historical building's interiors.

Client: Studios Architecture – England

## 2001

- **S. Maria in Aracoeli – Rome - Italy.** Measured and photogrammetric architectural survey of Baylon chapel. Photogrammetric survey of the frescoed surfaces.

Client: Soprintendenza per i Beni Artistici e Storici di Roma

## 2000

- **Upper Basilica of San Francesco – Assisi – Italy.** Digital restitution of the shop drawings of the reconstruction of Giotto's painted vaults.

Client: Istituto Centrale per il Restauro – ISCR

## 1999-2000

- **Villa D'Este – Tivoli (RM) – Italy.** Digital restitution of the decay mapping and conservation design of the fountain “della Rometta”.

Client: Istituto Centrale per il Restauro – ISCR

- **Archaeological Site of Arslantepe - Malatya – Turkey.** Consultancy for the Italian Archaeological mission in Oriental Anatolia for the conservation of the IV millennium B.C. palaces' structures.

Client: Università degli Studi di Roma “La Sapienza”

- **Upper Basilica of San Francesco – Assisi – Italy.** Digital restitution of the decay mapping and the restoration design of Giotto's painted vaults.

Client: Istituto Centrale per il Restauro – ISCR

## URBAN AND ARCHITECTURAL DESIGN

The services encompass urban planning, architecture design, feasibility studies and phasing activities for the rehabilitation projects of property assets, for private clients and public bodies or companies of national and international relevance.

In each planning and research project advanced systems have been studied and utilized on a case-by-case basis, in order to optimize the efficiency of the operation.

Every single project starts with the cultural assumption that each work has its specific social, cultural and environmental context, which results in the specific nature of each site and each intervention to carry out on the physical place. Specific projects deeply grounded to the sites are thus proposed against the tendency of modern planning to homologate designs worldwide, notwithstanding the deep differences among the sites, with the result of distorting the local characteristics and cause a generalized drop in quality, both of places and of life.

### Real Estate Rehabilitation Projects

#### 2008-2009

- **Cattleya Headquarter in Rome – Italy.** Measured survey, works supervision, shop drawings for the roofing system and plant design for the new headquarter of the Cattleya Film production company.

Project founded by: Cattleya S.p.A.

#### 2007

- **Faida Complex in Pontida (BG) – Italy.** Preliminary Design for the rehabilitation design of the historic buildings and adaptive reuse into touristic complex.

Client: Gruppo Ergon Italia

#### 2005

- **Manufactory Complex in Mazzano Romano (RM) – Italy.** Preliminary design for the adaptive reuse of the complex into residential and commercial spaces.

Client: Immobiliare Sviluppo S.p.A.;

#### 2004

- **Tobacco Manufactory Complex in Milan – Italy.** Feasibility study, Preliminary design - reuse of the Tobacco Manufactory Complex in residential and commercial spaces.

Client: Fintecna S.p.A.

#### 2003

- **Exedra Luxury Hotel in Rome – Italy.** Preliminary design of the multipurpose centre in the Terme di Diocleziano in Rome.

Client: Gruppo Ergon Italia for Boscolo Group

- **Tobacco Manufactory C.R.T.S. Complex in Via Ostiense in Rome – Italy.** Feasibility study, Preliminary design, Final and Execution design and Works Supervision – partial adaptive reuse of the complex.

Client: ETI S.p.A. – Ente Tabacchi Italiani

#### 2002

- **Tobacco Manufactory Complex in Piazza G. Da Verrazzano, Rome – Italy.** Feasibility study, Preliminary design – adaptive reuse of the Tobacco manufactory complex into multipurpose centre.

Client: ETI S.p.A. – Ente Tabacchi Italiani

- **Tobacco Manufactory Complex in Milan – Italy.** Feasibility Study, Preliminary Design - reuse of the complex into “Città del Patrimonio Archivistico, Librario e Documentario” e “Città Universitaria” - in joint venture with Regione Lombardia, Archivio di Stato di Milano, Biblioteca Nazionale Braidense, Comune di Milano, Università degli Studi di Milano Bicocca.

Client: ETI S.p.A. – Ente Tabacchi Italiani

### Urban Design

#### 2011-2012

- **Integrated Plan “Open Media Park” - Formello (RM) – Italy.** Urban design for 240,000 cubic meters of new multipurpose buildings.

Client: Tecnoconsult International srl

#### 2010

- **Master Plan “Grottefranca”- Formello (RM) – Italy.** Housing design for n. 560 predicted inhabitants.

Client: Private

## 2009

- **Master Plan “Le Nocette”- Formello (RM) – Italy.** Housing design for n. 120 predicted inhabitants.

Client: Private

## 2007

- **Master Plan “Terre di Ronca”- Formello RM – Italy.** Housing design for n. 160 predicted inhabitants

Client: Private

## 2000-2001

- **Organic development plan of Comune di Premariacco UD – Italy.** Extension of the Master Plan in order to develop the territory respecting environmental-natural and anthropic aspects.

Client: C.P.T. S.r.l. Centro per la Pianificazione Territoriale for Comune di Premariacco (Italy).

## Architectural Design

## 2010-2012

- **Design of “Praticello” Housing Complex – Formello (RM), Italy**

Client: Private

## 2008

- **Preliminary Design of “Selviata” Housing Complex – Formello (RM), Italy**

Client: Pegaris S.r.l.;

- **Design of three housing complexes - Formello (RM) –** The overall 45 units are located in “Selviata”, “Terre di Ronca” and besides the historic town

Client: Santofin S.r.l.;

## 2005-2007

- **Design and Works Supervision of Housing Complex in Via della Villa Formello (RM), Italy.**

Client: Rigamonti Real Estate S.r.l.;

- **Design of a private detached house in “Borgo Piccolo”– Formello (RM), Italy**

Client: Private

- **Feasibility Study and Preliminary Design for the rehabilitation of a car park in Viale Regina Margherita, Rome, Italy - 5000 sqm**

Client: Sidera Real Estate S.r.l.;

- **Feasibility Study and Preliminary Design for the rehabilitation of a car park in Via Nizza, Rome, Italy - 5000 sqm**

Client: Private.;

- **Design and Works Supervision of a detached house in Campagnano (RM), Italy**

Client: Private;

- **Design of n. 4 headquarters of companies in the manufacturing-directional area of the town - Formello (RM) - Italy**

Clients: GE.RO. S.r.l., Masper Police S.r.l., Buccali S.r.l., Sunshop s.r.l.;

- **Design of Office Building in Via di Santa Cornelia Formello (RM), Italy – 15.000 sqm**

Clients: GE.RO. S.r.l.,

## 2004

- **House design in Ponte di Nona, Rome, Italy.**

Client: Private

## 2003 - 2005

- **Boscolo Group “Exedra Luxury Hotel”– Rome - Italy.** Final and detailed design of the multipurpose center and Beauty Farm in the exedra of the Terme di Diocleziano in Rome

Client: Ergon Group Italia

## 2002

- **Private palace in Corso Vittorio Emanuele III, Farnese (VT), Italy.** Survey and preliminary design for the adaptive reuse of the building.

Client: Private

## 2001

- **Multipurpose and residential complex in Premariacco (UD) – Italy –** The building includes: private housing, assisted housing for elderly people, public spaces, commercial area, hotel services, conference rooms, etc.

Client: CER Progetti S.r.l.;

## 1999

- **Design of a Multifunctional Centre specialized in housing and care of elderly people and social services - Campagnano (RM) - Italy.**

- **Residential Complex in the Archaeological Area of “Celle” - Pozzuoli (Na) – Italy.** Rehabilitation design of the abandoned complex.

Client: private.

## 1997-1998

- **Conservation and interior design of an agricultural and residential village, composed by N. 7 independent units in Le Nocette - Formello (RM) - Italy**



## TRAINING AND LECTURES

On top of the constant commitment in the field of applied research, our technicians carry out training activities in national as well international contexts. Courses and lessons address topics as documentation and use of advanced technologies for surveying and conservation purposes. In particular, the CEO held the following courses:

### 2019

#### **International Training Project (ITP) at the “Istituto Superiore per la Conservazione ed il Restauro” - Rome – Italy**

Training Course “Techniques and instruments for 3D documentation and three-dimensional properties” - Title of the lectures: “*Laser scanner and APR technology for the survey of Cultural Heritage*”.

Client: Istituto Superiore per la Conservazione ed il Restauro - ISCR.

### 2018

**International Training Project (ITP) at the “Istituto Superiore per la Conservazione ed il Restauro” - Rome - Italy** - Training Course “Techniques and instruments for 3D documentation and three dimensional properties”, countries Georgia - Egypt. Title of the lectures: “*Laser scanner for architecture: scanning, aligning and inserting control points. Case studies*”.

Client: Istituto Superiore per la Conservazione ed il Restauro - ISCR.

### 2017

**Lectures at RE-ART - Course “Il cantiere di Restauro” - Title of the lectures: “Tecnologie avanzate per il rilievo. Advanced technologies for surveying”.**

Client: Centro Studi Turistici - Firenze.

### 2005-2019

**Lectures on advanced technologies for surveying and documentation for Cultural Heritage at the “Istituto Superiore per la Conservazione ed il Restauro” - Rome - Italy.**

Client: Istituto Superiore per la Conservazione ed il Restauro - ISCR.

### 2012

#### **Project for the establishment of the Central Institute for the Conservation in Belgrade – CIK**

Title of the lectures: “*Control Survey – 3D Laser Scanning - Data Collection*” - course “*Architectural Heritage Conservation*” in the Central Institute for Conservation in Belgrade.

Project founded by: Italian Development Cooperation, Italian Ministry of Foreign Affairs - Istituto Superiore per la Conservazione ed il Restauro (ISCR)

### 2011

#### **Project for the establishment of the Central Institute for the Conservation in Belgrade – CIK**

Title of the lectures: “*Documentation for Conservation - Graphical Documentation*” - course “*Architectural Heritage Conservation*” in the Central Institute for Conservation in Belgrade

Project founded by: Italian Development Cooperation, Italian Ministry of Foreign Affairs - Istituto Superiore per la Conservazione ed il Restauro (ISCR)

### 2008

#### **Project of development of the Centre for Restoration of the Monuments in Tirana within the Institute for Monuments of Culture of Albania**

Title of the lectures: “*Drawing, Survey and Documentation - Advanced Course of Autocad*”

Project founded by: UNESCO

### 2006-2017

**Lectures on advanced technologies for surveying and documentation for cultural heritage at the “Istituto Superiore per la Conservazione ed il Restauro” – Rome – Italy.**

Client: Istituto Superiore per la Conservazione ed il Restauro (ISCR).

*In compliance with the GDPR and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document.*

Rome, January 2022



C.P.T. Studio S.r.l.

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## Archaeological site survey

*Ostia Antica, Rome, Italy - Theatre - Architectural and archaeological survey by laser scanner and photogrammetric systems. 2020*

The Theatre in the Ostia Antica site was entirely surveyed using the integration of topography, laser scanning and photogrammetric systems.

In order to describe all the parts of the monument, we produced 54 orthophotographic and cad sections and 3 plans.

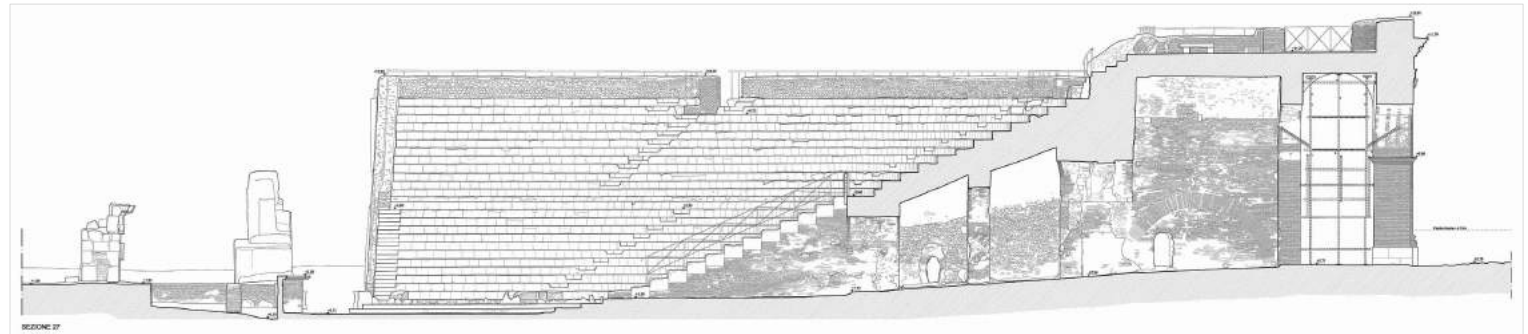
During the field work we used a phase shift laser scanner, high resolution cameras and drones for detailed three-dimensional surveys.

### Notes:

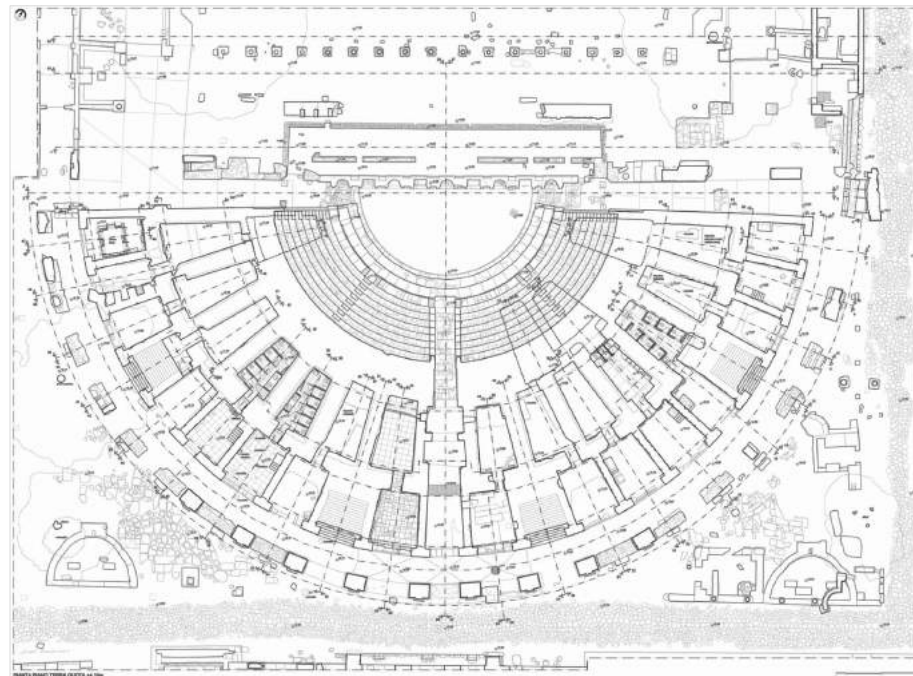
- Objective of the assignment: Architectural and archaeological survey with topographic, scanner laser and photogrammetric systems;
- Client: Parco Archeologico di Ostia Antica.



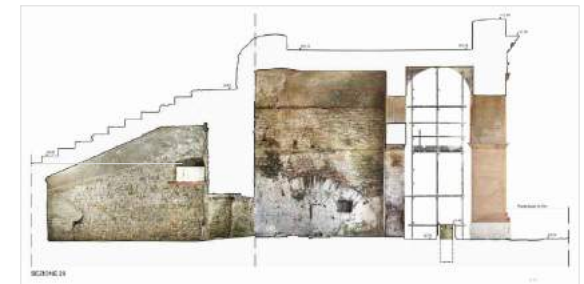
1



2



3



4



5

Orthophotographic elevation of the cavea 1:50 scale 1

Section of the monument 1:50 scale 2

Plan of the monument quote +4.10m, 1:50 scale 3

Orthophotographic section 1:50 scale 4

Photography realized during the drone flight 5





## Archaeological site survey

Ostia Antica, Rome, Italy - Sacred Area of the Republican Temples - Temple of Hercules and temple of the Round Altar - Georeferenced survey with laser scanner 3D and photogrammetry. 2020

The survey of the Temple of Hercules and temple of the Round Altar was preliminary to the conservation of the ancient structures.

We carried out a georeferenced topographic survey of the site and the architectural and archaeological survey of the temples.

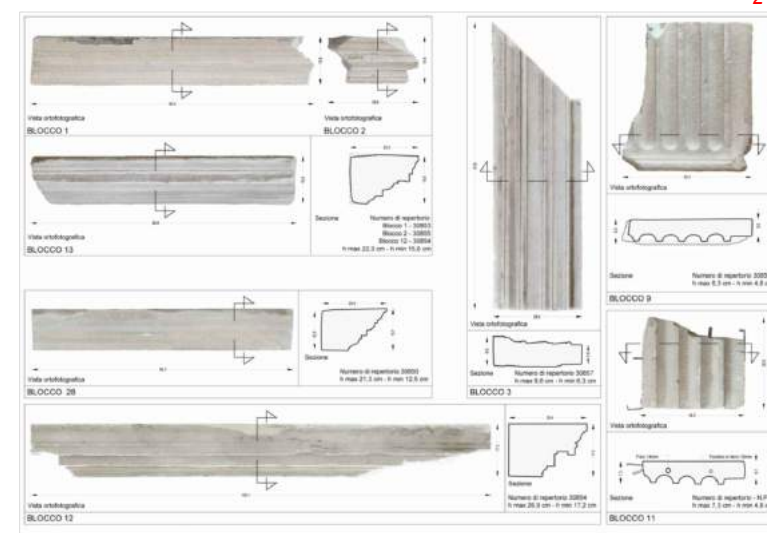
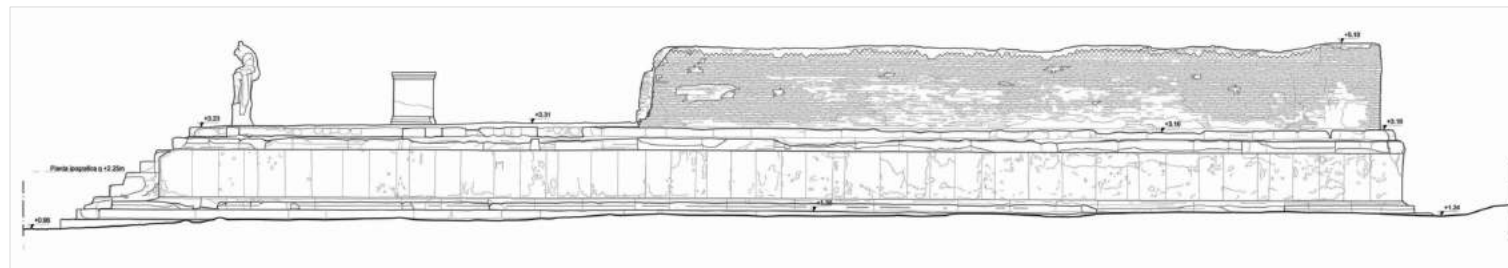
We produced orthophotographic and cad drawings of both temples in 1:50 and 1:20 scale and a study of all the ancient sewer tunnels in the area.

The altars and architectural remains were surveyed and catalogued on sheet in 1:10 scale.

Using the best topographic, laser and photogrammetric technologies, we reached the most detailed results.

### Notes:

- Objective of the assignment: Georeferenced survey with laser scanner 3D;
- Client: Parco Archeologico di Ostia Antica.



Cad elevation of the temple of Hercules, 1:20 scale 1

Orthophotographic elevation of the temple of Hercules 2

View of the 3D model of the site 3

Abacus of the architectural remains, 1:10 scale 4



## Architectural survey - Integrated survey technology

Rome, Italy - Palazzo Nardini - Three-dimensional survey and detailed drawings of the complex named Palazzo Nardini in Rome. 2021

The complex of buildings named Palazzo Nardini is located next to Piazza Navona, along via del Governo Vecchio. Its 15th century's structures are the result of many modifications had along the centuries.

The survey started with a topographical net. We also used two laser scanners and a drone to reach the higher parts of the buildings.

### Notes:

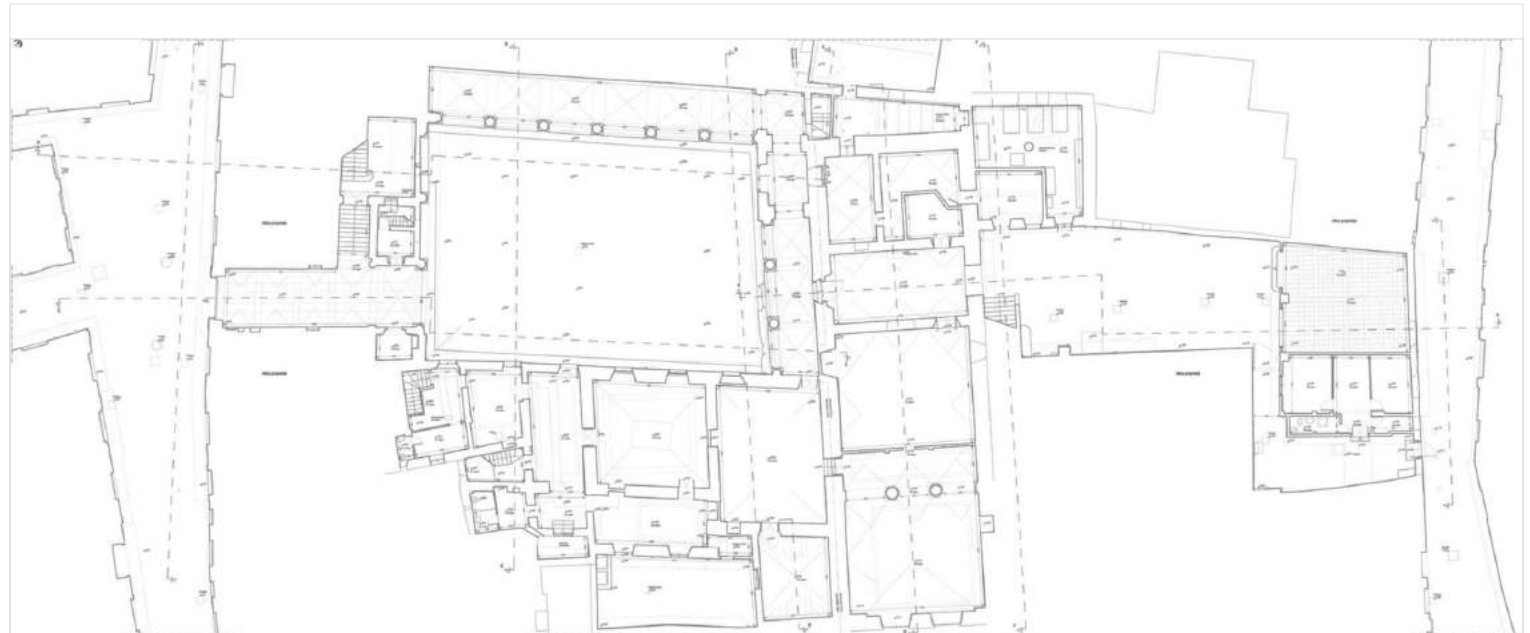
- Objective of the assignment: Three-dimensional survey and detailed drawings of the building named Palazzo Nardini in Rome, via del Governo Vecchio;
- Client: private.



1



2



3

Elevation of the palace on via del Governo Vecchio, 1:50 scale 1

Cross section of the palace, 1:50 scale 2

Plan of the complex between via del Governo Vecchio and via della Fossa, 1:50 scale 3





## Architectural survey - Integrated survey technology

Rome, Italy - The National Roman Museum - Crypta Balbi  
Three-dimensional laser scanning and topographic survey and restitution of cad elevations, sections and plans. 2021

Crypta Balbi is one of the locations of The National Roman Museum. It is a complex made of ancient, medieval and modern structures and remains.

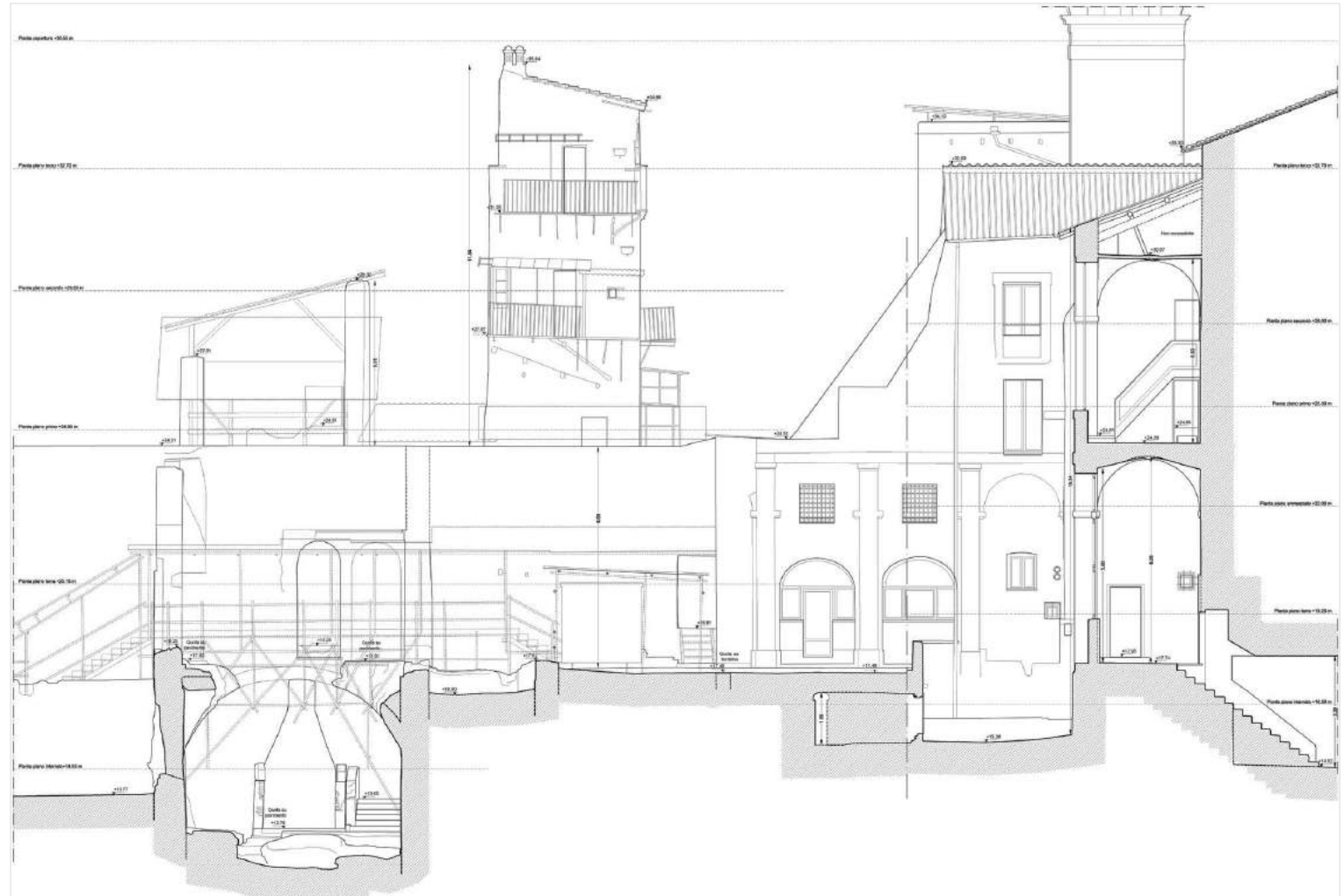
The survey was the first step of a project of restoration of the buildings.

The entire block has been described by cad plans, sections and elevations at 1:50 scale.

We used an high resolution drone to survey the highest structures and roofs.

### Notes:

- Objective of the assignment: Three-dimensional laser scanning and topographic survey and restitution of cad elevations, sections and plans;
- Client: The National Roman Museum, Crypta Balbi.



Cross section of the complex, 1:50 scale 1

Picture of the archeological area made during the drone flight 2

View of the 3D model of the complex 3

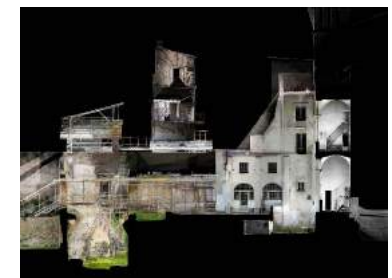
Cross section of the point cloud, 1:50 scale 4



2



3



4





## Architectural survey - Integrated survey technology

Valmontone (RM), Italy - Doria Pamphilj Palace -  
Seismic Risk Assessment by three-dimensional laser  
scanning and topographic survey and restitution of  
cad elevations, sections and plans and cracking  
pattern. 2021

The Doria Pamphilj Palace in Valmontone was  
surveyed in order to produce scale 1:50 drawings. The  
drawings were used as a basis for the structural  
diagnosis and consolidation design. All elevations and  
sections contain the crack pattern on the walls. The  
plans were enriched with the information about the  
underlying floor walls' position in order to support the  
structural diagnosis.

The high quality of the scans allowed also to produce  
a ceiling orthophotographic plan of the first floor, which  
is decorated with very interesting frescoes.

The survey of the higher parts of the building was  
carried out with a drone.

### Notes:

- Objective of the assignment: Seismic Risk Assessment by three-dimensional laser  
scanning and topographic survey and restitution of cad elevations, sections and plans and  
cracking pattern;

- Client: Ministero per i Beni e le Attività Culturali e per il Turismo - Soprintendenza  
Archeologia Belle Arti e Paesaggio per l'area metropolitana di Roma, la Provincia di Viterbo  
e l'Etruria meridionale.

Plan of the ground floor of the palace, 1:50 **1**

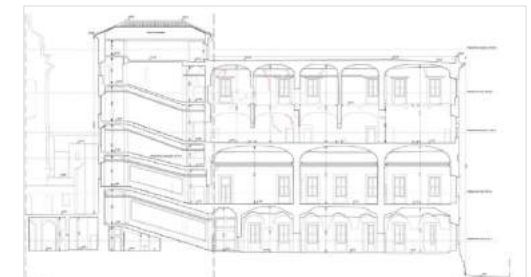
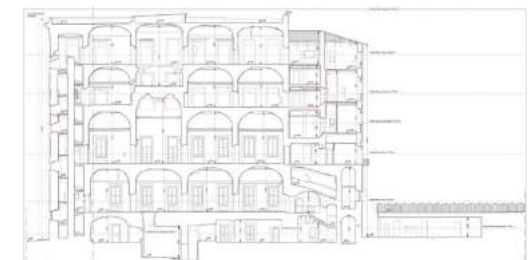
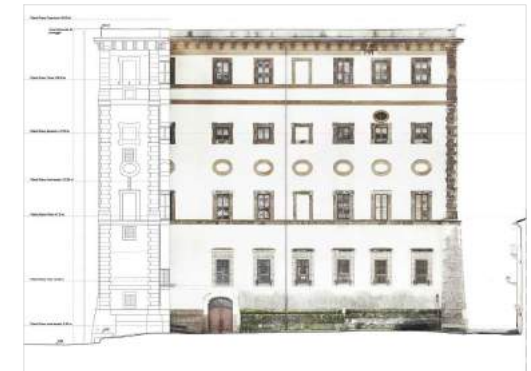
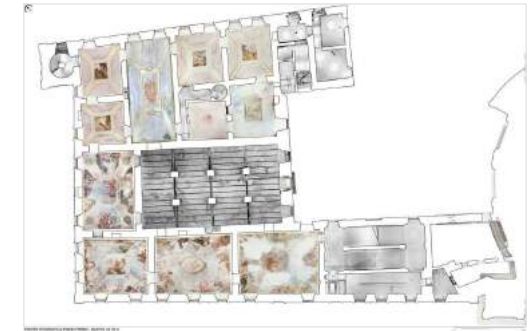
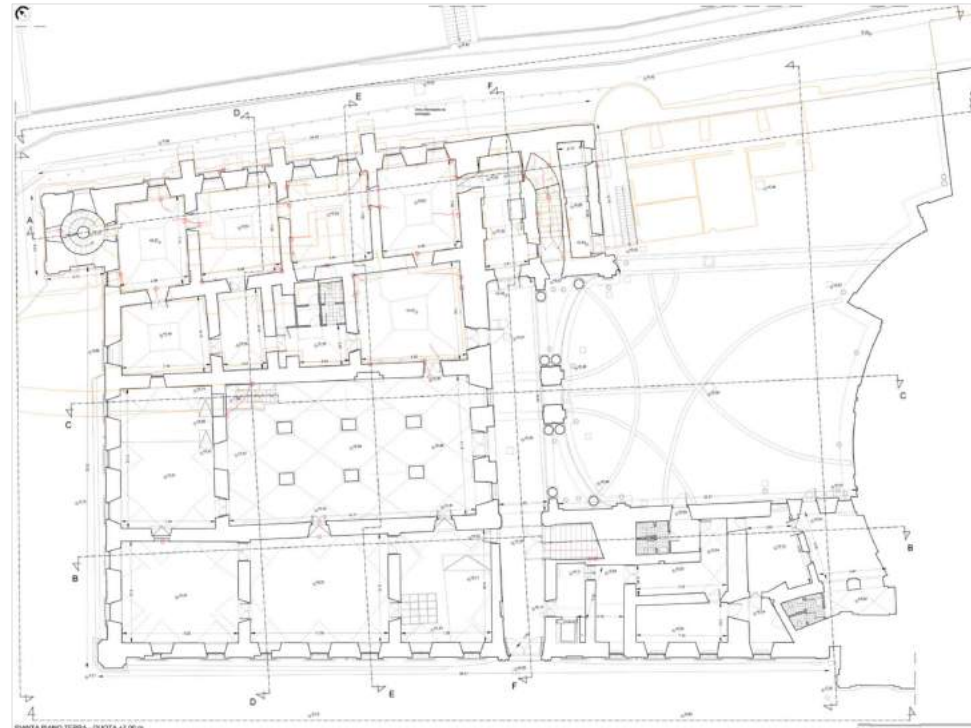
Orthophotographic elevation of the palace, 1:50 **2**

Orthophotographic ceiling plan of the first floor, 1:50 **3**

Orthophotographic and cad drawing of the NW elevation, 1:50 **4**

Cross section of the northern wing of the palace, 1:50 **5**

Cross section of the southern wing of the palace, 1:50 **6**



## Architectural survey - Integrated survey technology

Rome, Italy - Palazzo ex INPS in piazza Augusto Imperatore. Three-dimensional survey and cad drawing of the elevations. 2021

The three-dimensional architectural survey of the building was mainly focused on the facades. We used an integrated system of technologies to create an high-resolution three-dimensional model. From the 3D model we extracted the basis for the cad drawings of the elevations and plans. All the cad drawings were used for the conservation design of the building.



### Notes:

- Objective of the assignment: Three-dimensional survey and cad drawing of the elevations;
- Client: private.

Elevation of the building on piazza Augusto Imperatore, 1:50 1  
scale

3D view of the model 2





## Architectural survey - Integrated survey technology

Rome, Italy - Roman Forum - Arch of Septimius Severus - Three-dimensional laser scanning survey, restitution of orthophotographic and cad elevations, sections and plans and condition mapping drawings. 2020

The Arch of Septimius Severus was surveyed using an integrated technology that involves photogrammetric, laser scanning and topographic systems.

We produced scale 1:50 plans, orthophotographic sections and elevations and CAD drawings.

The condition mapping was useful in view of the conservation interventions.

Using two different photogrammetric drones, we took high resolution photos of all the surfaces of the monument. The condition mapping was carried out using the overlay of the orthophotographic and cad drawings directly on CAD.

### Notes:

- Objective of the assignment: Three-dimensional laser scanning survey, restitution of orthophotographic and cad elevations, sections and plans and condition mapping drawings;
- Client: Parco Archeologico del Colosseo.

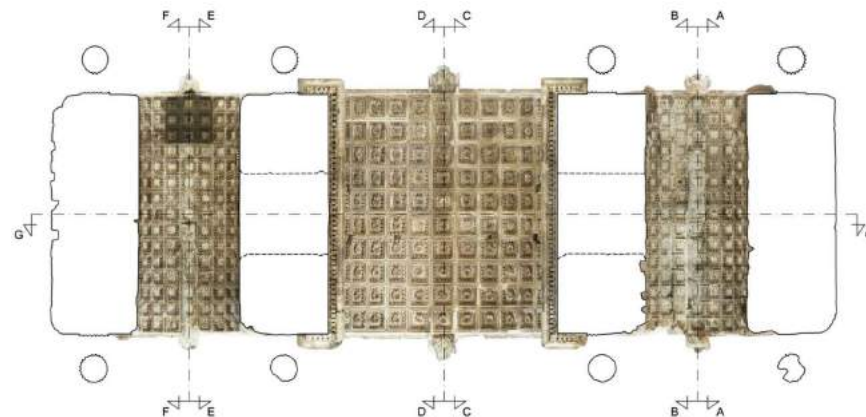
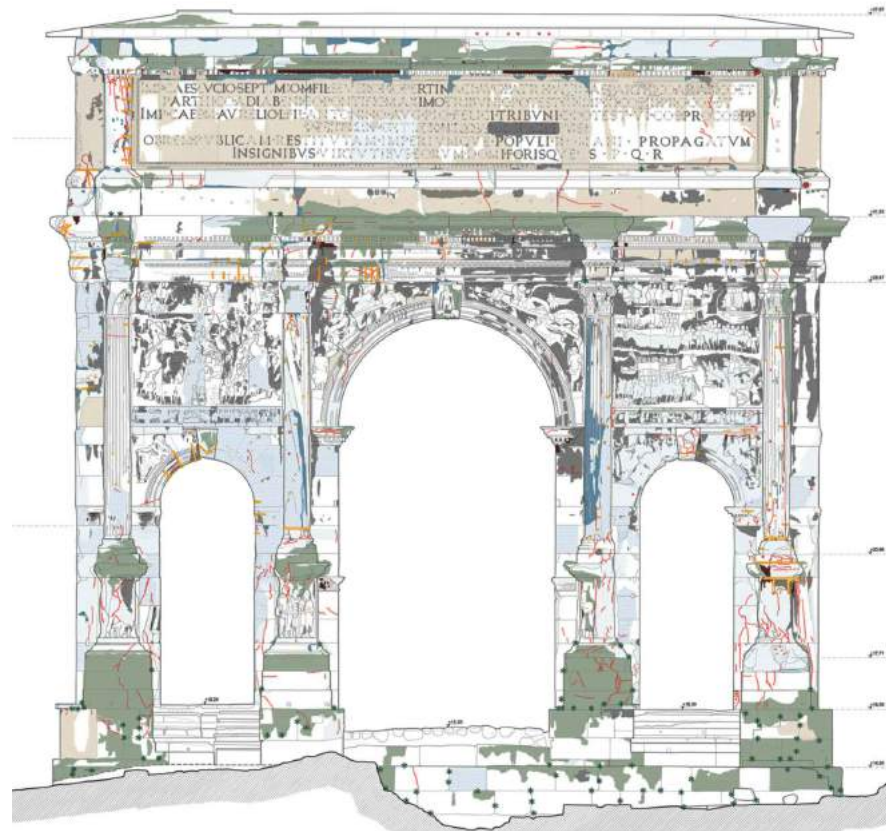
South-east elevation and condition mapping 1

Orthophotographic reflected ceiling plan 1:50 2

Detailed photo produced by drone 3

Detailed photo produced by drone 4

Drone flying during the field work 5



3



4



5



## Architectural survey - Integrated survey technology

Sohag, Egypt - White Monastery - Three-dimensional survey of the church and archaeological areas. 2019

Inside the White Monastery is located a byzantine three nave church with a triconch sanctuary.

The entire building and surrounding archaeological areas were surveyed. Plans, sections and elevations CAD drawings, orthophotographic images and digital drawings were produced (about 11.000 sq m of plans and 26.600 sq m of sections). They were exported by a 3D model of the building made integrating the use of a 3D laser scanner, topographical surveys and a three-dimensional photogrammetric system.

We produced two orthophotographic abacuses: one of the niches (1:20 scale) and one of the spolia hieroglyphic blocks (1:10 scale).

We also examined the geometry of the perimetral walls of the monastery, carrying out a deformation analysis.

### Notes:

- Objective of the assignment: Three-dimensional survey of the church and archaeological areas of the White Monastery (Sohag, Egypt);
- Client: Yale in Egypt - Yale Monastic Archaeology Project (South).

Section of the church; **1**

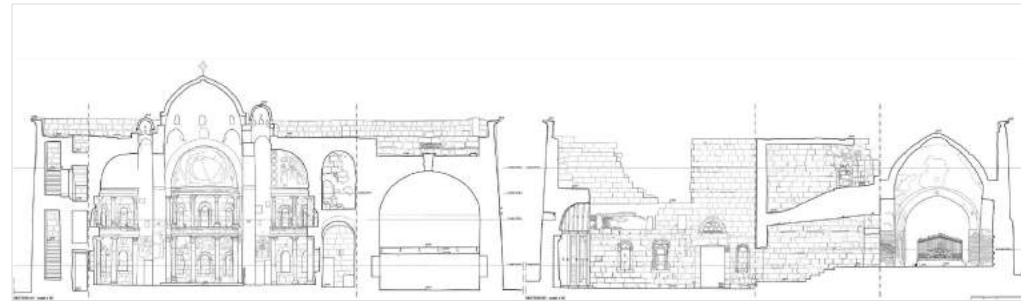
Deformation analysis; **2**

Detail of an orthophotographic section of the church; **3**

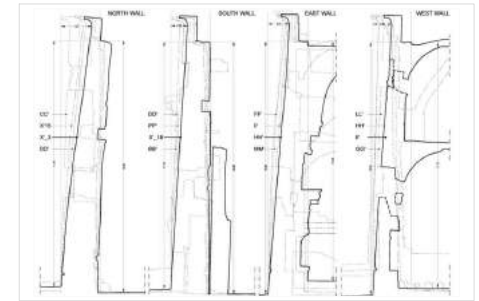
Detail of a niche; **4**

Cutaway perspective view of the church; **5**

Cutaway perspective view of the triconch. **6**



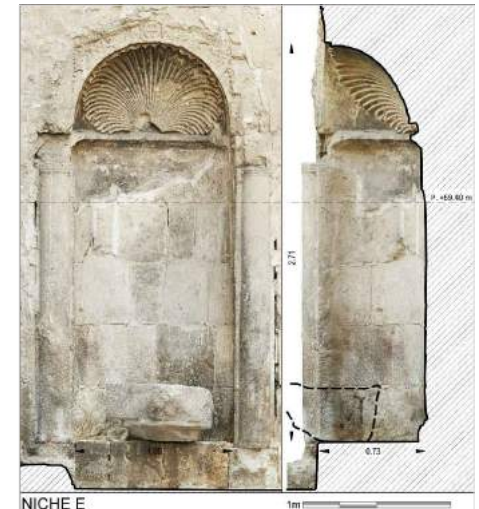
**1**



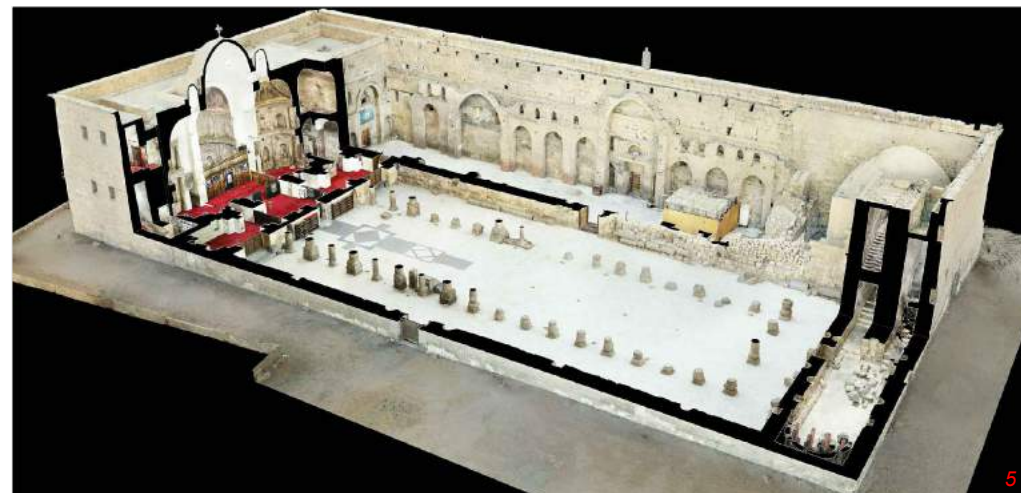
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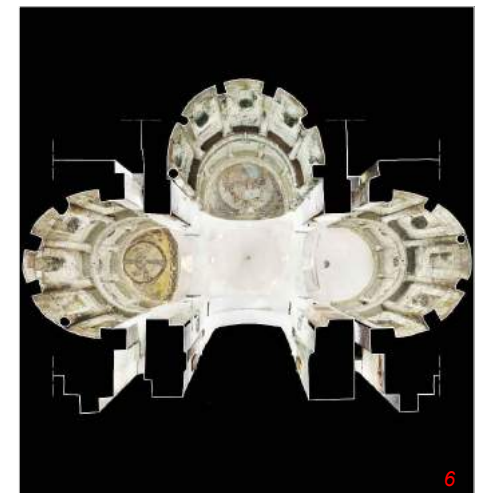
**3**



**4**



**5**



**6**



## Archaeological site survey

Sohag, Egypt - White Monastery - Three-dimensional survey of the church and archaeological areas. 2019

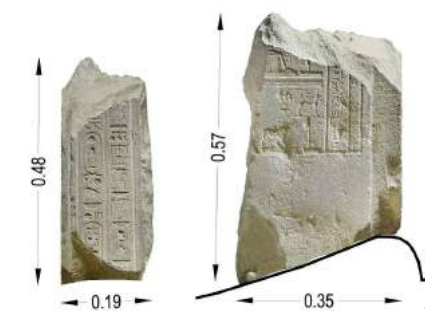
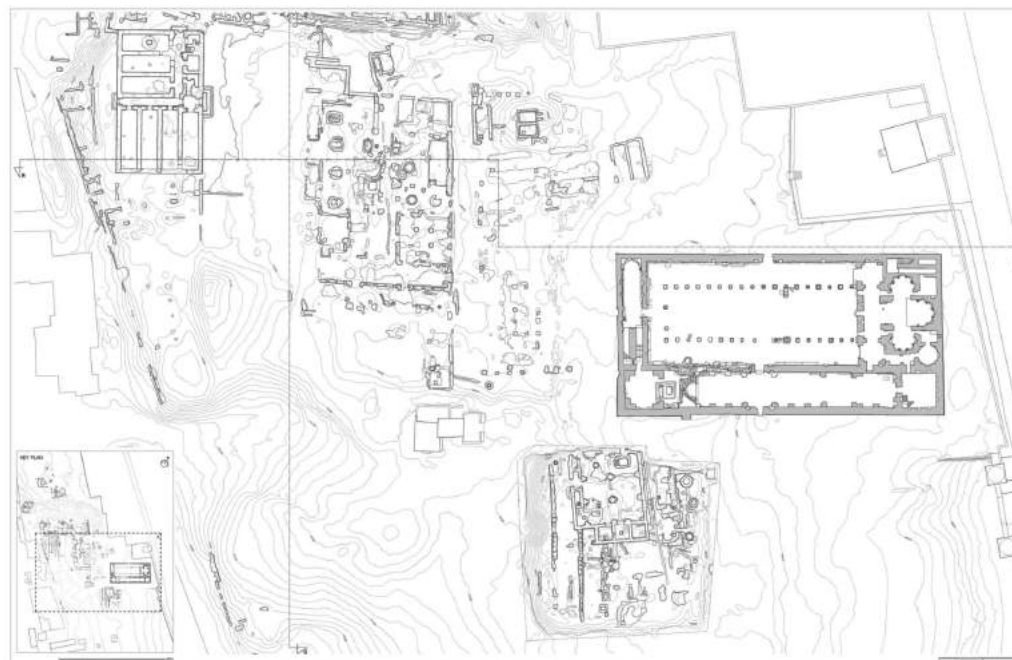
We surveyed the entire extension of the White Monastery archaeological area (about 55.000 sq m).

We produced general and detailed drawings from the 1:200 scale to a 1:10 scale.

An integrated system of technologies was used for the generation of a high-resolution three-dimensional model, from which all the graphic and orthophotographic drawings were extracted.

### Notes:

- Objective of the assignment: Three-dimensional survey of the church and archaeological areas of the White Monastery (Sohag, Egypt);
- Client: Yale in Egypt - Yale Monastic Archaeology Project (South).



Excerpt of the general orthophotographic site plan; 1

Detail of a hieroglyphic block; 2

Detail of a hieroglyphic block; 3

Detail of an orthophotographic section of the area; 4

Field survey; 5

3D model of the archaeological area; 6

3D model of the archaeological area. 7





## Three-dimensional and ortophotographic survey

Rome, Italy - Capitoline Museums - Palazzo dei Conservatori - Sala dei Capitani - Ortophotographic survey of the frescoes. 2020

We produced a detailed three-dimensional and orthophotographic survey of the "Sala dei Capitani" in the Capitoline Museums.

The aim of the survey was to produce four high resolution orthophotographic elevations of the painted walls and statues for the conservation design of the hall.

The orthophotographic images have a resolution of 1:1 scale.

For the field survey we used a phase shift laser scanner and a high resolution camera for detailed three-dimensional photogrammetric surveys.

### Note:

- Objective of the assignment: Three-dimensional survey and orthophotographic restitution of the frescoes;
- Client: CBC Conservazione Beni Culturali Soc. Coop.

Orthophoto of the painting "La battaglia del ponte Regillo" 1

Flat view of the 3D model of the room 2

Detail of the painting "Orazio Coclite al ponte Sublicio" 3





## Three-dimensional and orthophotographic survey

Archaeological area of the San Vincenzo al Volturno Monastery, Castel San Vincenzo (IS), Italy -  
Three-dimensional and orthophotographic survey of the frescoes of the Epiphanius abbot's crypt. 2021

The Epiphanius abbot's crypt contains precious frescoes dated to the early Middle Ages.

We carried out the 3D laser scanner and orthophotographic survey of the frescoes and the flat orthophotographic reproduction of the painted surfaces in order to produce the basis for the conservation mapping and project.

### Notes:

- Objective of the assignment: Three-dimensional survey with the purpose of the securing and restoration of the frescoes of the Epiphanius abbot's crypt inside the archaeological area of the San Vincenzo al Volturno Monastery;

- Client: Ministry of Culture, Soprintendenza Archeologia Belle Arti e Paesaggio del Molise.

Flat orthophotographic reproduction of the frescoes, 1:5 scale **1**

Laser scanner working in the archaeological area **2**

Photogrammetry equipment inside the crypt **3**

Color checker on the frescoes for the images' regulation **4**



## Three-dimensional and orthophotographic survey

Rome - Church of Santa Maria della Pace - Chigi Chapel - Three-dimensional and orthophotographic survey. 2019

The Chigi Chapel is a Raphael work and has an elevation of about 11 metres.

The survey was realized before the restoration works in order to have an high resolution orthophotographic reproduction of the surfaces and the best color rendering.

On field we used a phase shift laser scanner, an high resolution camera and two professional photographic lamps.

The acquisition was realized with a 4 pixel/mm<sup>2</sup> resolution.

### Notes:

- Objective of the assignment: Three-dimensional and orthophotographic survey;
- Client: Forcellino restauri.

Orthophotographic and cad elevation of the cavea 1:50 scale **1**

Orthophotographic plan of the monument 1:50 scale **2**

General site plan 1:50 scale **3**

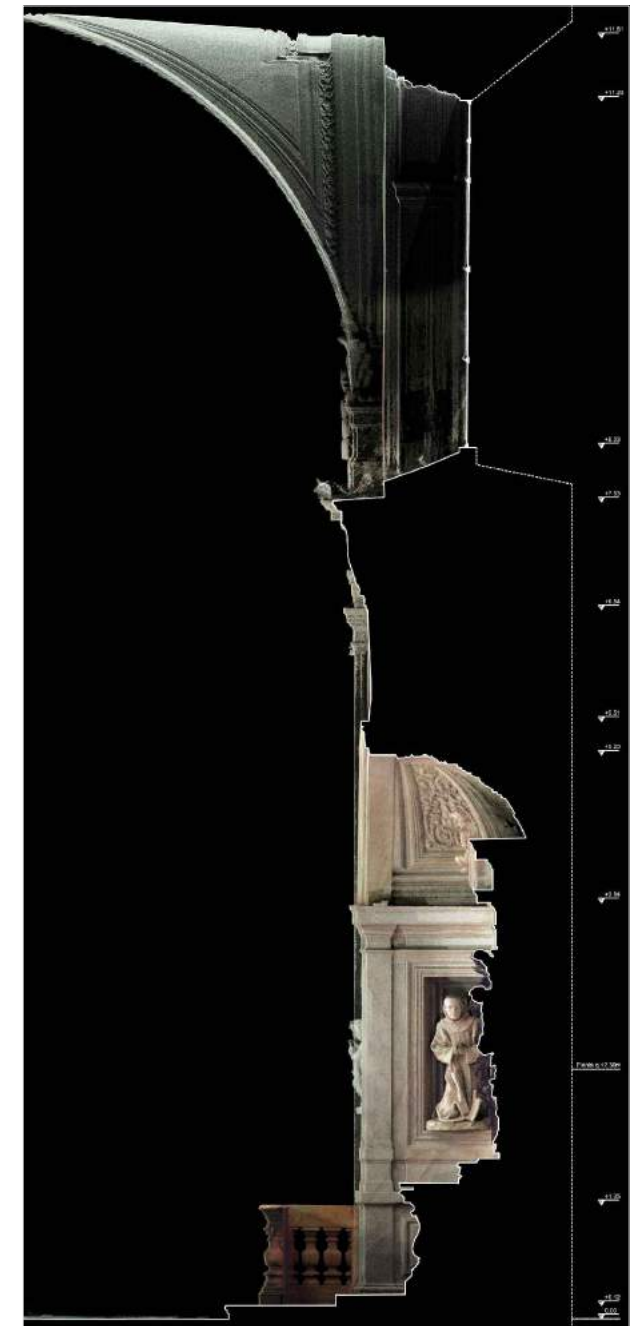
Plan of the monument quote +4.10m, 1:50 scale **4**

Photography realized during the drone flight **5**

Drone flying during the field work **6**



**1**



**2**





## Architectural survey - Integrated survey technology

Tuscania (VT) - Church of Saint Peter and Palazzo dei Canonici - Support in the design of the new setting of the painted fragments' room in the Palazzo dei Canonici. 2019

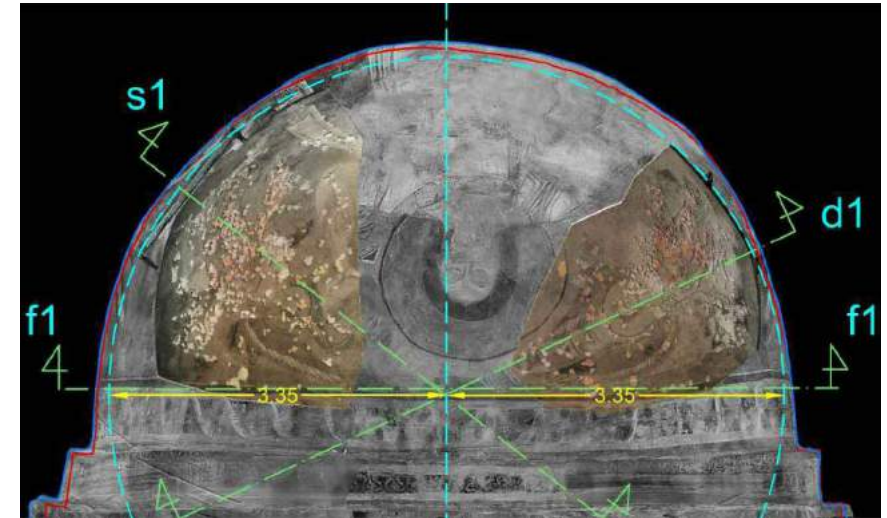
The scope of service was:

- the 3D survey of the Palazzo dei Canonici building;
- the 3D survey of the apse of the church;
- the 3D modeling of the design elements;
- the support in the design of the setting of the room.

A very interesting side of the work was the geometrical study we conducted on the two parts of the apse, collapsed in the 1971 earthquake. The study was necessary for the modeling of the parts in order to plan the new positioning of them and the design of their supports.

### Note:

- Objective of the assignment: Support in the design of the new setting of the painted fragments' room in the Palazzo dei Canonici.;
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro.

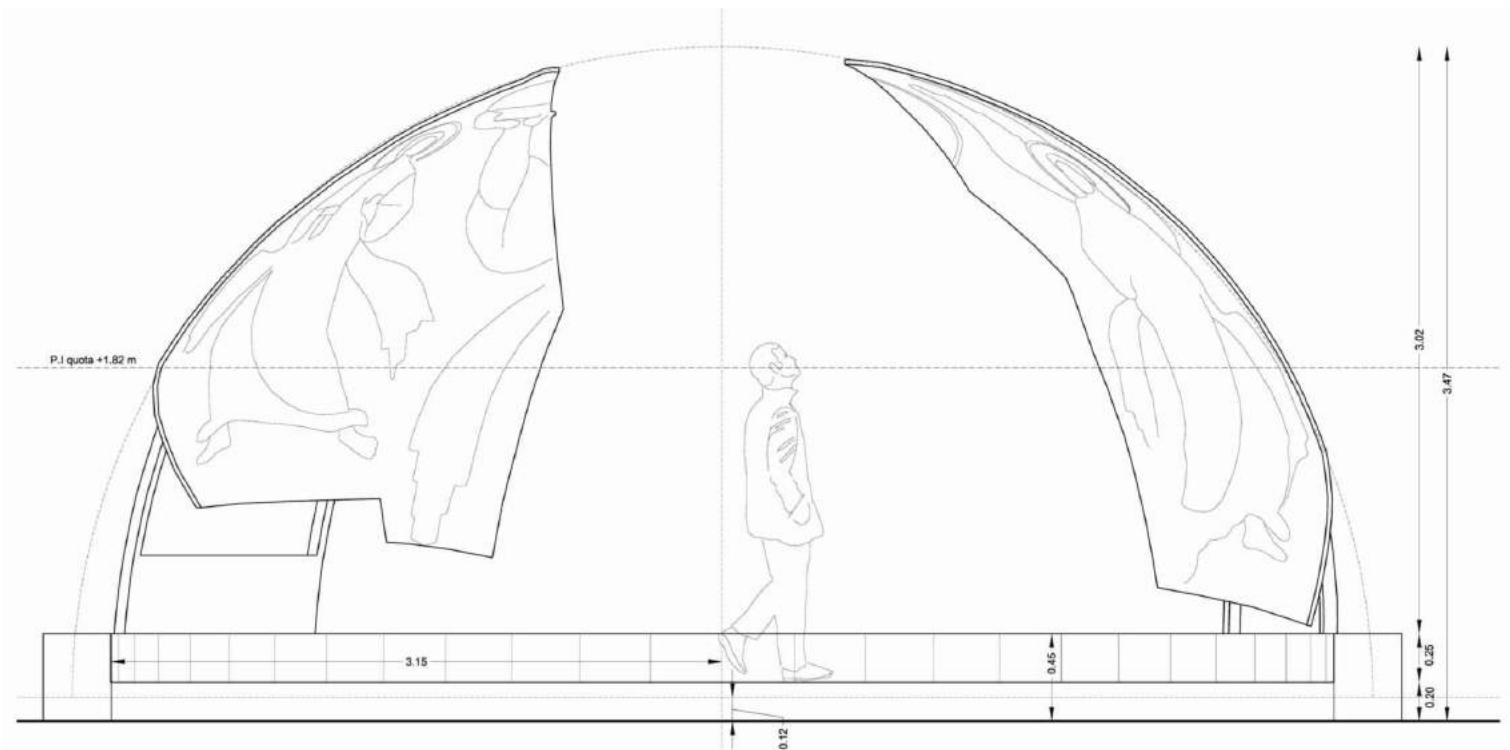


Section of the Palazzo dei Canonici 1

Section of the Palazzo dei Canonici 2

Ceiling plan of the 3D model of the apse 3

Project of the positioning of the apse parts 4





## Three-dimensional and orthophotographic survey of the paintings

Venice - Gallerie dell'Accademia - Vittore Carpaccio's  
Saint Ursula Cycle - Orthophotographic survey of the  
paintings. 2016

For the conservation programme of the Saint Ursula cycle by Vittore Carpaccio we produced a detailed three-dimensional and orthophotographic survey of the paintings of the room. The aim of the survey was to obtain an high resolution orthophotographic reproduction of the paintings and the best color rendering, to be used as a basis for the study of the paintings and for the documentation of conservation works. The orthophotographic images had a resolution of 1:1 scale.

For the field survey we used a phase shift laser scanner and a high resolution camera for detailed three-dimensional photogrammetric surveys.

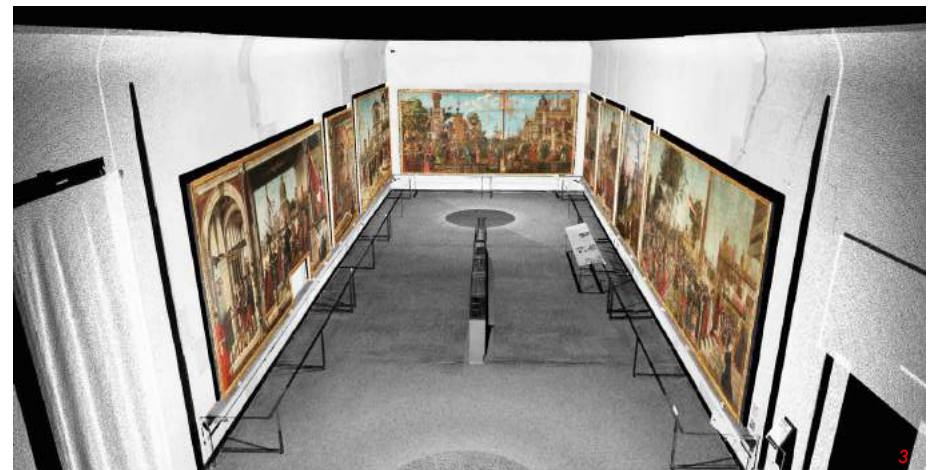
Note:  
- Client: SAVE VENICE Inc.



Orthophoto of the painting "Ritorno degli ambasciatori alla  
corte inglese" 1

Detail of the orthophoto 2

View of the 3D model of the room 3





## Three-dimensional and orthophotographic survey

Pisa - Italy - Cristo Deposto - Museo dell'Opera del Duomo

2014

In October 2014 we carried out the survey and graphic restitution of the wooden sculpture of the Cristo Deposto, dating from the 12th century. It is stored in the Museo dell'Opera del Duomo of Pisa, which planned a new museum set-up and conservative restoration interventions on the sculpture. We made a three-dimensional model of the sculpture, from which all the drawings were produced: front, lateral and back elevations, orthophotographic images and drawings.

An altitude analysis was also conducted to highlight the various elements that make up the wooden sculpture.

### Notes:

- Subject appointed: CPT Studio and Chief Executive - Arch. Pietro Gasparri;
- Client: MIBACT - ISCR - Istituto Superiore per la Conservazione ed il Restauro

Orthophotographic frontal view 1

Orthophotographic detail of the sculpture 2

Point cloud 3D model 3

Field survey - laser scanning and photogrammetry 4



## Survey of historical buildings damaged

Mosul, Iraq - Al Tahera Church and Al Aghawat Mosque - Architectural and topographic survey for the restoration of the buildings. 2021

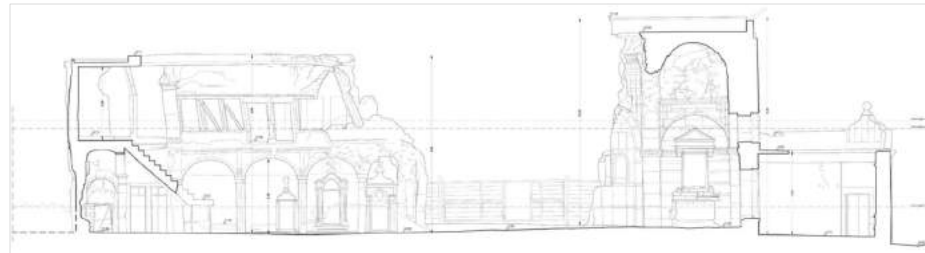
The survey of these monuments is part of UNESCO's project called "Reviving the Spirit of Mosul". The project aims to reconstruct the historic landmarks of the old city destroyed during the IS occupation.

We produced scale 1:50 plans, orthophotographic sections and elevations and CAD drawings.

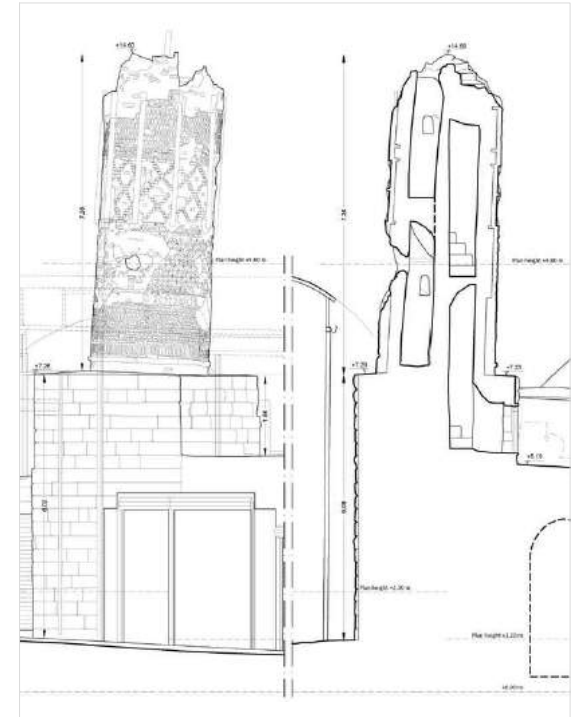
The survey was particularly accurate in order to describe and measure the remains of the destroyed parts of the structures.



1



2



3

Notes:  
- Objective of the assignment: Three-dimensional laser scanning, topographic and photogrammetric survey and restitution of orthophotographic and cad elevations, sections and plans;  
- Client: A.R.S. Progetti s.p.a. for UNESCO.

Internal view of the Al Tahera church after the destruction 1

Cross section of the cloister, nave and narthex of the church 2

Elevation and cross section of the Al Aghawat minaret 3

Orthophotographic section of the Al Aghawat mosque 4



4



## Survey of historical buildings damaged by an earthquake

Amatrice, Rieti - Civic Museum "Cola Filotesio" -  
Earthquake of August 2016 - Three-dimensional laser  
scanning, terrestrial and aerial imaging and 3D  
mapping, topographic survey of the ruins of the tower  
and Museum 2017.

Further to the earthquakes that struck central Italy  
between 2016 and 2017, we undertook the survey of  
some deeply damaged historical buildings. The Civic  
Museum of Amatrice is one of the most significant  
buildings among those devastated by the earthquake.

The survey carried out in 2017 had the main purpose  
of providing a precise and complete basis for safety  
interventions on the tower and on the building. The  
greatest difficulty in carrying out the work was linked to  
the inaccessibility of the area, due to safety reasons.  
Thus, the most advanced technologies have been used,  
to remotely survey the site with absolute  
precision. In addition to two phase-difference laser  
scanners, 3D and topographic photogrammetric  
systems, we used two photogrammetric drones, one  
of which has been programmed and driven to  
penetrate unsafe buildings without any danger for the  
operators.

### Notes:

- Client: MIBACT - Soprintendenza Archeologica Bello Arti e Paesaggio per le Province di  
Frosinone, Latina e Rieti.

Orthophotographic elevation of the south side; 1

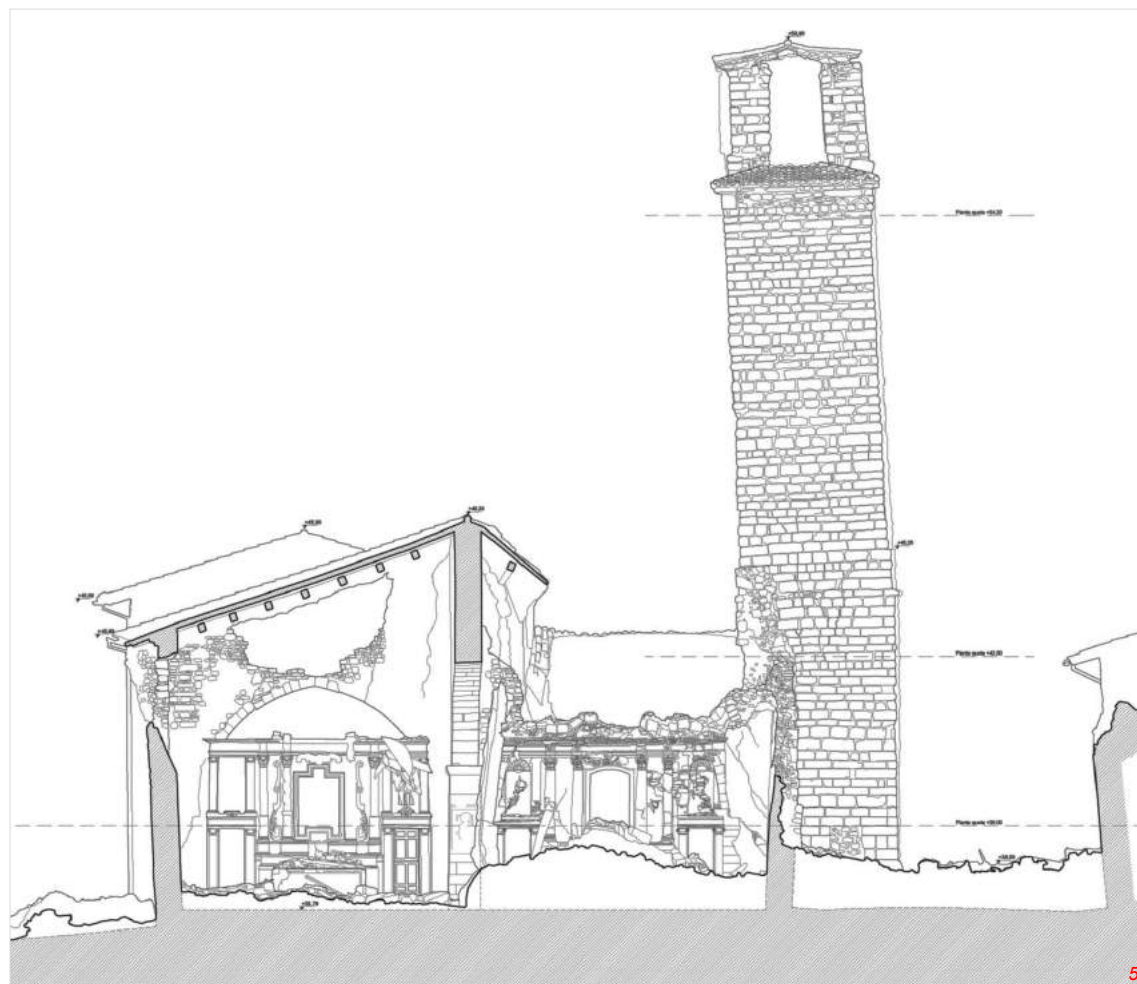
Orthophotographic cross section; 2

Photographic view of the upper part of the tower; 3

Photographic view of the internal part of the Museum in  
state of collapse; 4

Cross section (drawing); 5

Field survey - one of the two drones during filming. 6





## Survey of historical buildings damaged by an earthquake

Accumuli (RI), Italy - Church of S. Maria della Misericordia.

Three-dimensional and orthophotographic survey of the painting in the church and of the collapsed structures. 2018

In 2018 we carried out the survey of the Church of S. Maria della Misericordia, damaged by the 2017 earthquake. Particular attention was paid to the early 16th century fresco, placed inside a niche in the sacristy of the church, for which the experts from Ministry of Cultural Heritage foresaw studies aimed at conservation.

Also in this case, as in other earthquake interventions, we applied a highly advanced working methodology that allowed us to acquire the interior and external spaces of the church in 3D by means of integrated remote survey systems. The aim was that of exporting remote survey systems. The aim was that of exporting plants, elevations and sections, as orthophotographic images and drawings, useful for the consolidation and restoration programme.

Notes:  
- Objective of the assignment: Three-dimensional and topographic survey of the painting in the church;  
- Client: Ministero per i Beni e le Attività Culturali - Segretariato Regionale del MIBAC del Lazio

Cross-section (drawings); 1

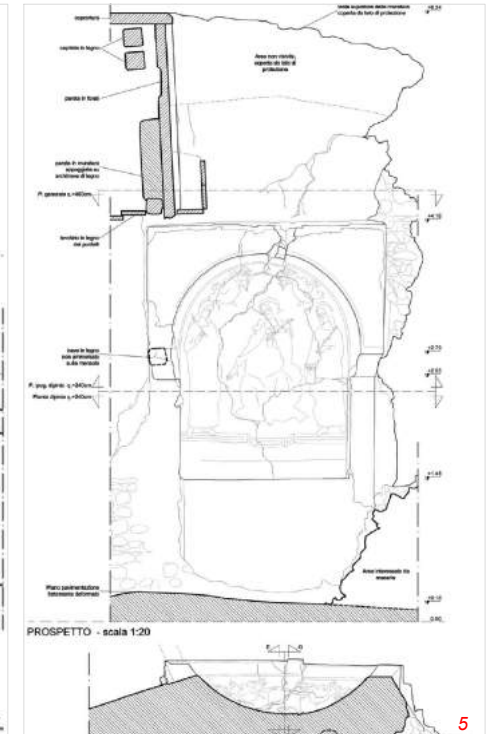
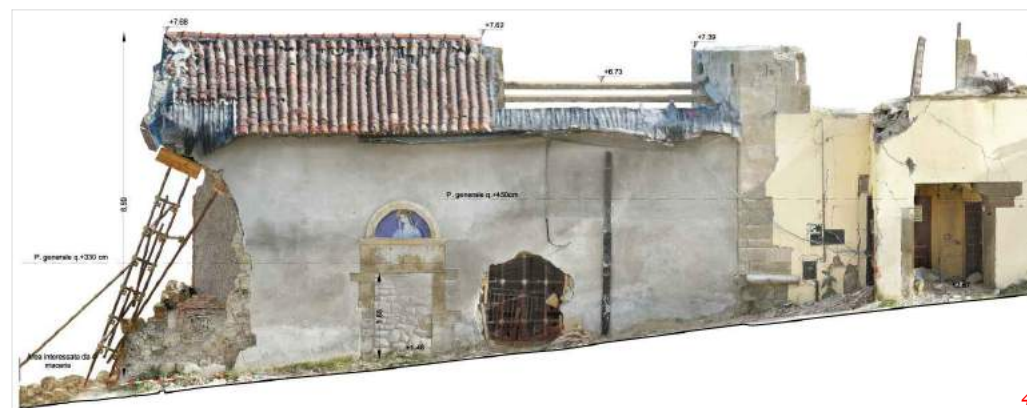
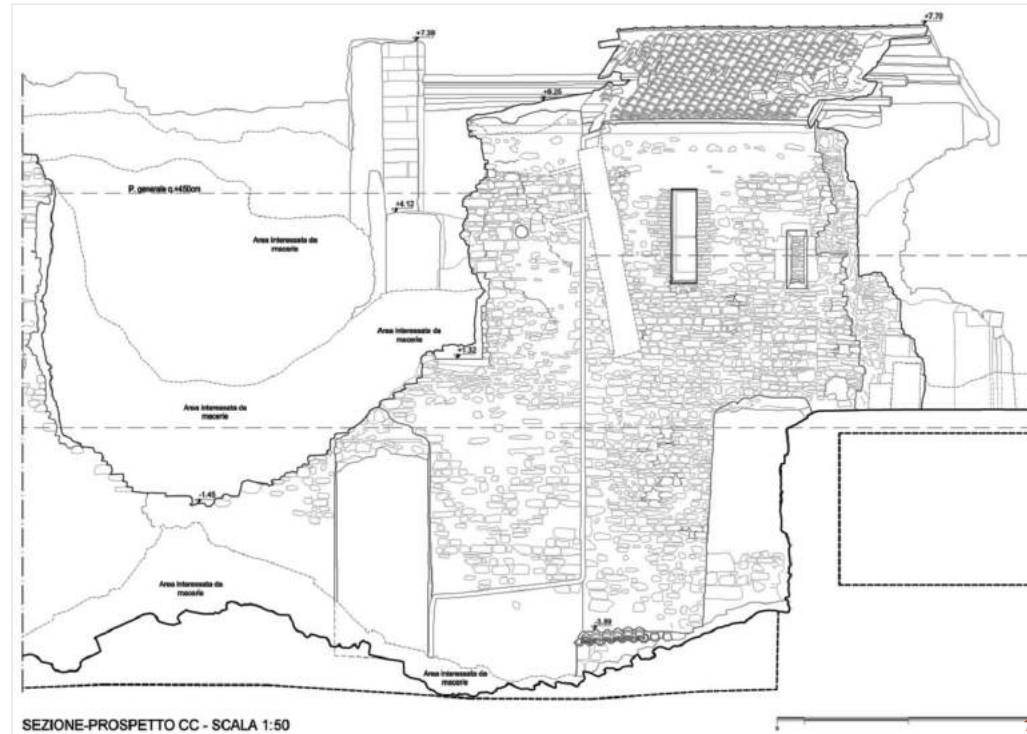
Field survey - drone during filming; 2

Field survey - laser scanning; 3

Orthophotographic elevation of the church; 4

Detail of the niche - cad drawing; 5

Detail of the niche - orthophotographic image; 6



## Survey of historical buildings damaged by an earthquake

L'Aquila, Italy - Architectural Complex of the Archaeological Museum.

3D laser scanning, architectural measured survey and orthophotos of the Palace. 2017

In 2017 we carried out the three-dimensional, architectural and orthophotographic survey of the architectural complex of the Archaeological Museum, damaged by the earthquake.

The work integrated the use of 3D laser scans, topographical surveys and three-dimensional photogrammetric system. From the 3D model we exported plans, including the roof plan, sections and elevations, orthophotographic images and digital drawings, useful for the conservation design.

### Notes:

- Objective of the assignment: 3D laser scanning, architectural measured survey of the Archaeological Museum with integrated technologies;
- Client: Private for the Comune dell'Aquila.

Cross-section; 1

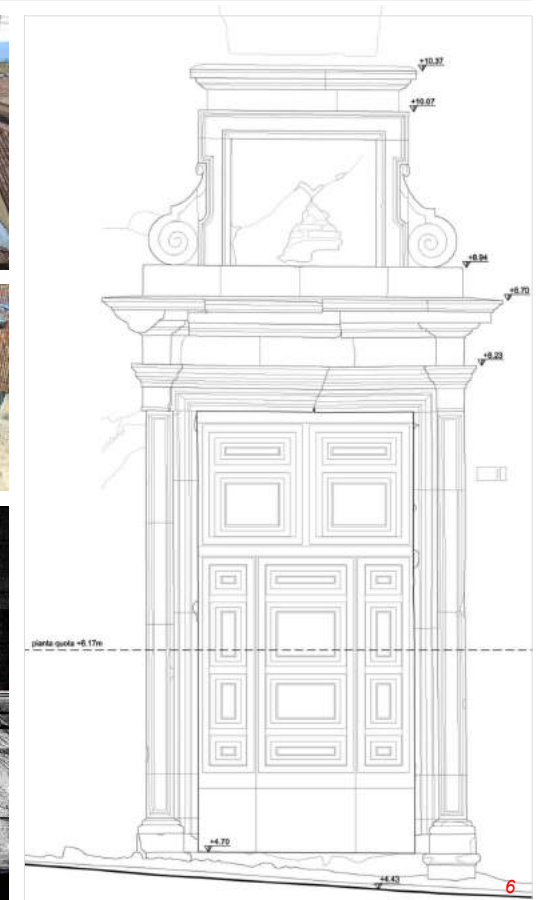
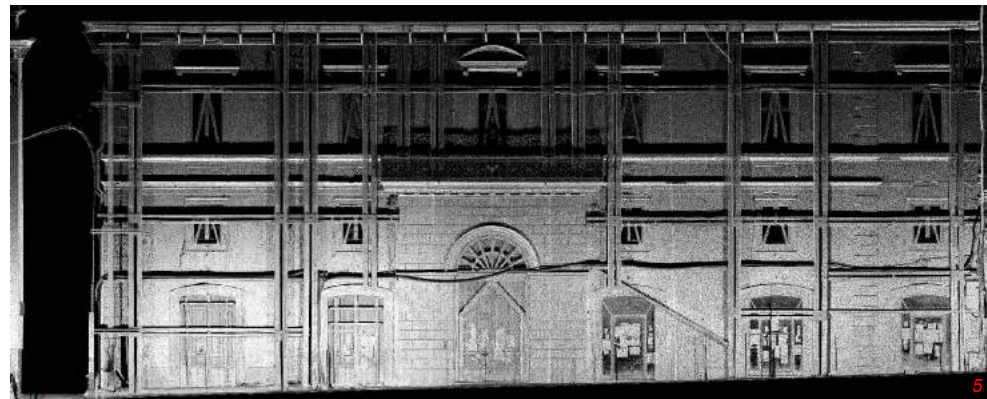
View of the 3D model; 2

View of the courtyard coverage; 3

Field survey - photographic image from the drone; 4

Facade - confidence point cloud; 5

Detail of one of the architectural portals; 6



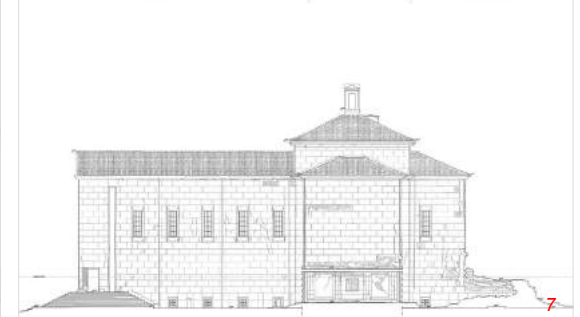
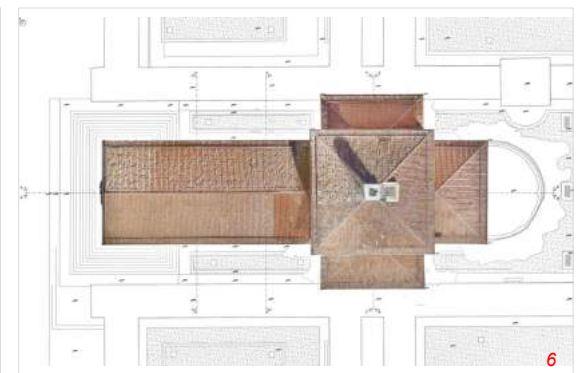
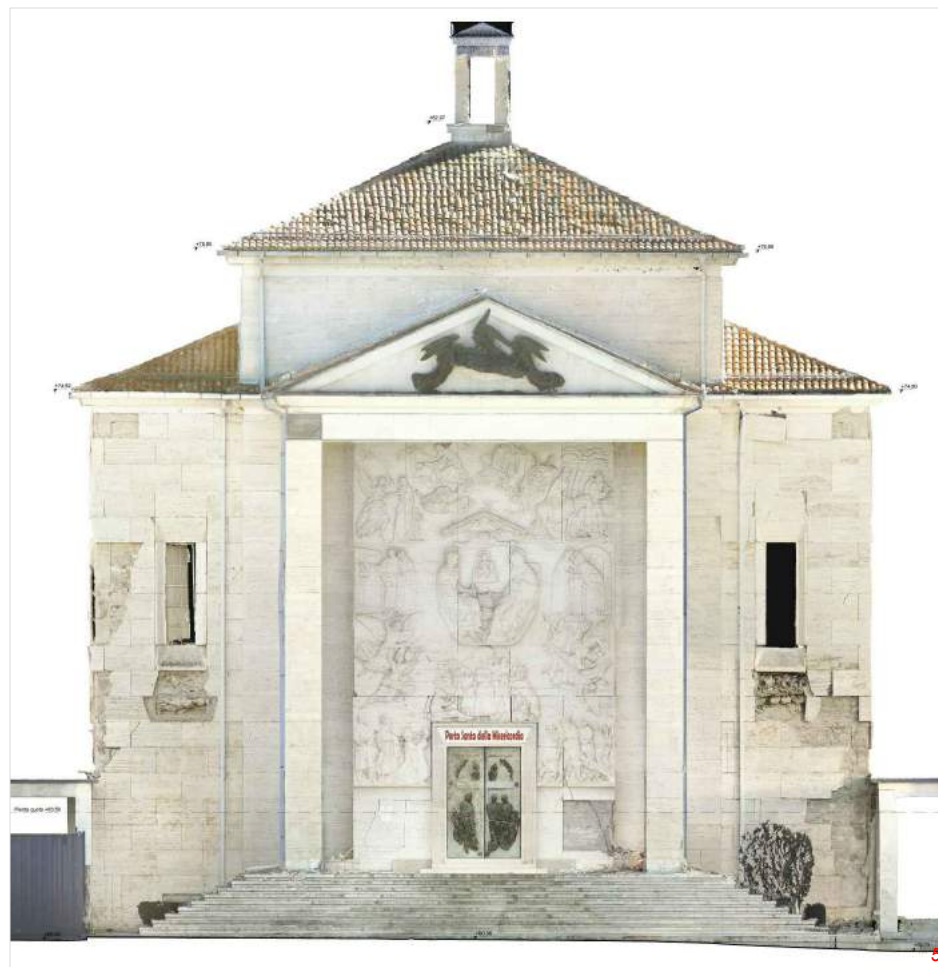


## Survey of historical buildings damaged by an earthquake

Amatrice, Rieti - Church of St. Maria Assunta - Urgent earthquake protection measures. Three-dimensional laser scanning, terrestrial and aerial imaging and 3D mapping, topographic survey 2017.

The Don Minozzi Complex with the Church of Santa Maria Assunta suffered severe damages because of 2016 and 2017 earthquakes. In 2017 we carried out the survey of the complex for securing the site. Also in this case, as in other earthquake interventions, we applied a highly advanced working methodology that allowed us to acquire the interior and external spaces of the building in 3D by means of integrated remote survey systems. The aim was that of exporting plants, elevations and sections, as orthophotographic images and digital drawings. Further to the measured and architectonic survey of the site after the seismic event, a detailed analysis of the geometry of the elevations was produced to highlight the major structural deformations.

Note:  
- Client: MIBACT - Segretariato Regionale del Ministero dei Beni e delle Attività Culturali e del Turismo per il Lazio.



- Field survey - Laser scanning from outside the church; 1
- Field survey: photogrammetric with drone inside the church; 2
- Field survey: drone from outside the church; 3
- View of the 3D model; 4
- Orthophotographic main elevation; 5
- Orthophotographic plan of the roof 6
- Right elevation - orthophotographic view and cad drawing 7





## Survey of historical buildings damaged by an earthquake

Campi di Norcia - Perugia - Church of San Salvatore -  
Three-dimensional laser scanning, terrestrial and  
aerial imaging and 3D mapping, topographic survey of  
the ruins of the church and analysis of the  
documentation methodologies. 2016

In 2016, we surveyed the San Salvatore site, before,  
during and after the first operations, providing support  
for structural strengthening, securing, rubble removal  
and cataloging of scattered material, construction of  
protective structures, etc.

It was necessary to penetrate into collapsed areas,  
which made the work very complex. The structures  
were no longer visible having been covered by rubble  
and debris, but it was mandatory to indicate even  
those parts in the drawings. So we used the most  
advanced technologies, to be able to remotely survey  
the site with absolute precision and no risks for  
operators.

Here are proposed some drawings of the first phase of  
the survey.

### Notes:

- Client: ISCR Istituto Superiore per la Conservazione ed il Restauro.

Orthophotographic cross sections AA' - BB';

1

Field survey - laser scanning;

2

Field survey - hexacopter drone;

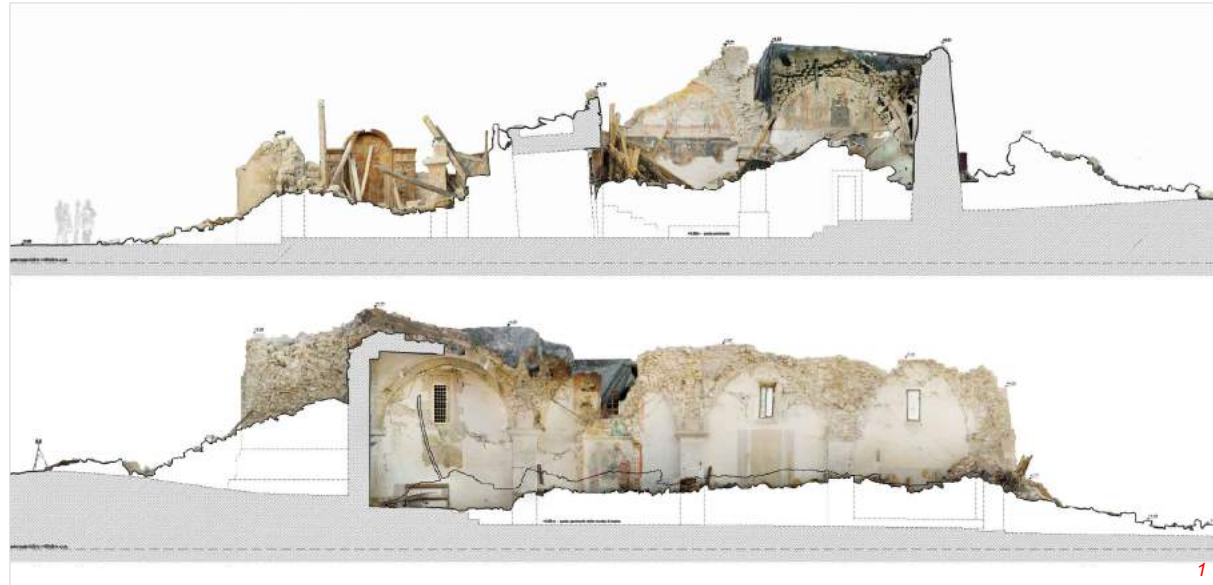
3

Orthophotographic plan;

4

Frames extracted from the video presentation.

5





## Architectural survey- Integrated survey technology

Complex of Convicinio di Sant'Antonio - Matera - Italy - three-dimensional laser scanning, photogrammetric and topographic survey of the four rupestrian churches. 2017.

The Convicinio di Sant'Antonio is a complex of four rupestrian churches, built inside the rock between the 12th and 13th centuries. In the churches there are wall paintings preserved in various conditions of conservation.

The survey was focused on the documentation of the wall paintings and on the architectural survey of the structures. An integrated system of technologies was used for the generation of a high-resolution three-dimensional model, from which all the graphic and orthophotographic drawings were extracted. Two laser scanners, a total station and a three-dimensional photogrammetric survey system were used in the field survey.

Note:

- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro.

Orthophotographic cross section of the church n. 4; **1**

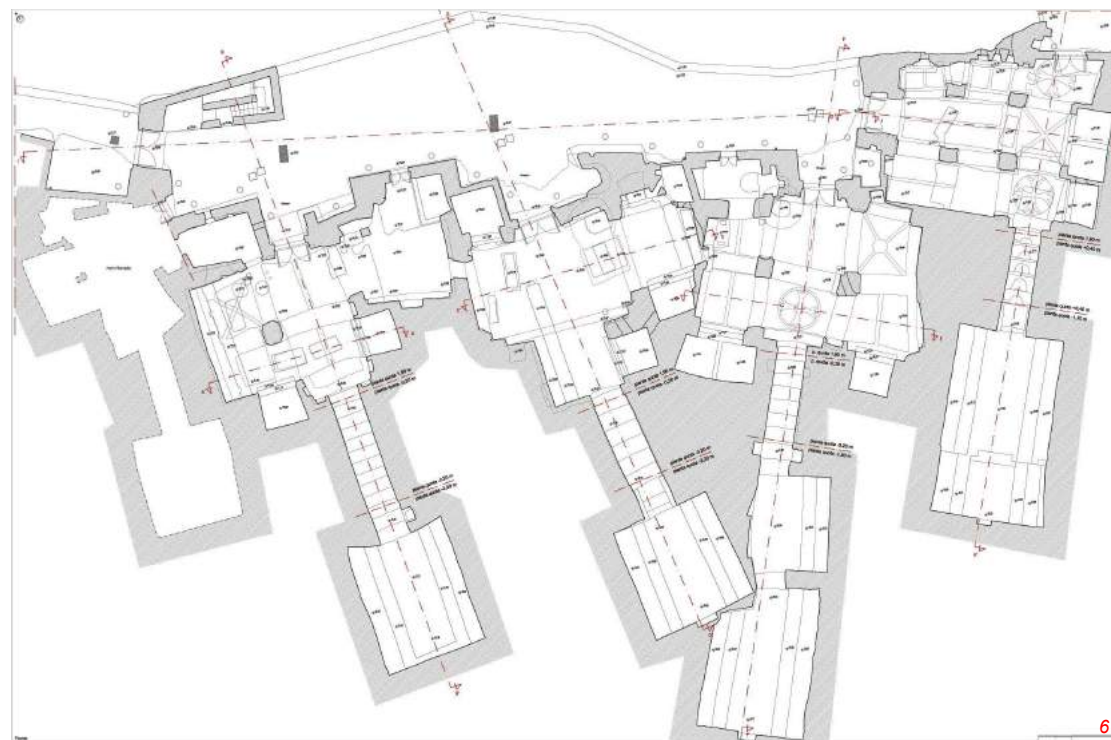
Field survey; **2**

The main portal of the Complex; **3**

Orthophotographic elevation; **4**

Detail of the wall painting of the church n. 2; **5**

General plan of the complex. **6**





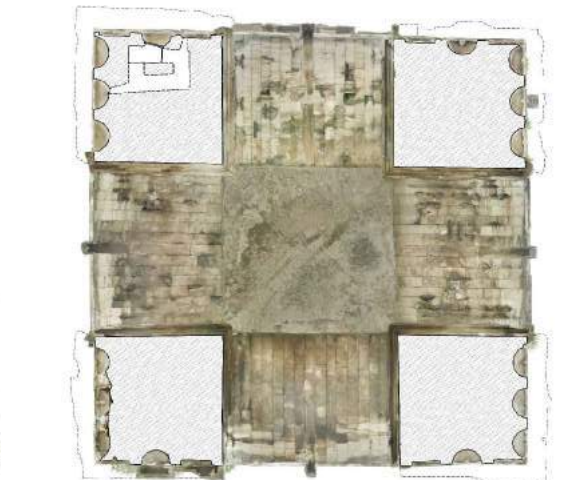
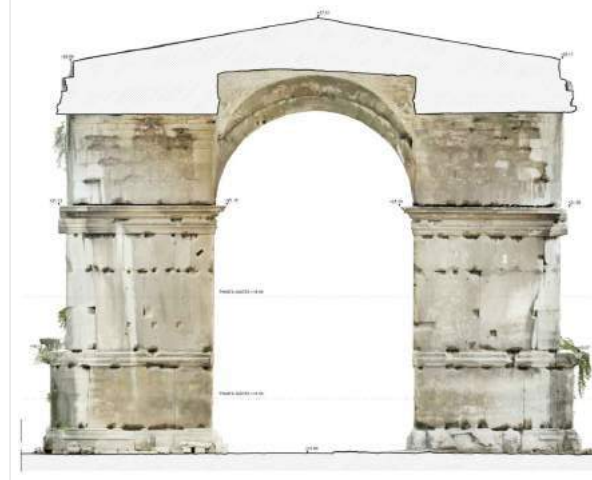
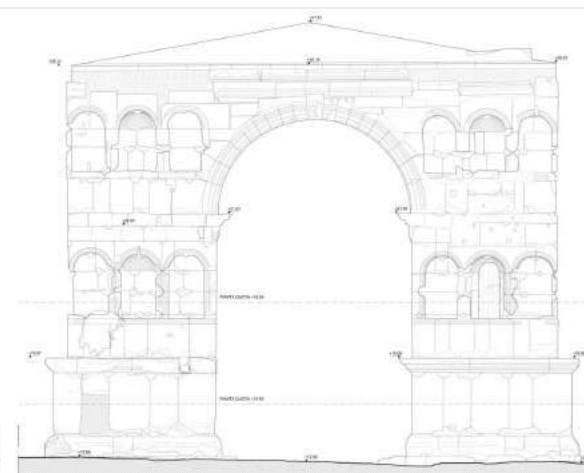
## Detailed Three-dimensional survey

*Arch of Janus - Forum Boarium, Rome, Italy*  
*World Monuments Fund Watch List - 2016*

The Arch of Janus is the only surviving quadrifrons arch in Rome. It is located in the Forum Boarium, in the center of ancient Rome and is 15 meters high. The work was funded by the World Monuments Fund and it is the last monument of the Forum Boarium to be restored.

We used an integrated technology that involves photogrammetric, laser scanning and topographic systems. The 3D model reproduces the morphology of the Arch with the highest level of detail.

*Note:*  
 - Objective of the assignment : 3D survey and restitution of all the elevations, sections and plans of the monument;  
 - Client: Private for World Monuments Fund and Sovrintendenza Speciale per il Colosseo e l'Area Archeologica Centrale di Roma  
 - Funding: World Monuments Fund, American Express



View of the 3D model; 1

View of the 3D model; 2

Field survey - Laser scanning 3

Plans, elevations and section extracted from the 3D model; 4

Frames extracted from the video presentation. 5





## Archaeological site survey

Rome - Italy - Domus Tiberiana - Palatine Hill

Laser scanning and photogrammetric survey of the archaeological site. 2014 - 2015

The work consists of the topographic and three-dimensional survey of the whole archaeological site and the detailed restitution of each elevation and plan. Sections and plans are drawn at 1:50 scale.

During the survey we produced about 150 general sections of the site and the plan of each level.

### Notes:

- Objective of the assignment: 3d Laser scanning and photogrammetric survey of the whole Domus Tiberiana archaeological complex;
- Client: Soprintendenza Speciale per i Beni Archeologici di Roma



Roman Forum and Palatine Hill - General view of the 3D model; 1

North side of the Palatine Hill - Second Level 3D view of the new routes; 2

Detail of the general section showing the archaeological structures on Via Nova; 3

Detail of a different section of the site; 4

Detail of a painted surface. 5





## Archaeological site survey

Rome - Italy - Domus Tiberiana - Palatine Hill

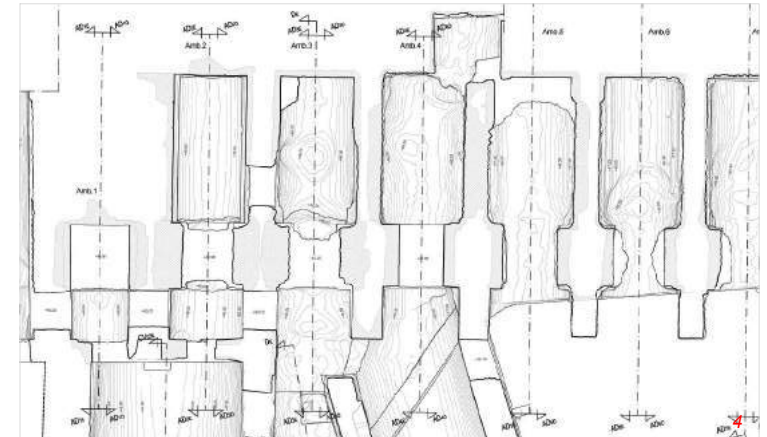
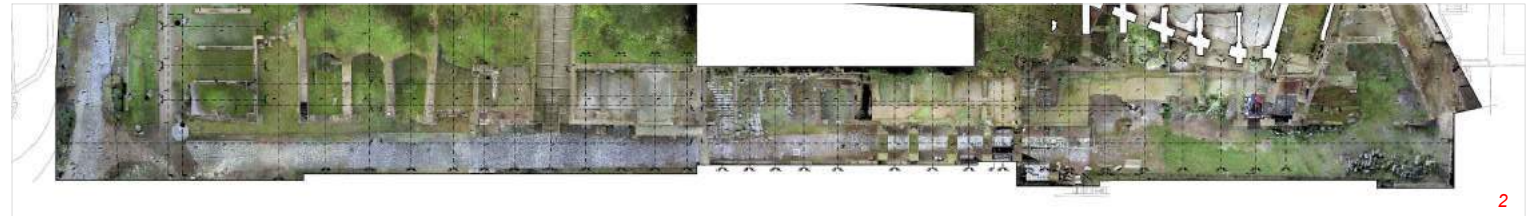
Laser scanning and photogrammetric survey of the archaeological site. 2014 - 2015

This table shows some examples of the general outputs delivered.

Image 1 is an orthographic general section extracted directly from the three-dimensional model. Image 3 is a 3D view of the color point clouds.

### Notes:

- Objective of the assignment: 3D Laser scanning and photogrammetric survey of the Domus Tiberiana Complex;
- Client: Soprintendenza Speciale per i Beni Archeologici di Roma



Elevation of the north side of the Palatine Hill; **1**

Excerpt of the general orthophotographic plan; **2**

View of the 3d model in RGB colour; **3**

Detail of the plan of the vaults - North side of the Palatine Hill - Second Level  
Countour lines each 10 centimeters; **4**

General plan: detail along Via Nova; **5**

Field survey from the Massenzio Basilica; **6**





## Archaeological site survey

Rome, Italy - Mausoleum of Emperor Gallienus, Appia Antica.

Laser scanning and photogrammetric survey. 2016

The survey included the acquisition and the graphic restitution of the Emperor Gallienus' Mausoleum, now in ruins.

The survey was carried out to produce orthophotos and cad drawings, useful for the knowledge of the monument and the conservation design.

An integrated system of technologies was used, based on the use of photogrammetry, laser scanning and topographic systems. The scaffolding around the circular structure of the Mausoleum made the survey and post-processing operations of the acquired data particularly complex. It was possible to obtain a single color and high resolution 3D model, from which the necessary two-dimensional and three-dimensional drawings were extracted.

### Notes:

- Objective of the assignment: General measured survey, ortho-photographic survey and graphic reconstruction of the geometry of the structures preserved;

- Client: private for Soprintendenza Speciale per i Beni Archeologici di Roma.

Orthophotographic elevation of the north west side; **1**

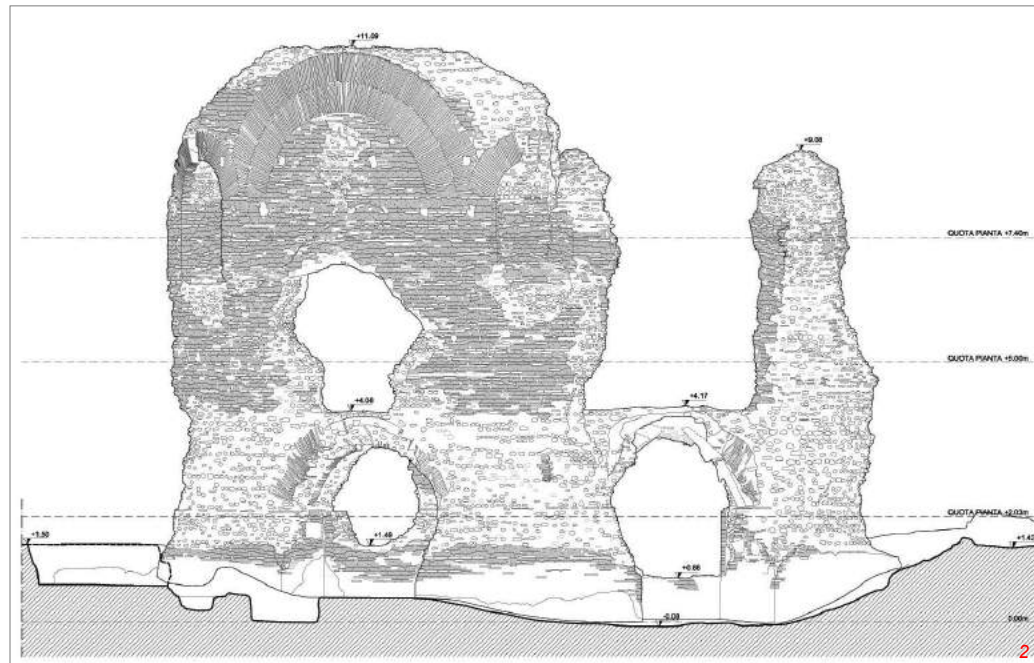
Elevation of the north west side in dwg format; **2**

Mausoleum with scaffolding; **3**

Mausoleum with scaffolding; **4**

Views of the three-dimensional model in RGB colour; **5**

Orthophotographic plan; **6**





## Archaeological site survey

*Ostia Antica - Roma - Italy - Survey of the Domus of the Mithraeum of painted walls. 2010*

Field survey consisted in the use of topographic instruments - GPS and total station - and three-dimensional photogrammetric techniques. The output consisted in the survey of all the walls and the following informatization of masonry stratigraphic units of the Domus.

### Notes:

- Objective of the assignment: Survey of the Domus of the Mithraeum of painted walls
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro.



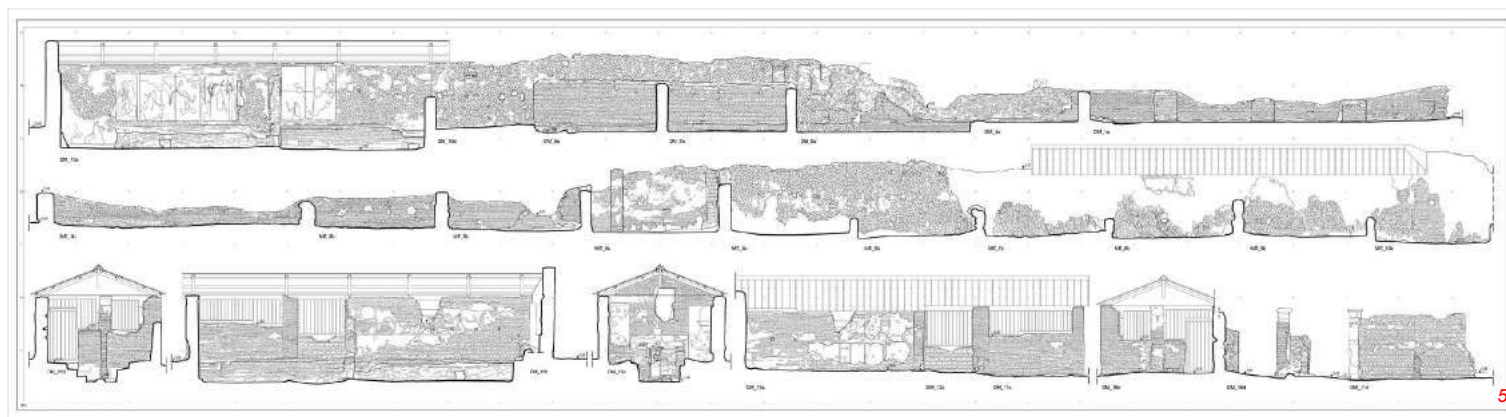
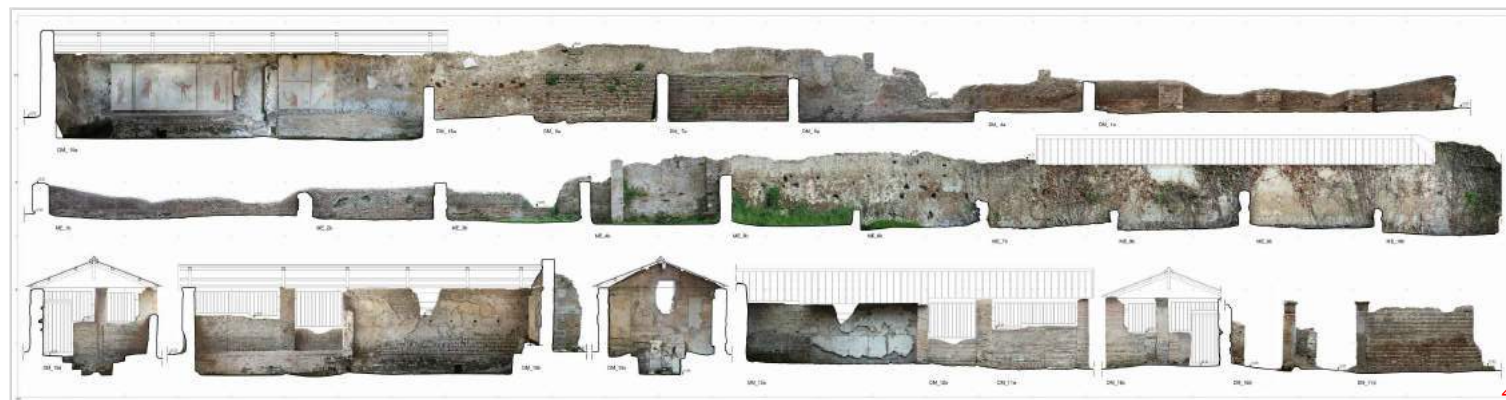
3D photogrammetric model of the walls; 1

View of the site; 2

Orthophotographic cross section and drawing; 3

Orthophotographic cross section; 4

Cross sections (drawings); 5





## Archaeological site survey

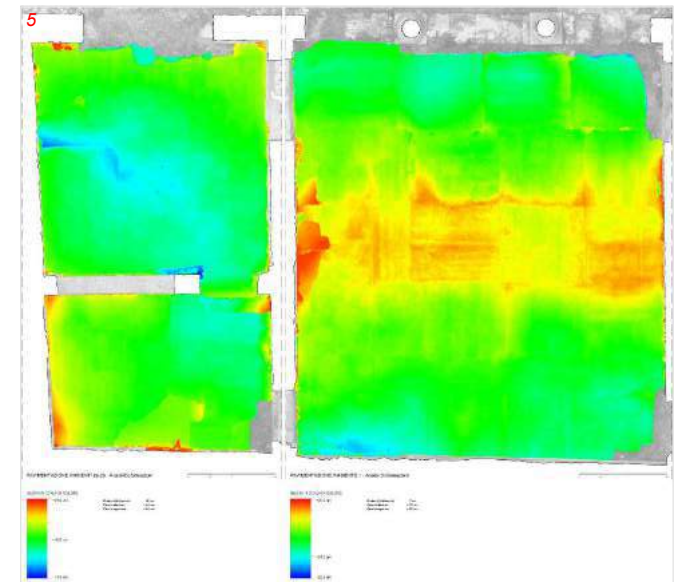
Ostia Antica - Italy - Schola of Trajan: Laser scanning and photogrammetric survey of the mosaics. 2015

This is an example of orthophotographic restitution of a mosaic floor in scale 1:5-1:1, here shown out of scale. The resolution of the raster image of 0.5mm/pixel allows to view in high definition each mosaic tile.

The work also included the deformation analysis of surfaces, a non-invasive technique to assess the deterioration of the structures under the floor.

### Notes:

- Objective of the assignment: 3d Laser scanning and photogrammetric survey of the mosaics of the Schola of Trajan
- Client: Archires Architettura e Restauro srl



Orthophoto of the mosaic of the main room 1

Details of the orthophoto 2-3

3D Model 4

Deformation analysis of the floor 5





## Archaeological site survey

*Villa Adriana, Tivoli (RM) - Italia - Excavation area in North corner of the complex. Topographic survey and laser scanning to produce orthophotographic elevation and sections of the site. 2016*

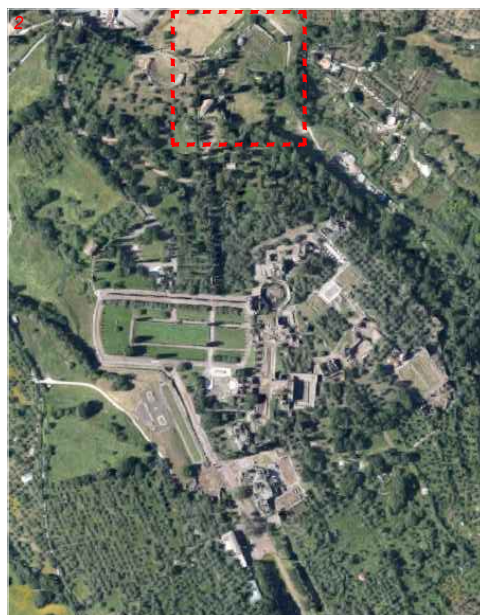
The work includes the general survey of the Villa and the graphic restitution of sections and elevations.

Image 1 shows orthophotographic sections extracted from the three-dimensional model.

Image 3 offers a view of the 3D model.

### Notes:

- Objective of the assignment: Topographic survey and laser scanning to produce orthophotographic elevation and sections of the site;
- Client: Private



Orthophotographic elevation and sections **1**

General site plan of Villa Adriana archaeological area **2**

Views of the three-dimensional model in RGB colour **3**





## Archaeological site survey

*Leptis Magna - Libya - Villa Silin*

*Laser scanning and photogrammetric survey of the painted surfaces and mosaics. 2013*

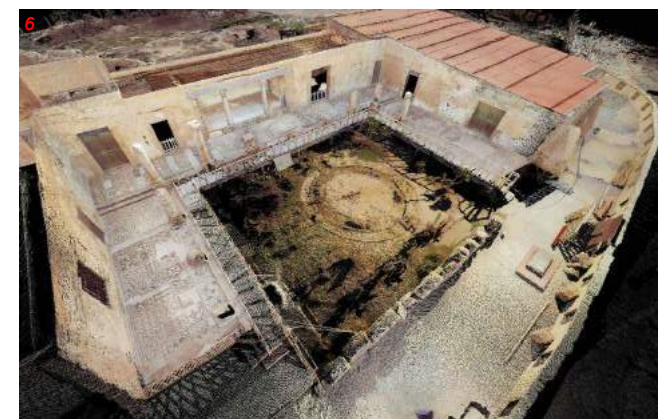
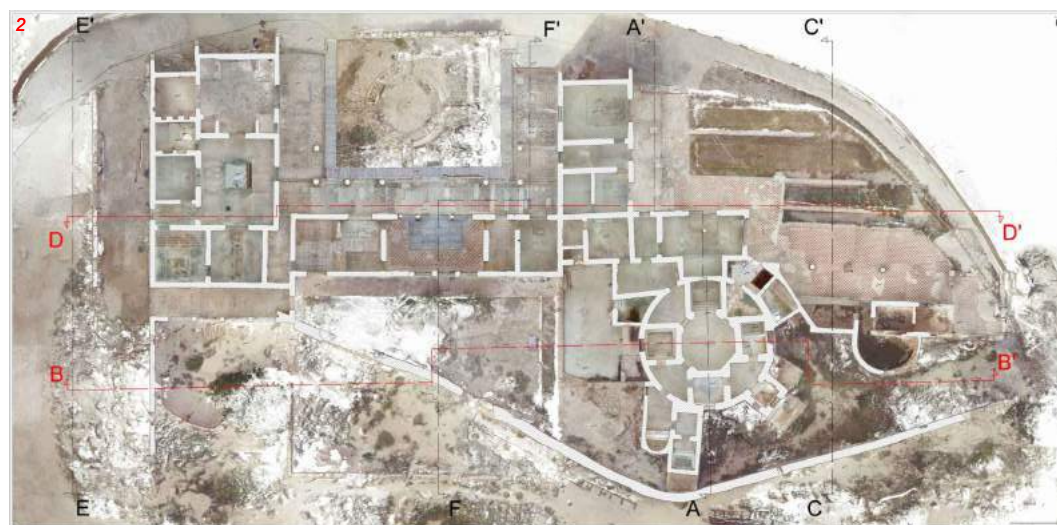
The work includes the general survey of the Villa and the graphic restitution of mosaic pavements and painted walls. Sections and plans are drawn at 1:10/1:5 scale.

Image 1 shows orthophotographic sections extracted from the three-dimensional model, partially integrated with high resolution pictures.

Image 2 is the general site plan, extracted from the three-dimensional model too.

**Notes:**

- Objective of the assignment: 3d Laser scanning and photogrammetric survey of the whole complex of the Villa Silin, Leptis Magna;
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro



Orthophotographic sections **1**

General site plan from the three-dimensional model **2**

Field survey **3**

Views of the three-dimensional model in RGB colour **4-6**





## Archaeological site survey

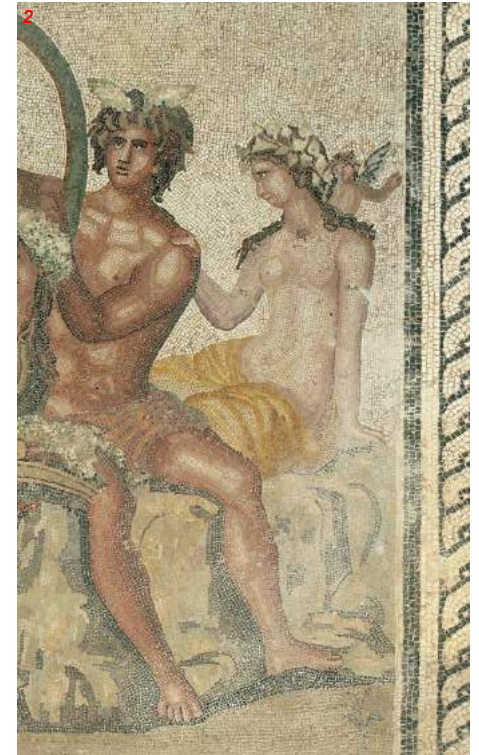
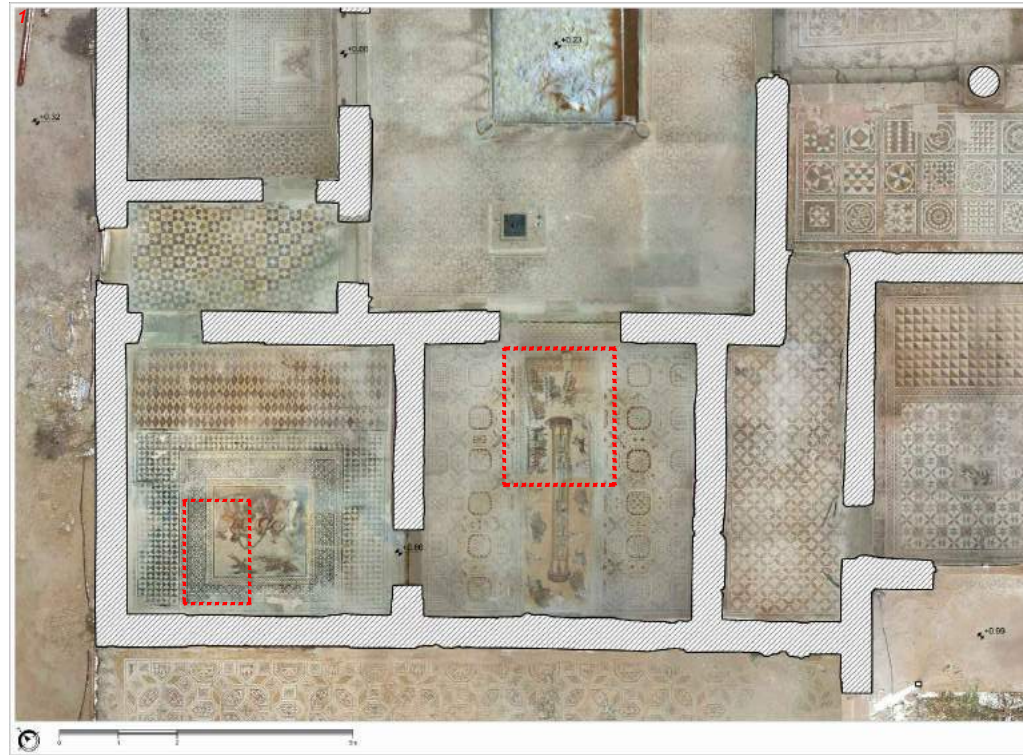
Leptis Magna - Libya - Villa of Silin

Laser scanning and photogrammetric survey of the painted surfaces and mosaics. 2013

This is an example of orthophotographic restitution of a mosaic floor in scale 1:5, here shown out of scale. The resolution of the raster image of 1mm/pixel allows to view in high resolution each mosaic tile, also in the central carpet, where the tile dimension is approx. 3mm.

**Note:**

- Objective of the assignment: 3d Laser scanning and photogrammetric survey of the whole complex of the Villa of Silin;
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro



Detail from the orthophotographic general plan, underlined in red the detail of the image 2

1

Orthophotographic general plan, detail of the of the mosaic floor

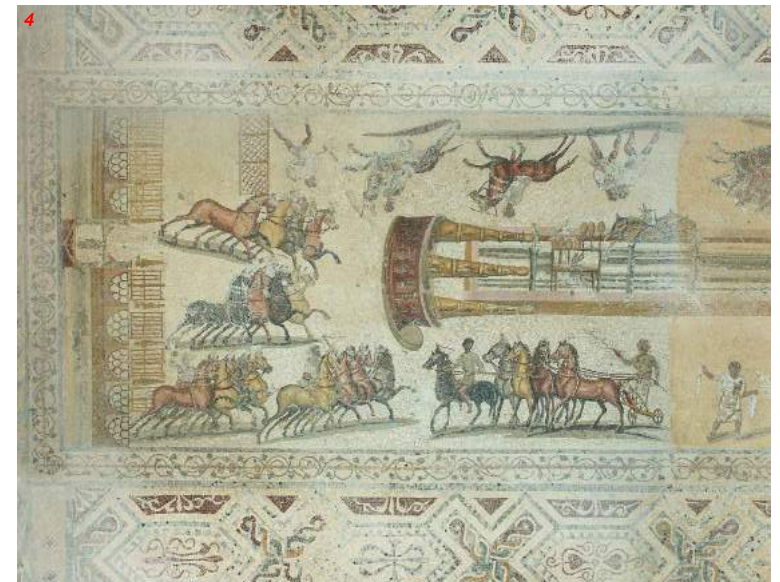
2

Field survey

3

Orthophotographic general plan, detail of the of the mosaic floor

4





## Archaeological site - Analysis of the phases of the walls

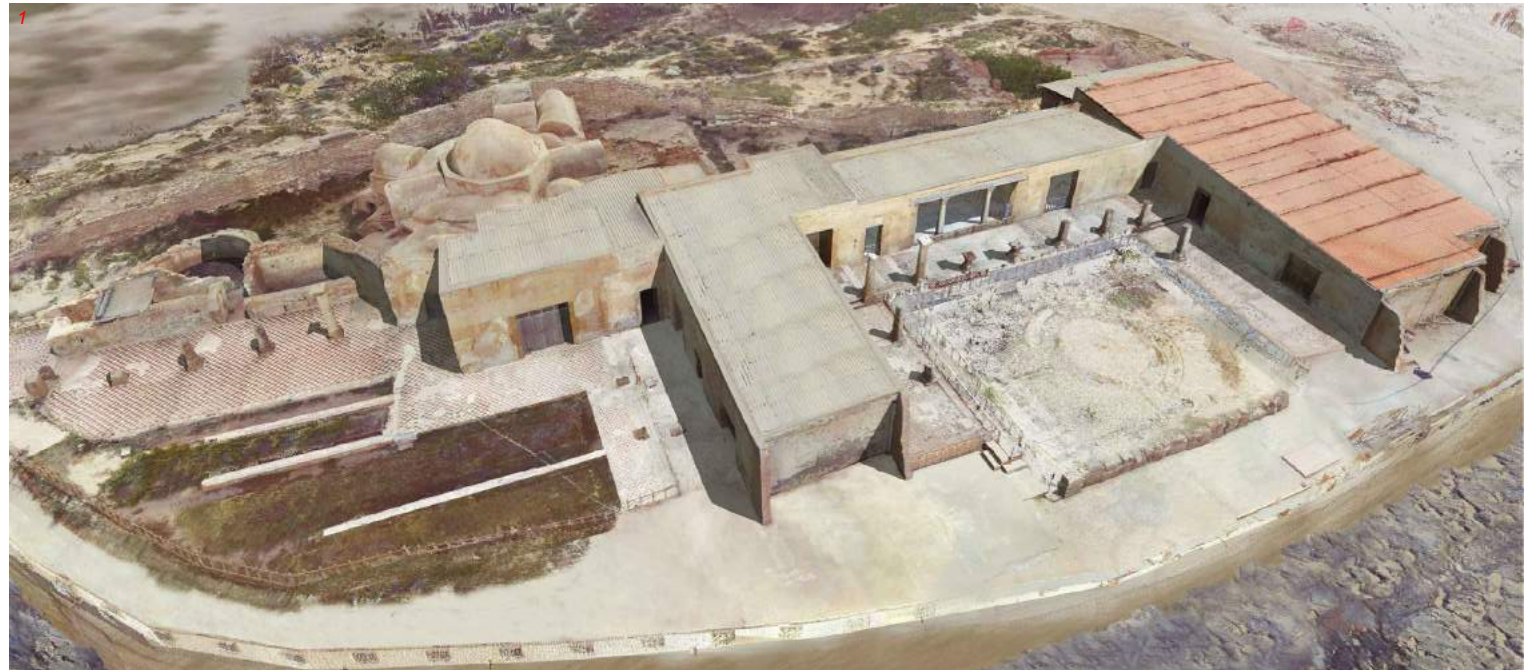
*Leptis Magna - Libya - Villa of Silin*

*Studies on the phases of the walls and the reconstruction of the roofs. 2015*

This table shows two images of the Villa focusing on the modern integration phases of roofing and walls. The first image refers to the three-dimensional model of the villa at the present; the second one is the site reconstruction in the 70s.

Note:

- Objective of the assignment: Studies on the phases of the walls and the reconstruction of the roofs of the whole complex of the Villa of Silin;
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro



View of the 3D model of the Villa

1



The Villa at the end of the 70s

2





## Archaeological site survey

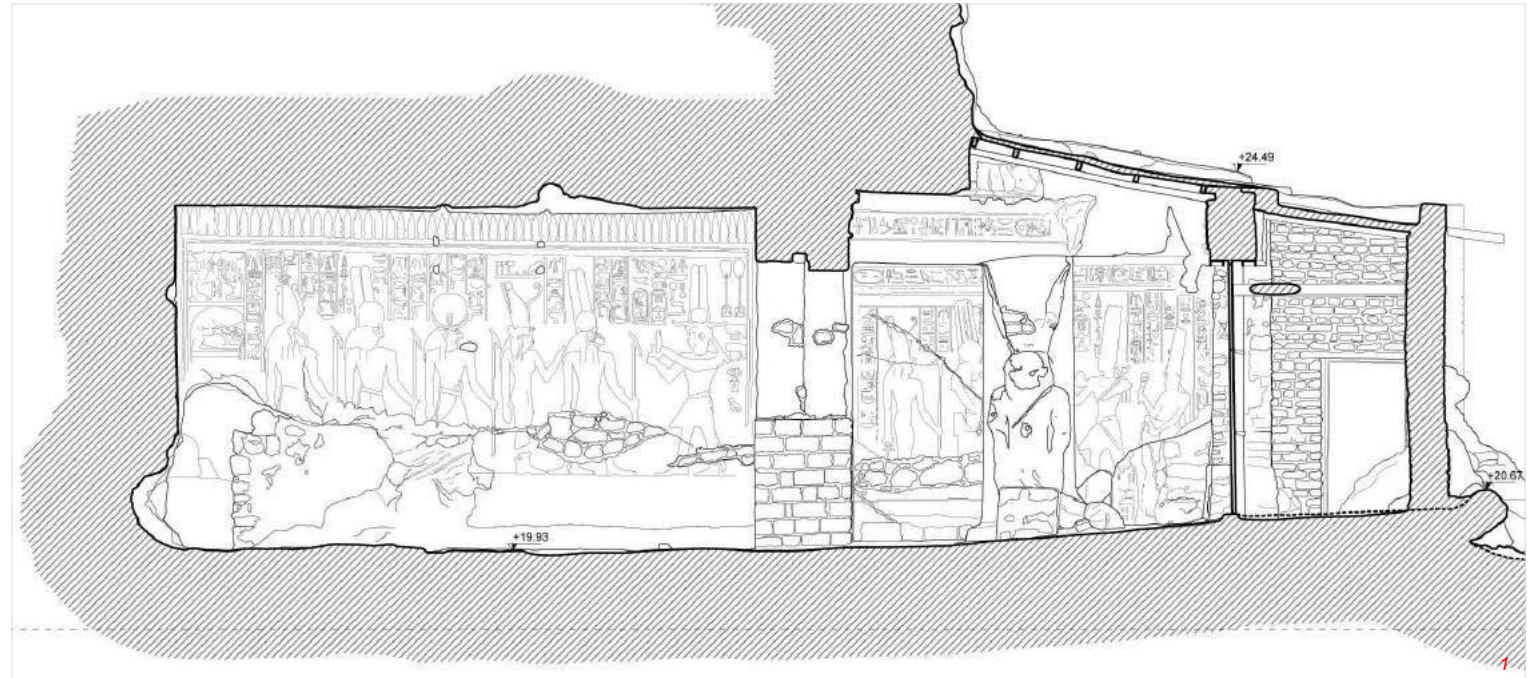
Karima - Sudan - Temple of Mut - Gebel Barkal

Laser scanning and photogrammetric survey. 2015

The Gebel Barkal is an Unesco World Heritage site since 2003. It has been a sacred mountain from 1500 BC. The Mut Temple is located on the south side of the mountain and It has been built around 690 BC, during the XXV Taharka dynasty. Images to the side show a detail of a section and a detail of the general plan with contour lines each 20 centimeters.

### Notes:

- Objective of the assignment : "Three dimensional survey of Temple of Mut";
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro
- UNESCO World Heritage Site.



Cross section 1

Detail of the site plan 2

Orthophotographic detail of the hieroglyph decoration 3

Field survey 4





## Archaeological site survey

Karima - Sudan - Temple of Mut - Gebel Barkal

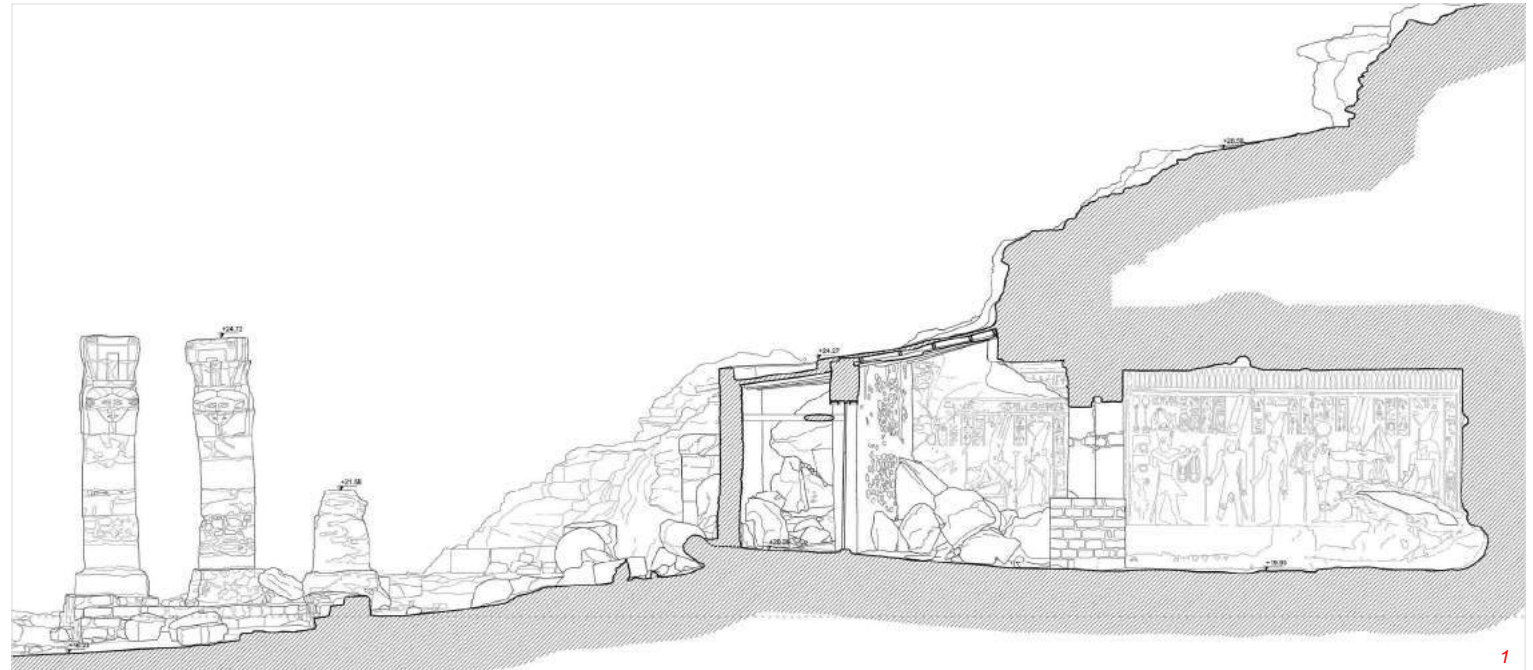
Laser scanning and photogrammetric survey. 2015

The three-dimensional model was produced combining the point cloud with the color information acquired by photogrammetry. These two technologies insure the highest image definition and precision.

Images to the side show the result of the whole process. Image 1 shows the high definition of the cross section at the end of the process. Image 2 is the orthophotographic section extracted from the point cloud, where we can appreciate the texture of materials.

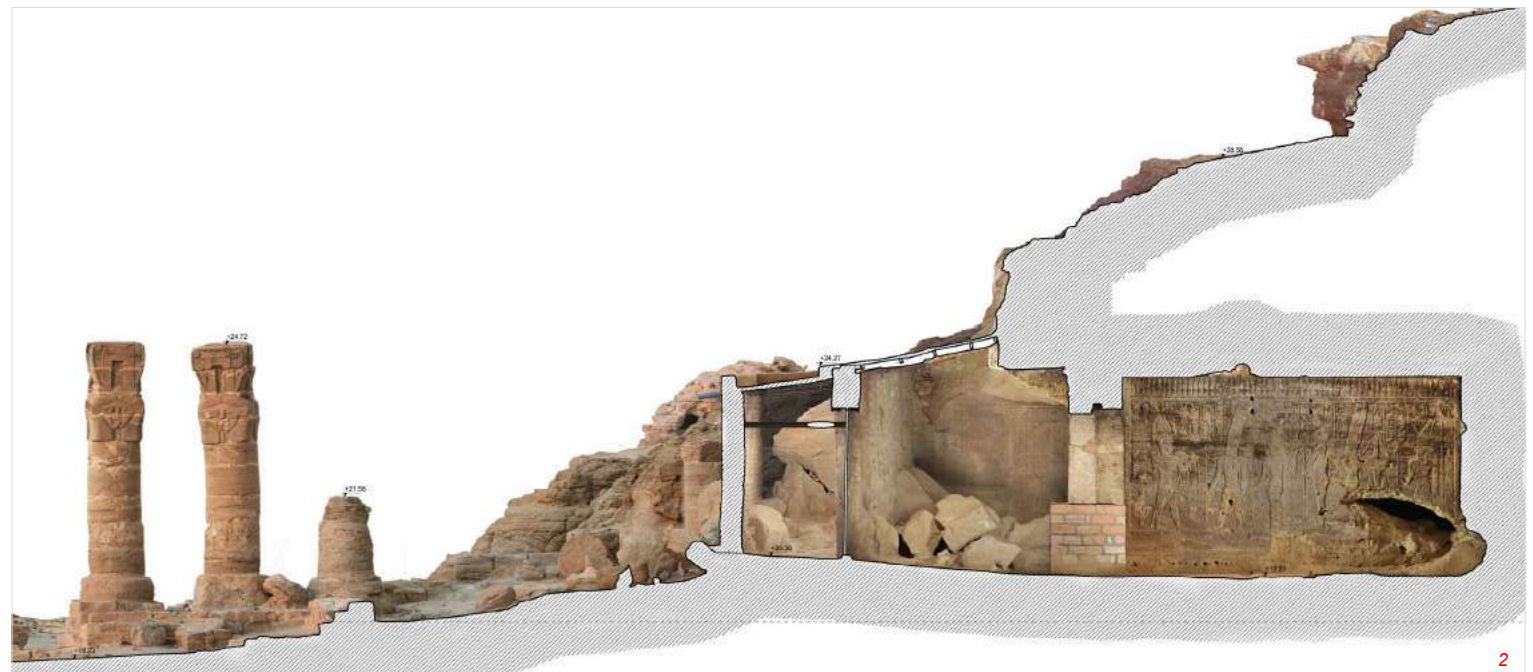
### Notes:

- Objective of the assignment : "Three dimensional survey of Temple of Mut";
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro
- UNESCO World Heritage Site.



Section 1

Orthophotographic section 2





## Archaeological site survey

*Pasargadae - Iran - Tomb of Cyrus the Great and Palace "P": Laser scanning and photogrammetric survey of the Archaeological site. 2015*

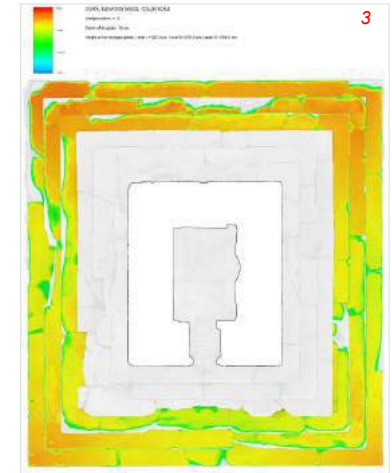
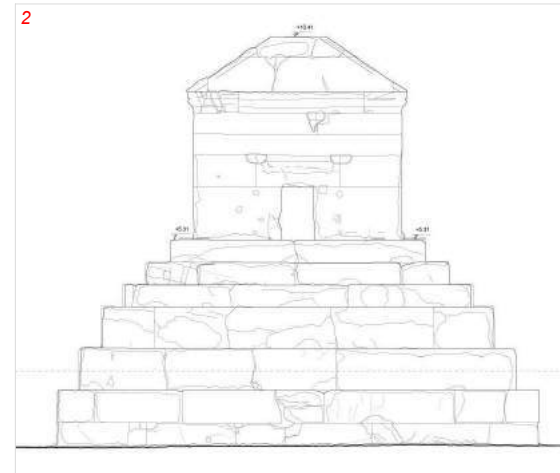
The archaeological site of Pasargadae includes ancient structures of the capital of the Achaemenid Empire, founded by Cyrus II the Great. It is inscribed in UNESCO World Heritage List since 2004.

The survey allowed to document the conservation works on the Tomb and to design the new presentation of the Palace "P" area.

The assignment included the graphic restitution of plans, sections and elevations and the deformation analysis of the structures.

### Notes:

- Objective of the assignment: 3D Laser scanning and orthophoto of the Tomb of Cyrus the Great and Palace "P";
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro
- UNESCO World Heritage Site.



Tomb of Cyrus the Great - 3D model 1

Tomb of Cyrus the Great - Main Elevation 2

Tomb of Cyrus the Great  
Deformation analysis of the steps of the tomb 3

Palace "P" - Detail of the plan extracted from  
the point cloud 4

Palace "P" - Views of the point cloud 5-7





## Protection of archaeological sites

Archaeological Site of Arslantepe - Malatya - Turkey.  
2000

Casa dei Vettii - Pompeii - Italy. 2005

Drawings and design of new roofing system.

The conservation of archaeological structures often requires the construction of roof structures above the findings. We took part to many projects of this kind. Among the others, we cooperated to the protection interventions of the Archeological site of Arslantepe in Turkey and of the House of the Vettii in the archaeological site of Pompeii.

The roofing systems were designed taking into consideration the best practice in the use of local materials and most appropriate construction techniques.

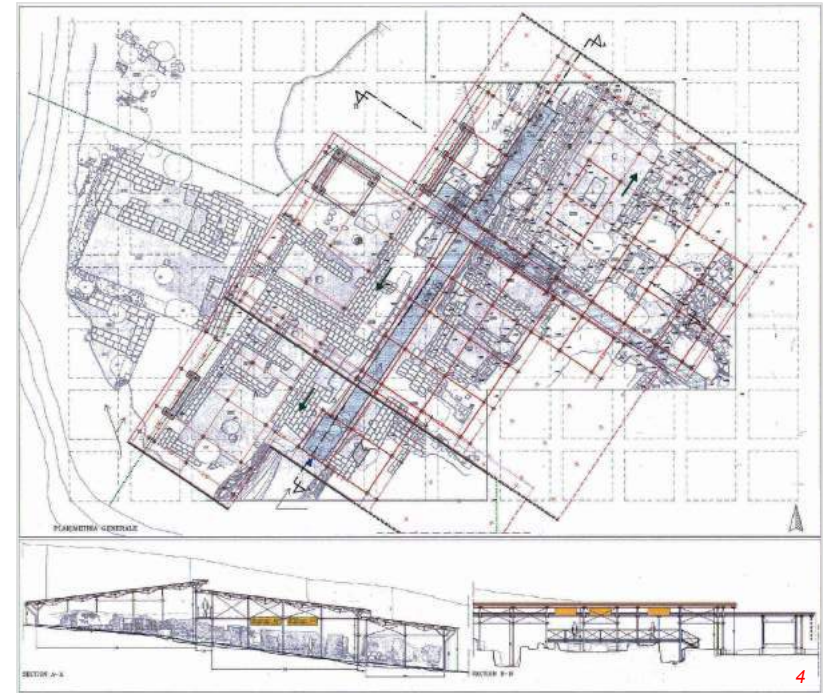
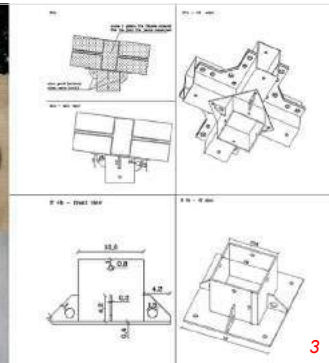
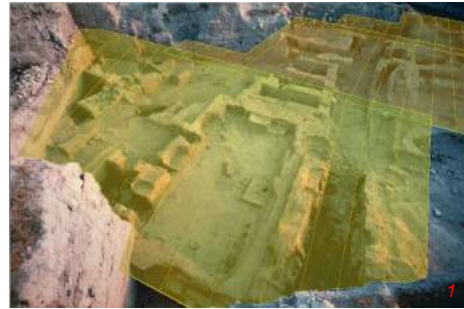
- Objective of the assignment :Archaeological Site of Arslantepe - Protection roof design for the archaeological site, in collaboration with Arch. C. Prosperi Porta (Italian Ministry of Cultural Heritage and Activities and Tourism)

- Client: Università degli Studi di Roma "La Sapienza" - Dipartimento di Scienze Storiche Archeologiche ed Antropologiche dell'Antichità

- Objective of the assignment : House of the Vettii - Cad drawings of the new roofing system design.

- Client: Istituto Superiore per la Conservazione ed il Restauro - ISCR.

- UNESCO World Heritage Site.



Arslantepe - roof geometry 1

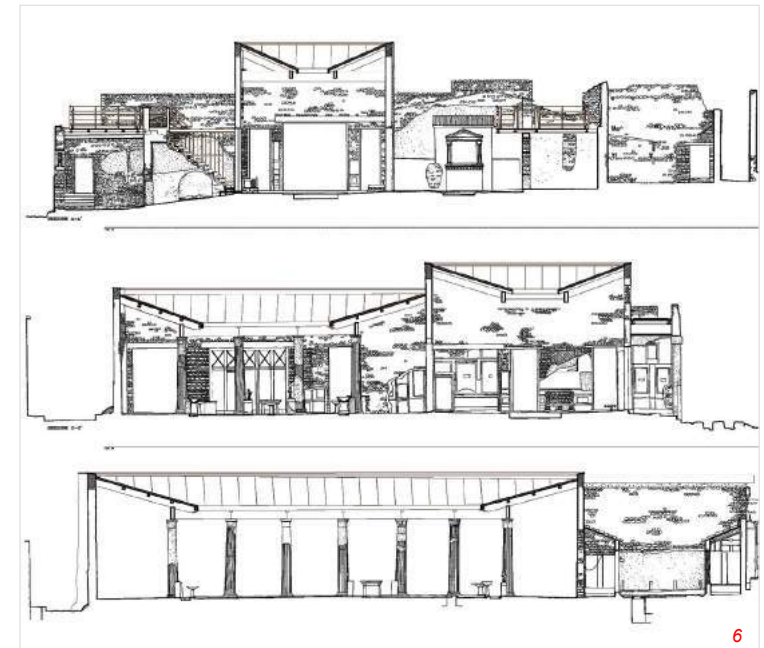
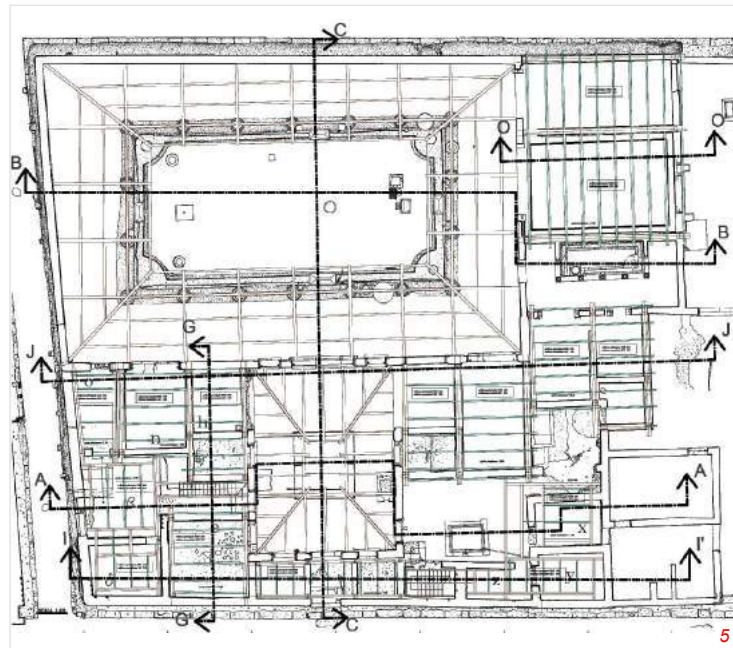
Arslantepe - detail pictures 2

Arslantepe - structural detail 3

Arslantepe - section and plan 4

House of the Vetti - plan showing the structural system of the roof 5

House of the Vettii - cros sections 6





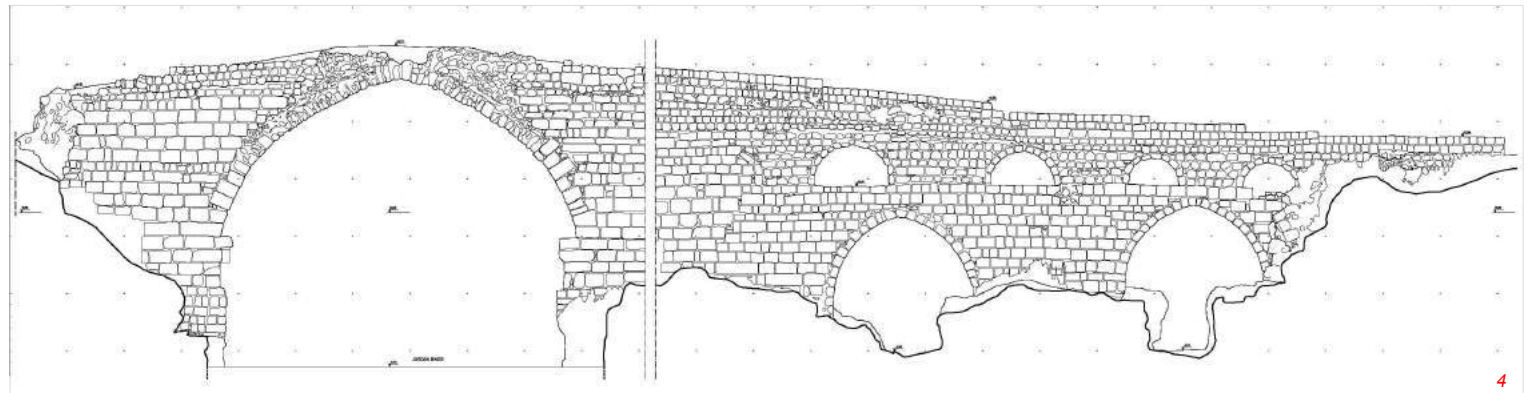
## Survey and restoration design

Jordan - Jaser Almaima'ah Gesher Bridge on Jordan River. Photogrammetric and laser scanner survey.2011

Gesher bridge is located at the border between Jordan and Israel on the Jordan River. The main arch had been severely damaged during last century war. In 2011 we were commissioned for the survey. The objective was to produce plans, sections and two elevations, both as drawing and as orthophoto. The survey was intended to document the condition of the monument and to facilitate the conservation design and works, which were implemented in 2014. The technologies chosen for this work are laser scanning and 3D photogrammetry. Images on the right show the condition of the site before the restoration works.

- Objective of the assignment: 3D survey of the bridge and generation of sections, elevations and plan in ortho-photographic and vector format

- Client: ISCR Istituto Superiore per la Conservazione e il Restauro



Picture of the bridge 1

Picture of the bridge 2

Picture of the bridge 3

South elevation 4

The Bridge during the restoration work - RGB point cloud 5

The Bridge during the restoration work - RGB point cloud 6



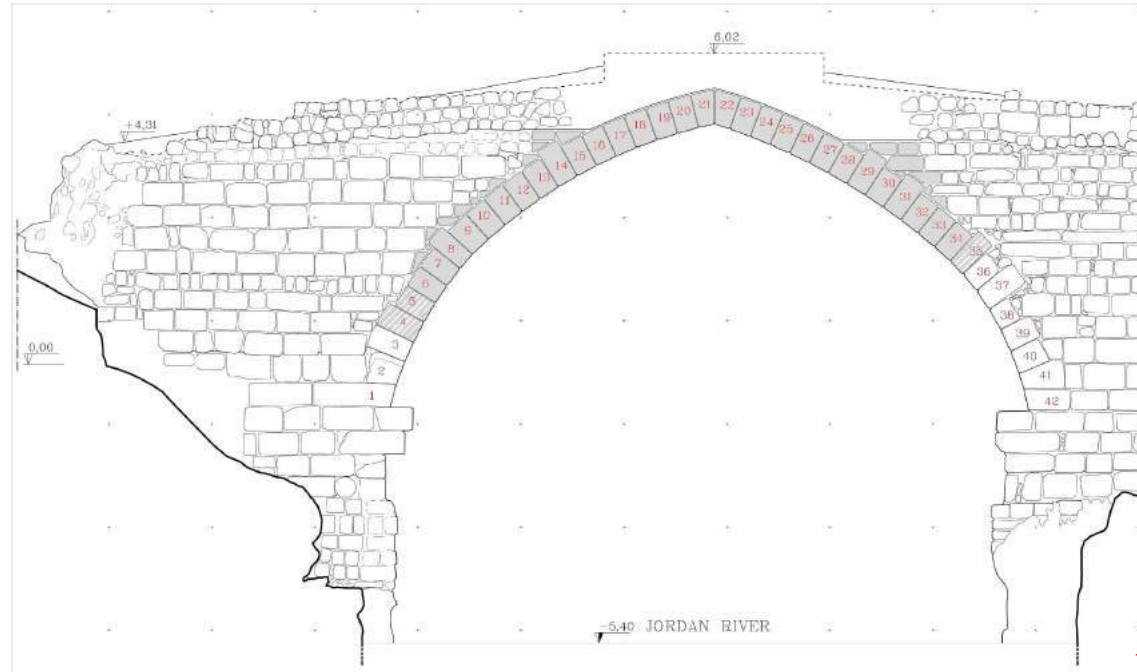
## Survey and restoration design

Jaser Almaima'ah Gesher Bridge on Jordan River -  
Jordan. Restoration design. 2014

Further to the architectural survey of the bridge Gesher, we also assisted the design team. The technical assistance consisted in the design of the arch rib and the reconstruction of the main arch.

### Notes:

- Objective of the assignment: Conservation design of the main arch of the bridge;
- Client: MIBACT Ministero dei Beni e delle Attività Culturali e del Turismo



Study for the reconstruction of the arch 1

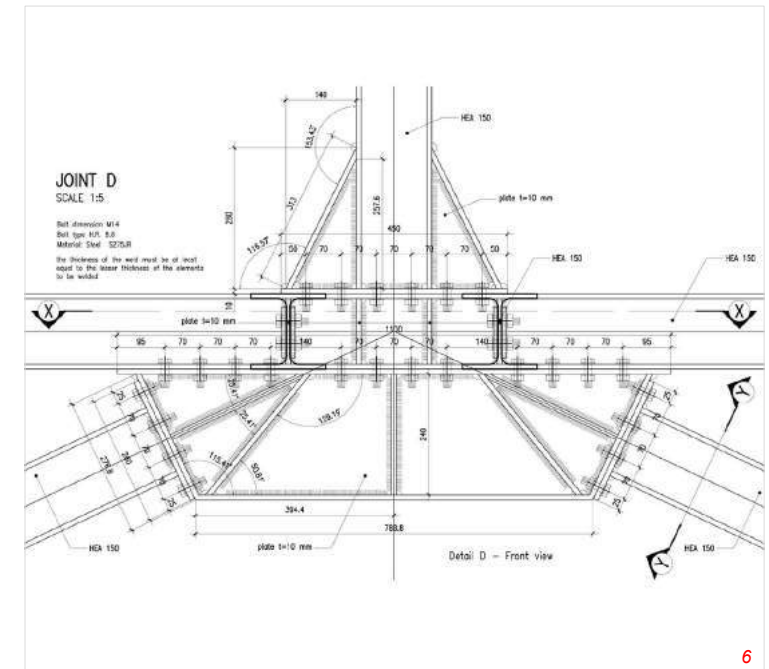
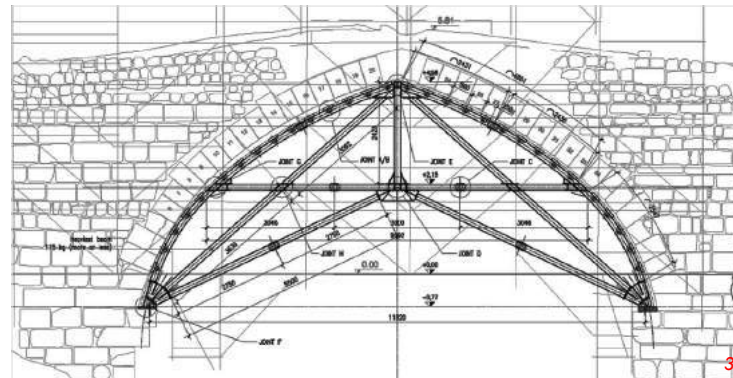
Pictures of the main arch of the bridge before the collapse (1900), after the damage (2011) and after the reconstruction (2014) 2

Final design of the steel rib 3

Picture of the rib during the construction in Jordan 4

Picture of the rib during the construction in Jordan 5

Rib detail 6





## Architectural and orthophotographic survey

Rome, Italy - Church of Santi Andrea e Claudio dei Borgognoni.

Three-dimensional laser scanning and topographic survey of the complex. 2018

In 2018 we carried out the three-dimensional architectural and orthophotographic survey of architectural complex of the church. The methodology we used is one of the most advanced now available, based on an integrated technology that involves photogrammetry, laser scanning and topographic systems. This methodology is the ultimate step of the technical progress in the field of the detailed architectural survey related to the cultural heritage. In addition to two phase-difference laser scanners, 3D and topographic photogrammetric systems, we used a photogrammetric drone, programmed and driven to penetrate in the church without any danger for the paintings.

The aim was exporting plants, elevations and sections, as well as orthophotographic images and digital drawings.

### Notes:

- Objective of the assignment: Architectural survey of the complex;
- Client: Ministère de la Culture, Ambassade de France près le Saint-Siège

Perspective view of the church; 1

View of the 3D model; 2

View of the 3D model; 3

Orthophotographic general plan 4

Detail of main facade in dwg format 5



## Architectural and orthophotographic survey

Colonna-Sordi Gallery Palace - Rome - Italy

Three-dimensional and orthophotographic survey of the facades with laser scanning and topographic system. 2017

The Colonna-Sordi Palace is in piazza Colonna in Rome and was built in 1922. It is one of the seats of the Italian Presidency of the Council of Ministers.

In 2017 we carried out the three-dimensional, architectural and orthophotographic survey of the facades of the Palace, useful for the conservation design of the external surfaces of the building.

Note:

- Client: Sorgente GROUP.

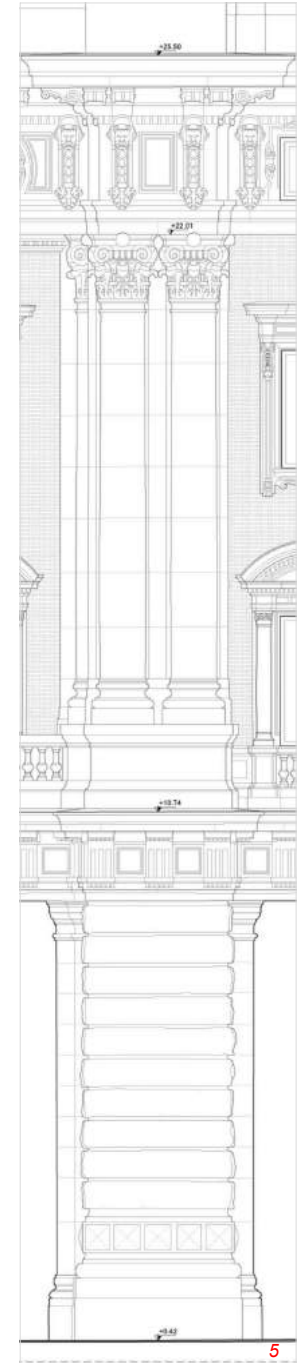
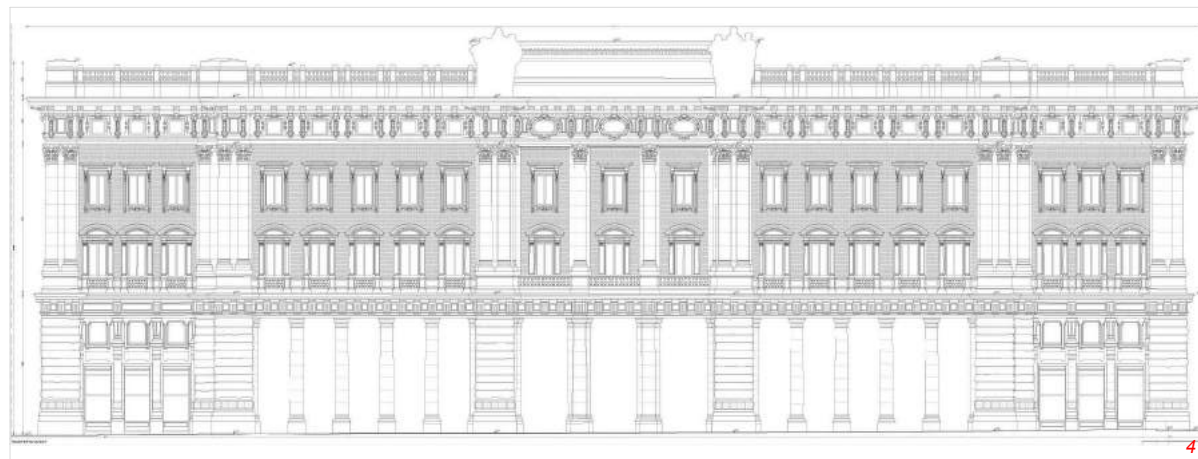
View of the 3D model; 1

View of the 3D model; 2

Orthophotographic elevation of the north side; 3

Main facade in vector format; 4

Detail of main facade. 5





## Architectural and orthophotographic survey

*Palazzo Maccarani Stati - Senate of the Italian Republic, Rome, Italy, 2016*

The Palace is one of the last work in Rome of the Renaissance master, the architect Giulio Romano. The Renaissance palace is currently home to the offices of the Senate of the Italian Republic.

On September, 2016 we carried out the three-dimensional, architectural and orthophotographic survey of the Palace.

The survey was carried out to produce orthophotos and cad drawings, usefull for the conservation design and works of the external surfaces of the building.

*Note:*

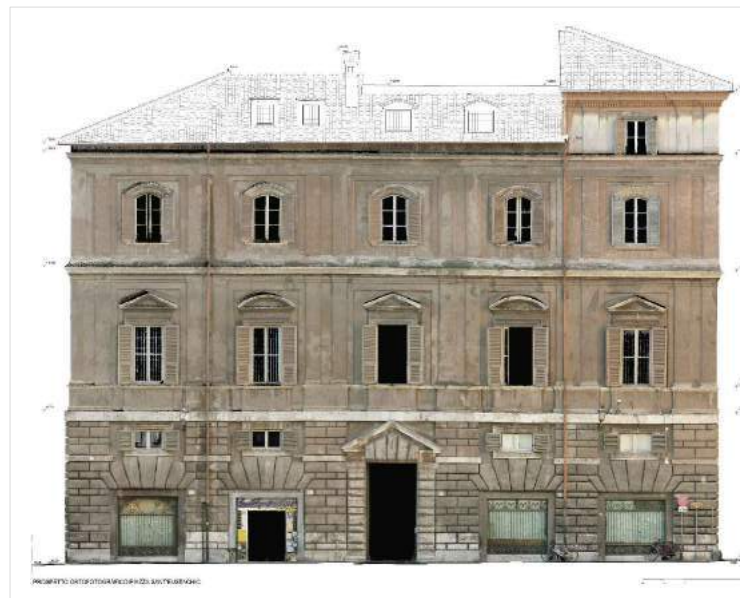
- Objective of the assignment : 3D survey and restitution of all the elevations of the building;
- Client: Private for Ministero delle Infrastrutture e dei Trasporti - Provveditorato interregionale alle OO.PP. per il Lazio, Abruzzo, Sardegna



view of the 3D model; 1

Frames extracted from the video presentation; 2

Main facade in orthophotographic and vector format. 3





## Architectural survey- Integrated survey technology

*Collegio Romano Complex - Headquarter of the Italian Ministry of Cultural Heritage and Activities and Tourism- Rome - Italy - Architectural survey. 2014*

The survey was developed as part of the functional adaptation interventions on electrical, mechanical and special systems of the building.

The work focused on the structures within the Ministry Headquarters, only marginally affecting other properties in the area.

The overall extension of the complex, drawn in plan, is approx. 26,000 square meters. A series of longitudinal and cross sections were also delivered, together with the three elevations facing on the Piazza del Collegio Romano, via del Collegio Romano and Via del Caravita.

- Objective of the assignment : Topographic and architectural measured survey, through three-dimensional technology;

- Client: Italian Ministry of Cultural Heritage and Activities and Tourism.



Field survey 1

Field survey 2

3D Model 3

3D Model 4

Main façade - RGB color 5

Main façade - Cad drawing 6



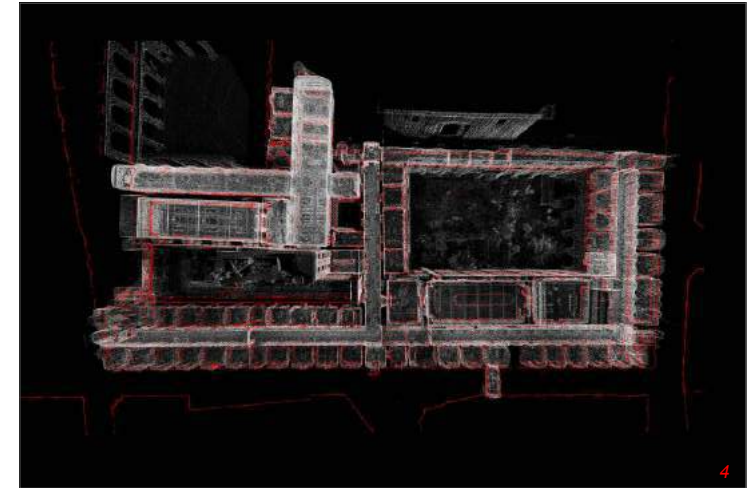
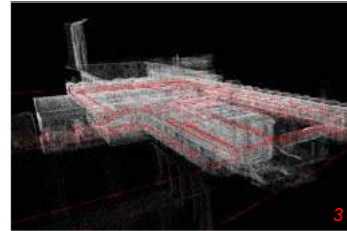
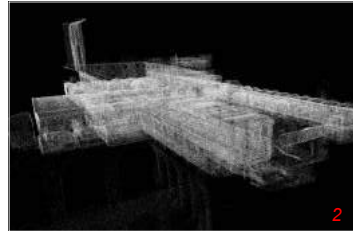


## Architectural survey- Integrated survey technology

Collegio Romano Complex - Headquarter of the Italian Ministry of Cultural Heritage and Activities and Tourism- Rome - Italy - Architectural survey. 2014

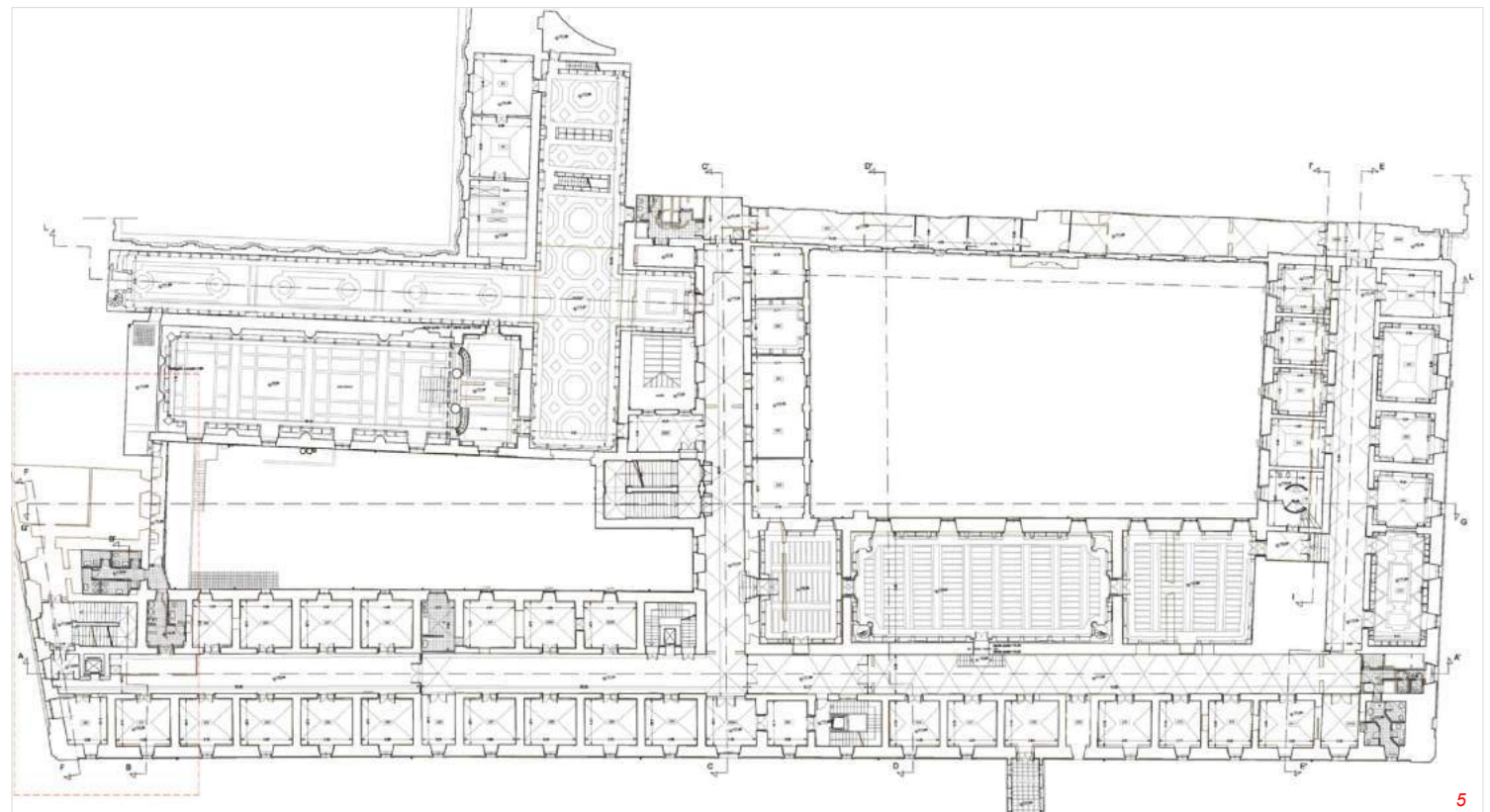
The methodology that we applied for the assignment guarantees the best results to date, both in terms of accuracy and of speed of field and desk operations.

The work has included the use of an integrated system of 3D laser scans, topographic surveys and direct surveys of architectural details. The point clouds acquired by laser scanners were combined in a single three-dimensional model, from which we extracted all the ortho-rectified images used as the basis of measured architectural drawings (plans, sections and elevations).



- Object of the assignment: Architectural survey, topographic and three-dimensional survey;

- Client: Italian Ministry of Cultural Heritage - Direzione Generale.



Field survey; 1

Point clouds; 2

From the point clouds to the cad plan; 3

From the point clouds to the cad plan (section line is highlighted in red); 4

Cad drawing (second floor plan) 5



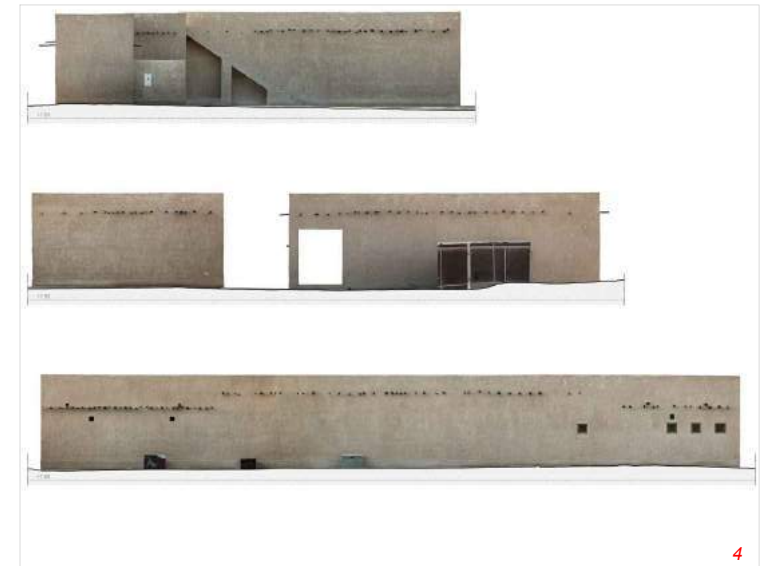
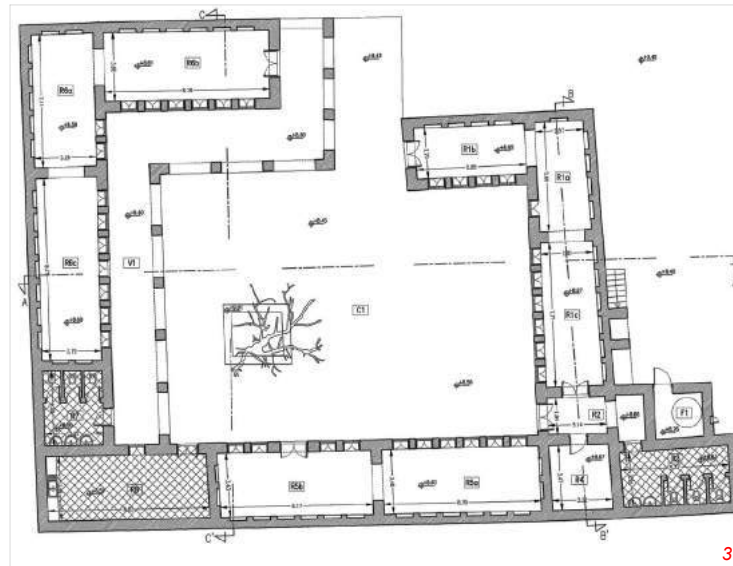
## Architectural survey- Integrated survey technology

*Qatar - Doha - Restoration of the Historic Structures in Education City - Doha. Geometrical and Dimensional/3D survey and Photogrammetric Survey. 2013*

This page shows the survey of one historic building inside the Education City - a courtyard house - Each three-dimensional model has been georeferenced to the topographic benchmarks of the municipality of Doha.

### Notes:

- Objective of the assignment : "Restoration of Historical Structures in Education City".
- Architectural survey, topographic and three-dimensional photogrammetric survey;
- Client: ARS Progetti SPA for Qatar Foundation



3D model 1

3D model 2

Ground floor plan 3

Orthophotographic elevations 4

Orthophotographic section 5





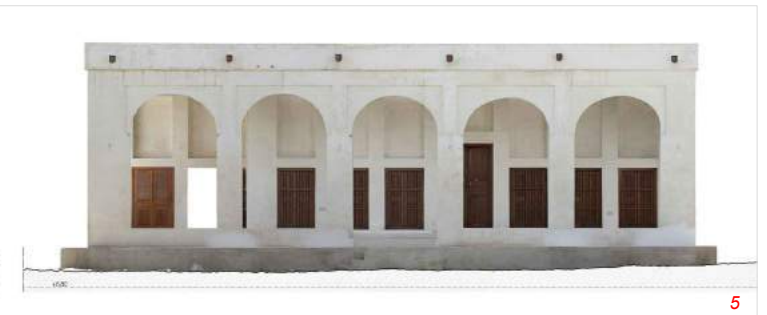
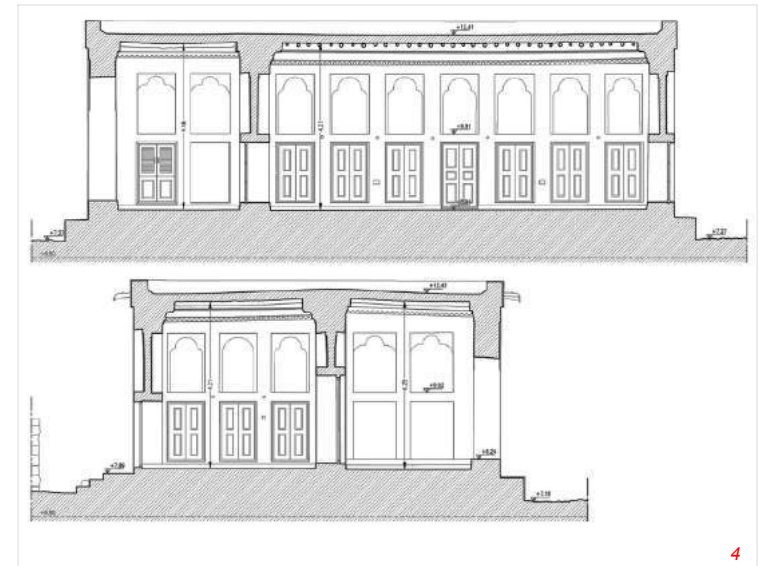
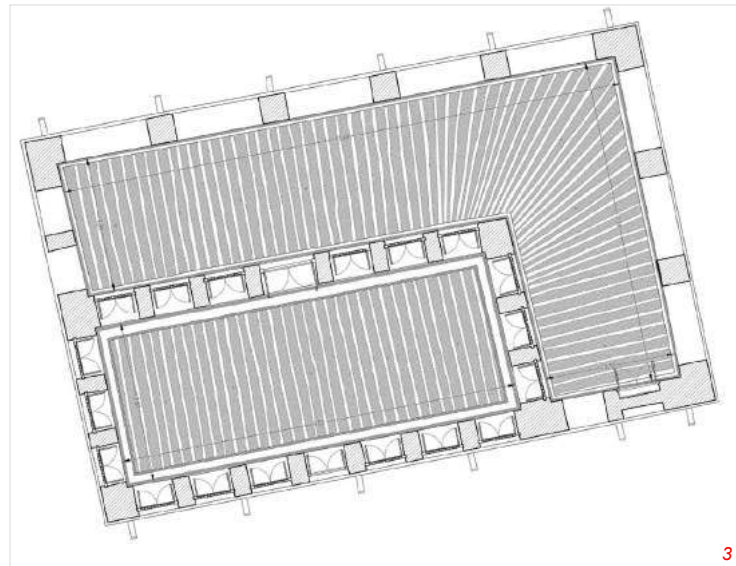
## Architectural survey- Integrated survey technology

*Qatar - Doha - Restoration of the Historic Structures in Education City - Doha. Geometrical and Dimensional/3D survey and Photogrammetric Survey. 2013*

In December 2013 we undertook the survey and architectural measured drawings of the buildings within the area of the Education City in Doha. The survey aimed to document the consistency of the historical and architectural heritage of the area by means of two-dimensional drawings and orthophotos. Here are some pictures of one of the buildings. The task encompassed the survey of the sites in 3D format, to produce a model usable in BIM software.

### Notes:

- Objective of the assignment : "Restoration of Historical Structures in Education City".
- Architectural survey, topographic and three-dimensional photogrammetric survey;
- Client: ARS Progetti SPA for Qatar Foundation



3D model 1

3D model 2

Reflected ceiling plan 3

Sections 4

Orthophotographic elevations 5



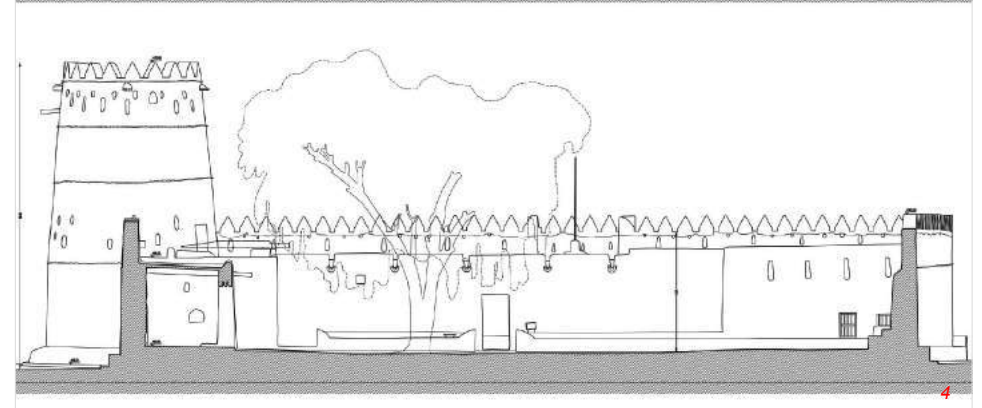
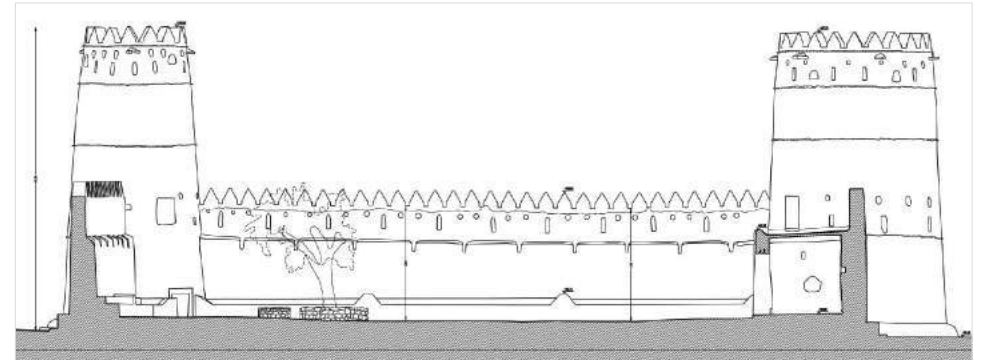
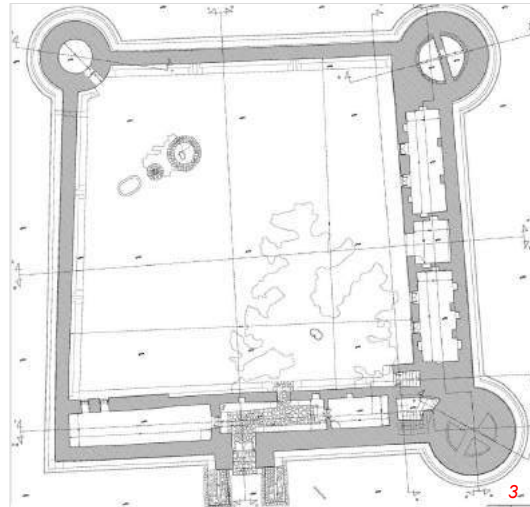
## Architectural survey- Integrated survey technology

*Sultan Fort, National Museum and Souks in Al Ain - United Arab Emirates. "Conservation Services for the Al Ain Souks and National Museum". 2014*

In July 2014 we undertook the topographic and measured architectural survey of Al Ain National Museum, Sultan Fort and Old Souks, in the Abu Dhabi U.A.E.

Plans, sections and elevations of each building of the complex were drawn at 1:50-1:100 scale. Images on the right refer to the field campaign and to a selection of outputs delivered for the Sultan Fort.

- Objective of the assignment : Architectural survey, topographic and three-dimensional survey;  
- Client: ARS Progetti SPA for TCA Abu Dhabi.



Field survey 1

Field survey 2

Ground Floor Plan 3

Sections 4

Main façade - RGB color 5



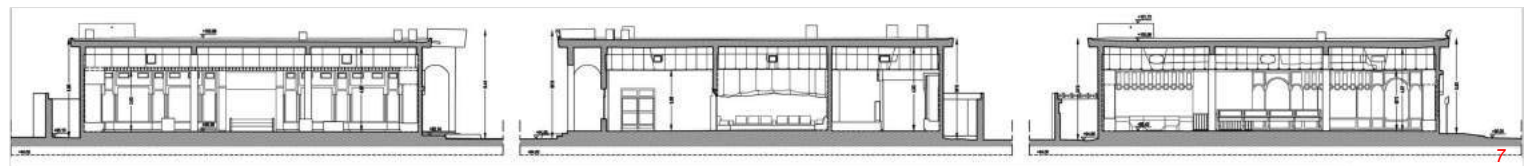
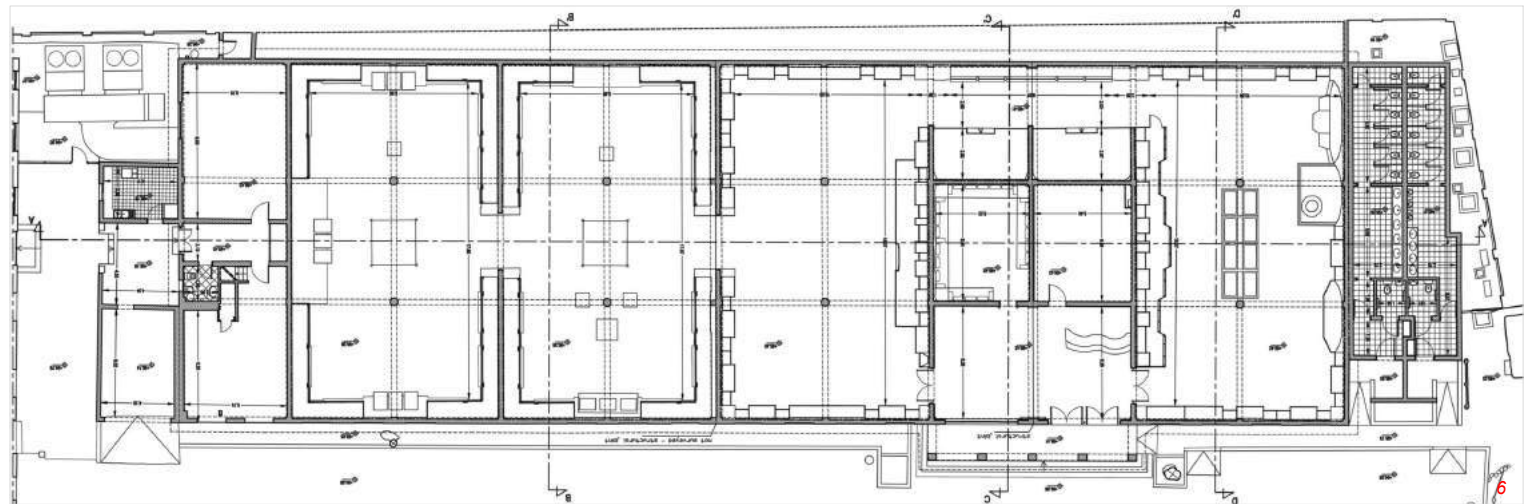
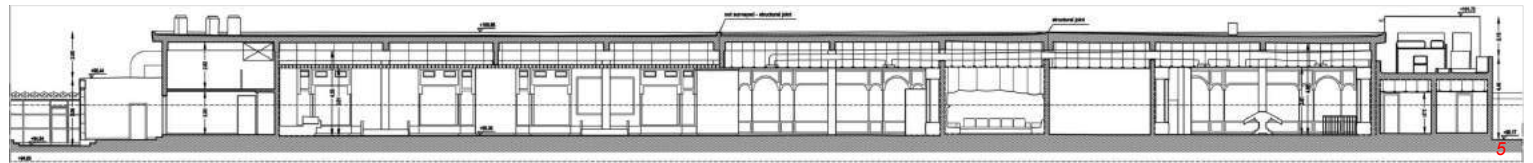


## Architectural survey- Integrated survey technology

*Sultan Fort, National Museum and Souks in Al Ain - United Arab Emirates. "Conservation Services for the Al Ain Souks and National Museum". 2014*

Images on the right refer to the main elevation of Al Ain National Museum, together with some of the drawings describing the building. The overall extension of the surveyed areas (National Museum, Sultan Fort, Souks) is approx. 30.000 square meters. Field work lasted ten working days. Seven technicians collected all needed data by means of three laser scanners, two GPS (base and rover) and two total stations.

- Objective of the assignment : Architectural survey, topographic and three-dimensional survey;  
- Client: ARS Progetti SPA for TCA Abu Dhabi.



3D Model - RGB color 1

Picture of the main façade 2

Picture of the main façade 3

Main façade - RGB color 4

Section 5

Ground Floor Plan 6

Cross sections 7



## Architectural survey- Integrated survey technology

San Michele a Ripa Grande Complex - Roma - Italy-  
Architectural survey. 2013-2014

The Complex of San Michele a Ripa Grande is one of the largest architectural structures of Rome. It was built between the late seventeenth and early eighteenth century as a multipurpose facility. Between 2013 and 2014 we undertook the survey of the Central Institute for Cataloguing and Documentation headquarters, finalized to the structural analysis of the complex.

The drawings (plans, sections, elevations), at 1:50 scale, cover an area of approx. 22,000 square meters.

The images here on the right show the field work and some processing details.

- Objective of the assignment : Topographic, 3D and architectural survey;  
- Client: Istituto Centrale per il Catalogo e la Documentazione - ICCD



Picture of the main courtyard of the complex 1

Courtyard - 3D model 2

Field survey; 3

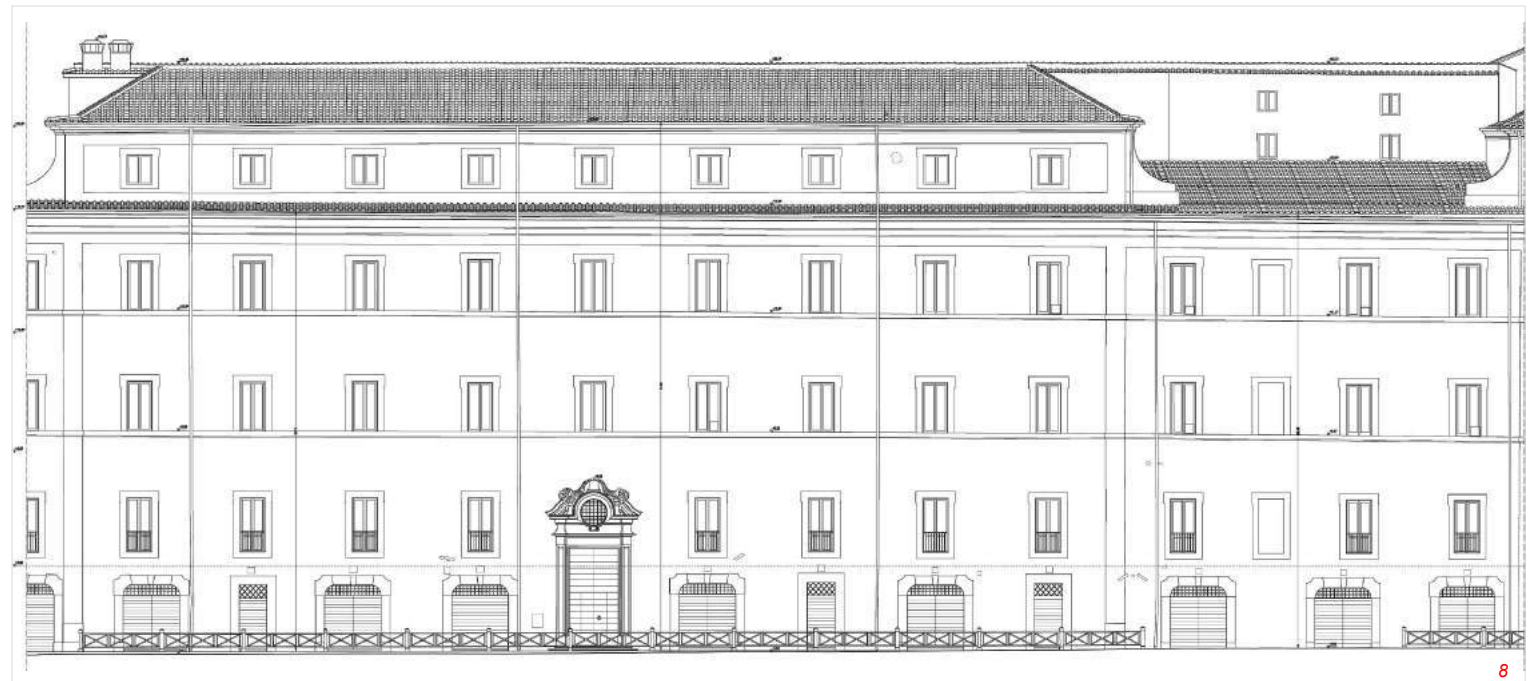
Field survey; 4

Courtyard and facade - 3D model 5

View of the facade - RGB point clouds 6

Detail - RGB point clouds 7

Facade - Cad drawing 8





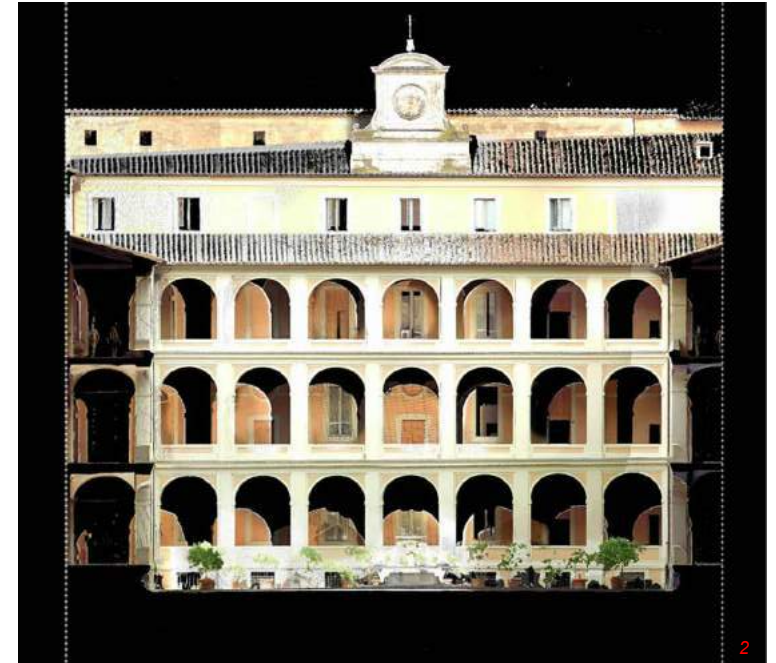
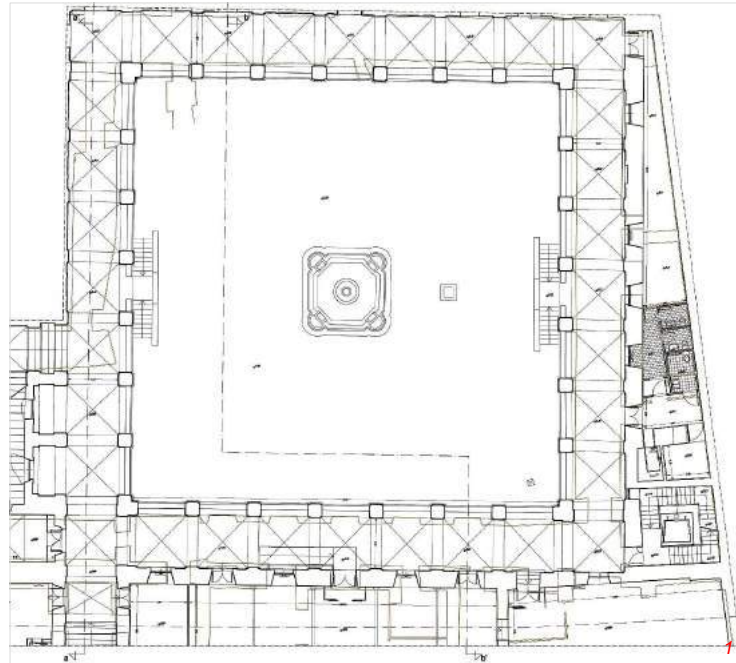
## Architectural survey- Integrated survey technology

San Michele a Ripa Grande Complex - Roma - Italy-  
Architectural survey. 2013-2014

Measured drawings are the last step in the post-processing operations. This phase of work has also required photographic documentation and direct surveys of architectural details.

This methodology allowed to produce extremely detailed and precise outputs very quickly.

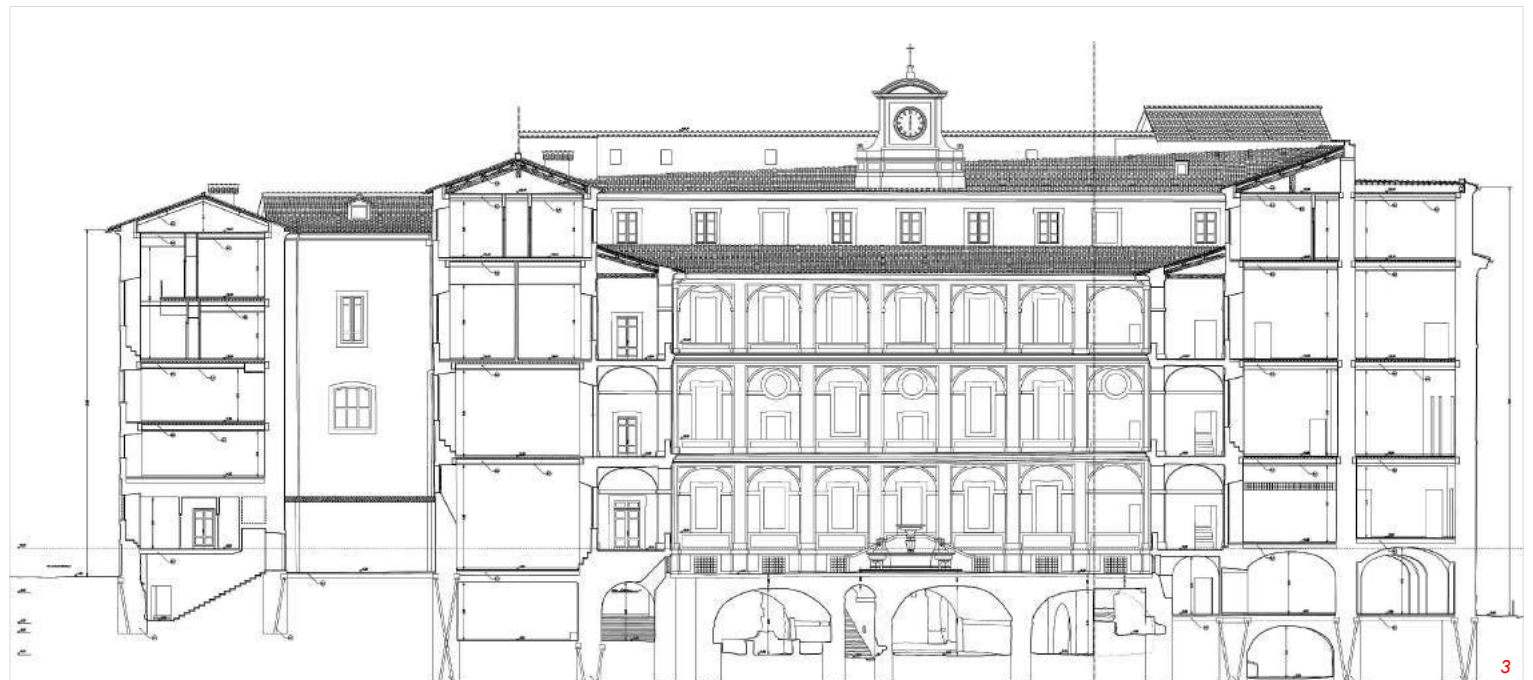
- Objective of the assignment : Topographic, 3D and architectural survey;  
- Client: Istituto Centrale per il Catalogo e la Documentazione - ICCD



Basement - Detail of the cad drawing 1

Detail - RGB color section 2

Cross section - Cad drawing 3



## Architectural survey- Integrated survey technology

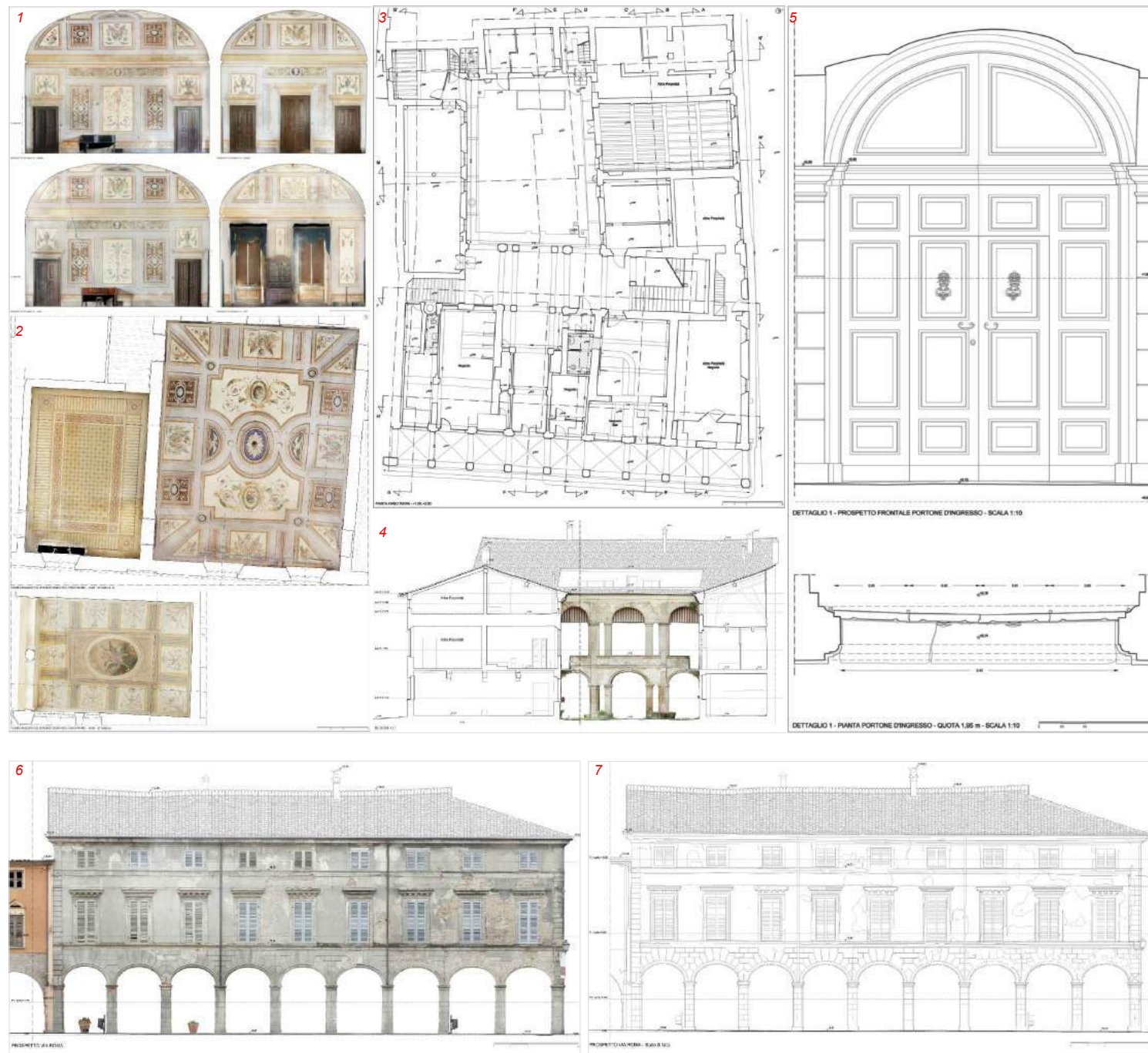
Busseto (Parma) - Italia - Palazzo Orlandi - 3D laser scanner survey, measured architectural drawings and orthophotos of Palazzo Orlandi in Busseto (PR). 2015

The methodology that we applied for the assignment guarantees the best results to date, both in terms of accuracy and of speed of field and desk operations.

The work has included the use of an integrated system of 3D laser scans, topographic surveys and direct surveys of architectural details. The point clouds acquired by laser scanners were combined in a single three-dimensional model, from which we extracted all the ortho-rectified images used as the basis of measured architectural drawings (plans, sections and elevations).

### Notes:

- Objective of the assignment: 3D laser scanner survey, measured architectural drawings and orthophotos of Palazzo Orlandi in Busseto (PR);
- Client: Archires srl - Sorgente Group SpA





## Architectural survey- Integrated survey technology

### Iraq - Tell and Erbil Citadel

#### Studies for the stabilization of the Erbil Citadel Slope and Perimeter Facades. 2011

The Erbil Citadel was inserted in the UNESCO World Heritage List in 2014. The survey here shown is part of the documents produced for inscribing the Citadel in the List.

The survey was focused on the analysis of the tell and perimeter facades.

The field work was conducted by a team of three technicians in nine working days using an integrated system of technologies. A general polygonal net around the Citadel was realized using two GPS. At the same time the laser scans of the whole site were produced. A topographic survey were carried out by a total station, in order to georeference the scans. A photographic survey both from the ground and from 20 meters above, from an aerial lift truck, was necessary to generate the orthophoto of all the facades of the perimeter of the tell. The post processing phase lasted about two months to produce the topographic maps and the elevations of about 45,000 sqm both in orthographic and cad format.

- Objective of the assignment: Studies for the Stabilization of the Erbil Citadel and the Perimeter Facades;

- Client: ARS Progetti SpA for UNESCO

- UNESCO World Heritage Site.

Orthographic elevations **1**

Field surveys **2**

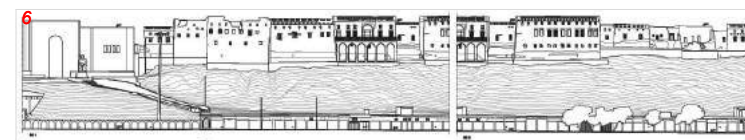
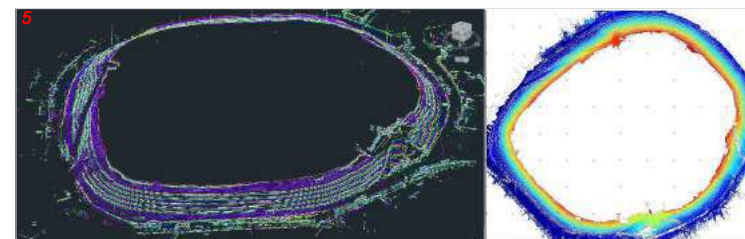
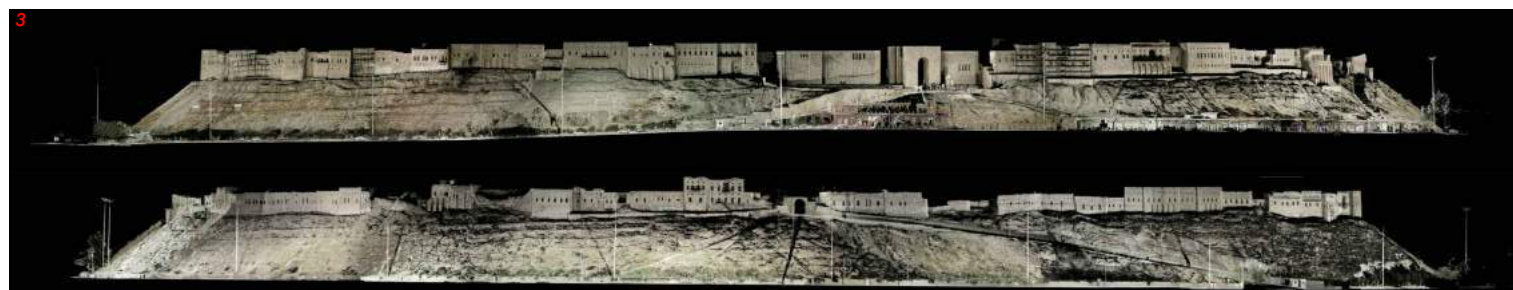
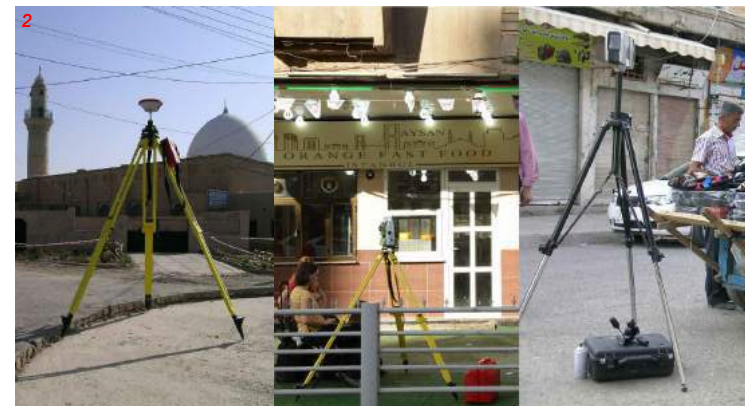
General elevation - points clouds in RGB colours; **3**

General plan - points clouds in RGB colours; **4**

3D model with contour lines in colour scale; **5**

Elevations - cad drawings; **6**

Elevation - points clouds; **7**





## Three-dimensional survey

Scrovegni Chapel - Padova - Three-dimensional survey of the complex. 2014

The Scrovegni Chapel in Padova is known for the fresco cycle, one of the most important masterpieces painted by Giotto in the early 14th century. In April, 2014 we carried out the survey and the orthographic restitution of all the wall paintings of the Chapel's crypt. Within this assignment we also implemented the three-dimensional model of the upper chapel. All painted surfaces of the crypt were drawn in scale 1:20/50.

All the drawings were extracted from the three-dimensional model of the complex.

**Note:**

- Objective of the assignment: Survey of the Scrovegni Chapel crypt and orthographic reproduction of the wall paintings of the crypt. Laser scanner, topographic and photogrammetric technologies;

- Client: ISCR Istituto Superiore per la Conservazione e il Restauro



1



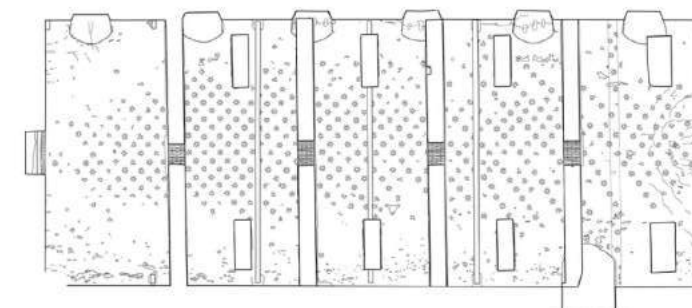
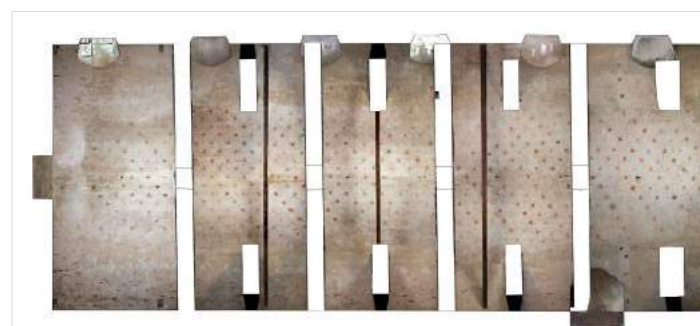
2

Chapel 3D model; 1

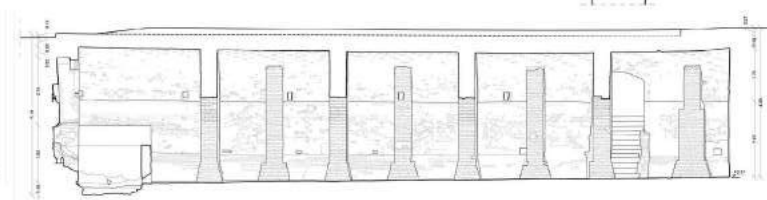
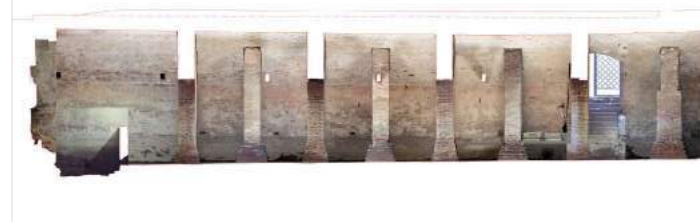
Cross section - point cloud in RGB colours; 2

Isographic (reflected ceiling) plan, orthographic view and cad drawings; 3

Longitudinal section, orthographic view and cad drawing; 4



3



4





## Photogrammetric survey of byzantine paintings

*Survey of Decani Monastery and Pec Patriarcate by photogrammetry- Kosovo. 2009*

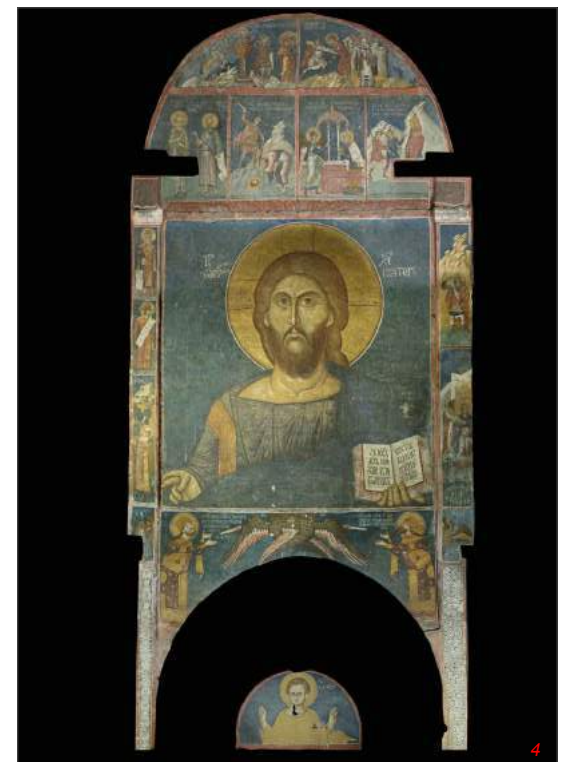
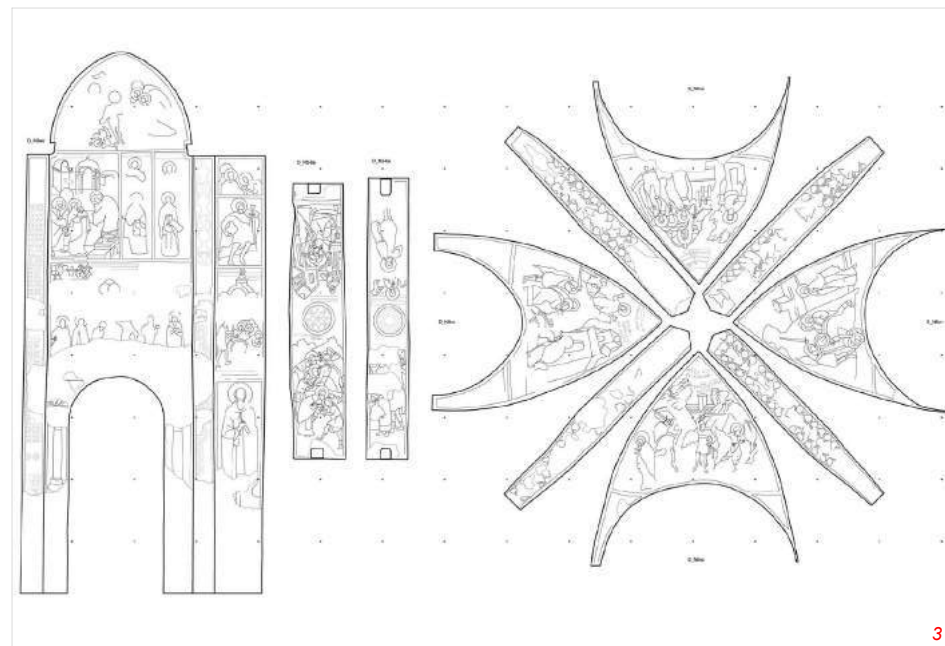
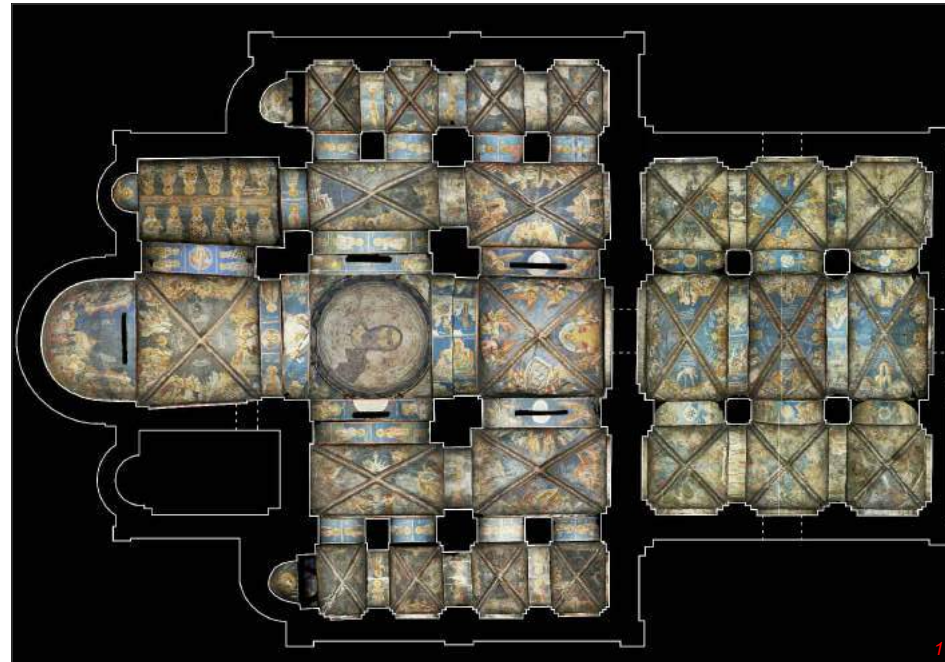
Between 2006 and 2012 we carried out the 3D survey, orthophoto and measured drawings of all the painted surfaces of the Byzantine complexes ,inscribed on UNESCO's World Heritage List since 2004. The assignment included the static monitoring of the walls by means of photogrammetric and topographic technologies.

The frescoed surfaces (more than 7000 square meters) were drawn at 1:20 - 1:10 scale.

The images refer to Decani Monastery (2009); they have been acquired by three-dimensional photogrammetric techniques for generating point clouds.

### Notes:

- Objective of the assignment: Survey of the frescoed surfaces of Decani Monastery, Kosovo
- Client: INTERSOS ngo for Unesco
- UNESCO World Heritage Site.



Reflected ceiling plan; 1

View of the photogrammetric point cloud; 2

Drawings; 3

Orthophoto; 4

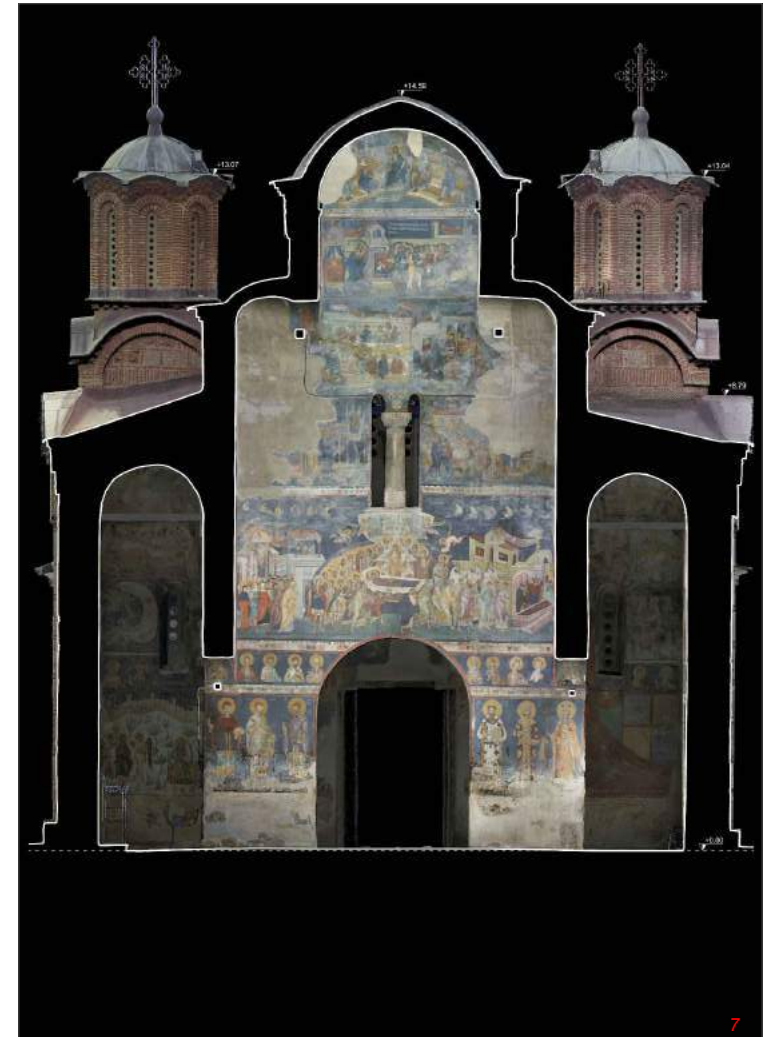


## Photogrammetric survey of byzantine paintings

Gracanica - Kosovo - Gracanica Monastery -  
Topographic, 3D laser scanning and photogrammetric  
survey, flat reproduction of the iconography of the wall  
paintings. 2012

Gracanica Monastery is one of Kosovo monuments in the UNESCO's World Heritage List. The survey was carried out to document all the painted cycles. Image n.7 is an orthophotographic section, in scale 1:20, here shown out of scale. All sections are produced from the tridimensional model. The perspective views of the church are extracted from the points clouds, shown in RGB colors. The colors of images are obtained directly from the internal camera of the laser scanner. Inside the church, we carried out the survey by using two different techniques: laser scanning integrated with high resolution pictures, taken from a professional camera.

- Objective of the assignment : 3D laser scanning and photogrammetric survey of the wall paintings of Gracanica Monastery in Kosovo;  
- Client: INTERSOS ong for US Embassy in Kosovo.



3D model 1

3D model 2

3D model 3

3D model 4

3D model 5

Orthophotographic section 6

Orthophotographic section 7



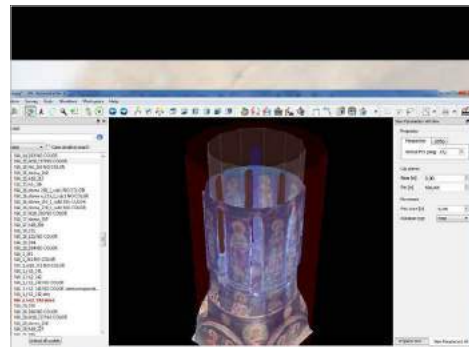


## Flat reproduction of the wall paintings

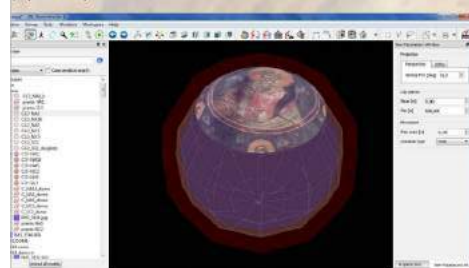
Gracanica - Kosovo - Gracanica Monastery -  
Topographic, 3D laser scanning and photogrammetric survey, flat reproduction of the iconography of the wall paintings. 2012

The church contains seven domes, five of which are set on painted drums. These architectonic elements make a curved surface form that can be likened to a cylinder. We found the way to develop curve surfaces and vaults with complex shapes, with specific solution in regard to the geometry and iconographic division of the paintings. In the following images are shown some examples of the flat reproduction of curved surfaces.

Note:  
- Object of the assignment : 3D laser scanning and photogrammetric survey of the wall paintings of Gracanica Monastery in Kosovo ;  
- Client: INTERSOS ong; Founded: US Embassy in Kosovo.



projected on: cylindrical surface

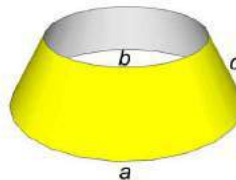


part of the dome projected on spherical surface



part of the dome likened to a surface with a truncated cone shape

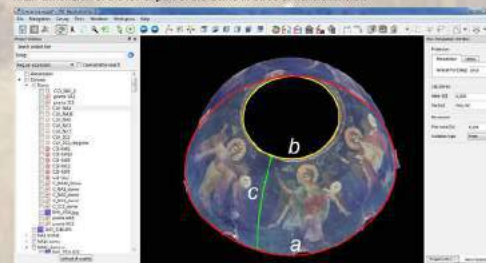
dimension of the cone shape



Developing the iconography of the wall paintings of a dome onto a flat surface

$$\begin{aligned} b &= x \pi y \rightarrow 0 < x < 2 & x &= \frac{b}{\pi y} & \alpha &= -\frac{360}{2\pi} \frac{bc}{a-b} \\ a &= x \pi (y+c) & y &= \frac{bc}{a-b} \\ 360 : 2\pi y &= \alpha : b \end{aligned}$$

Main dimension of the lower part of the dome in three dimensional view



Main dimension of the lower part of the dome in flat view





## Flat reproduction of curved surfaces

S. Cecilia, S. Clemente, S. Francesca Romana

- Rome - Survey of the apses, laser scanner technology. 2013

Within the frame of the ISCR's studies on mosaic decorations in early Christian basilicas of S. Cecilia, S. Clemente and S. Francesca Romana, in 2013 we surveyed and drew the decorations in CAD. We focused on the survey and on producing a flat view of the churches' apses. The images on the right show some examples of orthographic plans and flat projection of the apses, with different geometries, according to the iconography of the mosaics.

- Objective of the assignment: Survey of the apses of the basilicas of S. Cecilia, S. Clemente and S. Francesca Romana;

- Client: ISCR Istituto Superiore per la Conservazione e il Restauro.



S. Francesca Romana - ipographic (reflected ceiling) plan of the apse; 1

S. Francesca Romana - flat view of the apse divided by sectors; 2

S. Clemente - ipographic (reflected ceiling) plan of the apse; 3

S. Clemente - flat view of the apse divided by slices; 4

S. Cecilia - ipographic (reflected ceiling) plan of the apse; 5

S. Cecilia - flat view of the apse divided by slices; 6



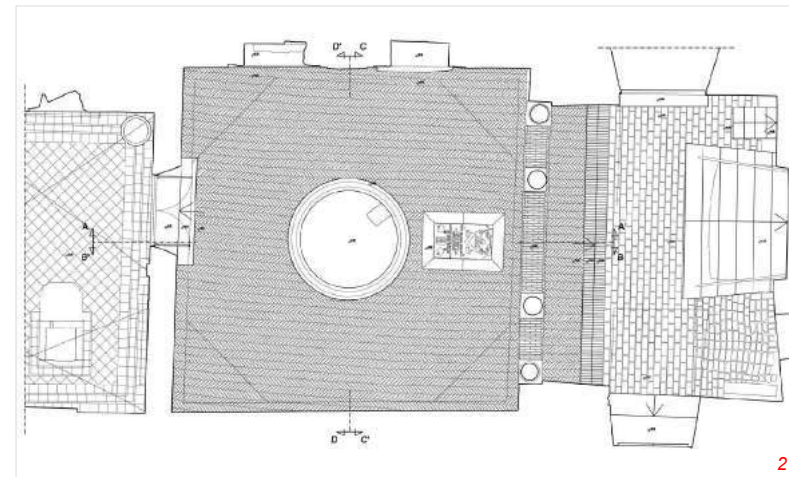


## Architectural survey and flat reproduction of the dome

Naples - Italy - Battistero di San Giovanni in Fonte -  
General survey of the complex with laser scanner and  
photogrammetric technology. 2014

The aim of the general survey of the Battistero di San Giovanni in Fonte in Naples was an accurate documentation of the mosaics dated back to the V century a.D. We produced ortophotographic elevations, sections and plan, drawn in cad in scale 1:50-1:10. The flat drawing of the dome mosaics derived from the study of the irregular geometry of the surfaces.

Notes:  
- Objective of the assignment: Survey of Battistero di San Giovanni in Fonte ;  
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro



Perspective view of the 3D model; 1

General plan - cad drawing; 2

Ortophotographic sections; 3

Ipographic plan and flat drawing of the dome; 4





## Three-dimensional survey

*Niccolò Forteguerri's funerary monument - Church of S. Cecilia in Trastevere, Rome - Italy. Measured survey mixing laser scanning and photogrammetric techniques. 2013*

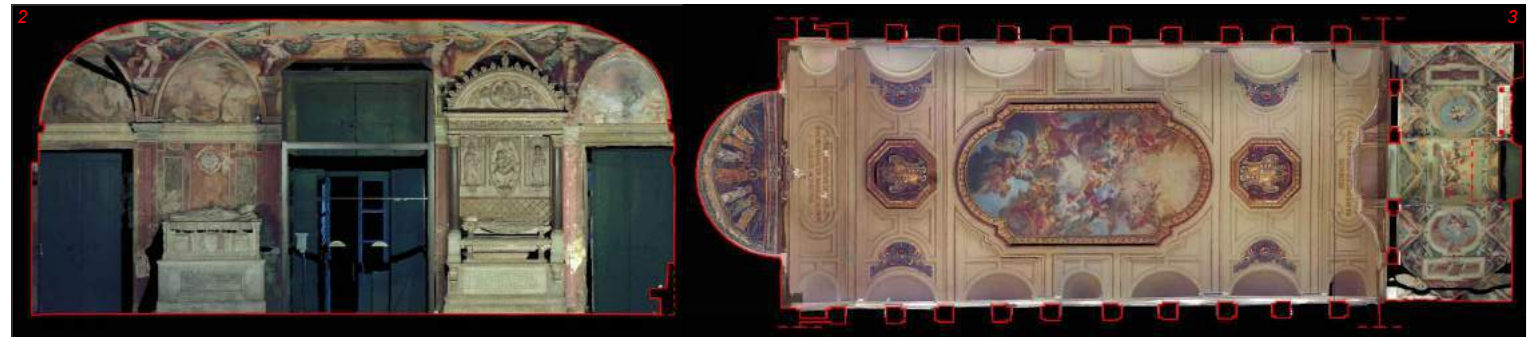
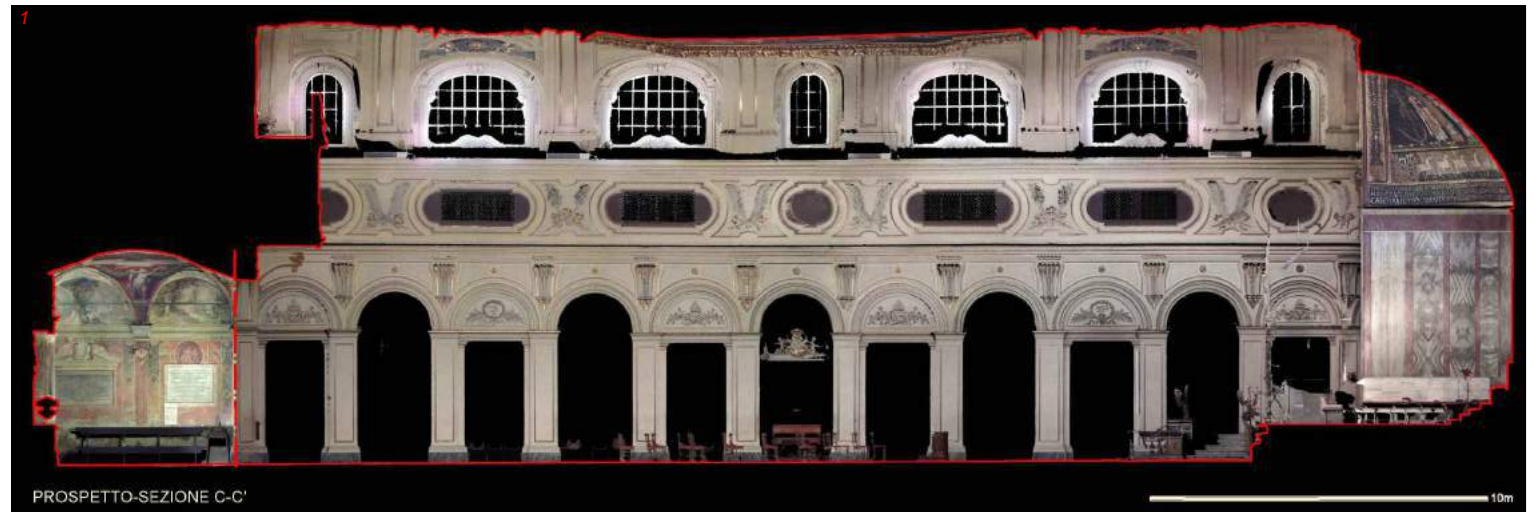
The monument shows a very complex geometry, given by a all-round sarcophagus made of two overlying parts inserted into a niche.

The work consisted in the measured survey, scale 1:10/5, of the monument before and after the conservation works, and in the general survey of the church.

Images on the right refer to the monument acquired by photogrammetric technique and laser scanner.

### Notes:

- Object of the assignment : Three-dimensional survey of the monument and restitution of sections, elevations and plan in ortho-photographic and vector format.
- Client: Istituto Superiore per la Conservazione ed il Restauro - ISCR;



Elevation-Section of the church of S. Cecilia and its counter-façade - points cloud in RGB colors; **1-2**

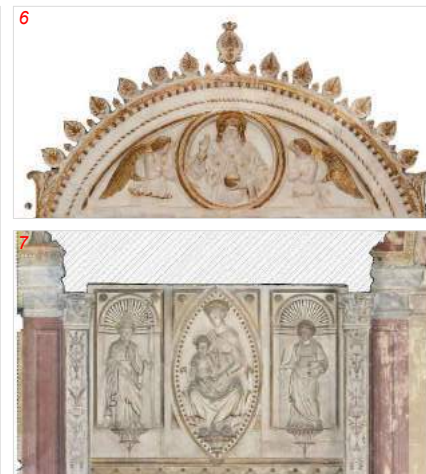
Isographic plan of the church of S. Cecilia - points cloud in RGB colors; **3**

Orthophotographic plan, sections and elevation before conservation works; **4**

Orthophotographic elevation after the conservation works; **5**

Detail - Orthophotographic elevation after the conservation works; **6-7**

Picture taken during the field work **8**





## 3D photogrammetric survey

Beijing - China - 3D photogrammetric survey of Zhalan Cemetery and Tomb of Father Matteo Ricci. 2010.

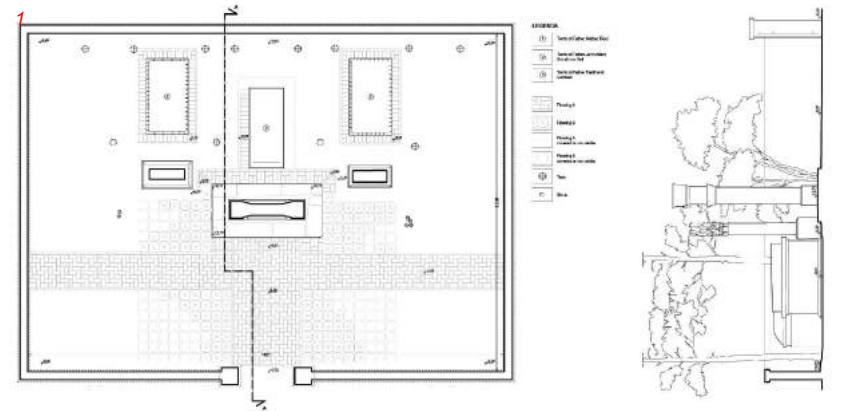
As part of the Italo-Chinese cooperation project for the conservation of the Funeral Monument of Father Matteo Ricci, CPT Studio developed the general survey of the site and the orthophotos and drawings of all the elevations and plants extracted from photogrammetric three-dimensional models, scale 1:10.

A further step consisted in the vectorization of materials and condition survey of the monument.

Thanks to the procedures we applied, field work was carried out in a single working day.

### Notes:

- Subject appointed: Arch. Pietro Gasparri, C.P.T. Studio srl CEO;
- Objective of the assignment: "Beijing - China. Conservation works of the Funeral Monument of Father Matteo Ricci";
- Client: ISCR - Istituto Superiore per la Conservazione ed il Restauro



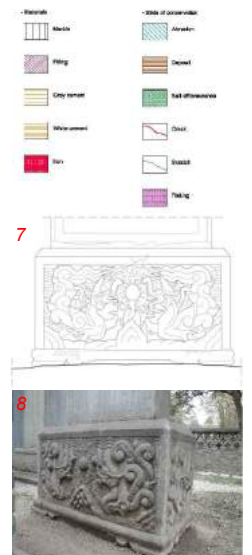
General Plan and cross section of the site **1**

Front view of the site **2**

Points cloud and drawings of the Tomb of Father Verbiest **3**

Elevation, materials mapping and condition survey of the Tomb of Father Matteo Ricci **4-6**

Detail of the base of the Tomb of Father Verbiest, CAD drawing and picture **7-8**





## Survey and documentation for conservation

Rome, Italy - Statue of St. Bibiana by Gian Lorenzo Bernini in the church of Santa Bibiana.

Three-dimensional survey of the sculpture and 3D modelling of the niche for the new placement of the statue. 2018

In 18th century, after the base of the statue of Santa Bibiana, by Gian Lorenzo Bernini, was damaged, it was relocated to an incorrect position. After an important conservation intervention, in September 2018, it was decided to study a new location within the niche, based on the existing historical iconography. Therefore we made two three-dimensional surveys, one of the niche and one of the sculpture, in order to virtually simulate the different admissible solutions, correcting the rotation of the axis of the statue to the original position. The three-dimensional model obtained was used to verify, in an indirect and non-invasive way, the best placement of the statue.

### Notes:

- Objective of the assignment: Three-dimensional survey of the sculpture and 3D modelling of the niche for the new positioning of the statue of St. Bibiana;

- Client: Associazione "Piazza Vittorio APS"

Photo of the statue of St. Bibiana; 1

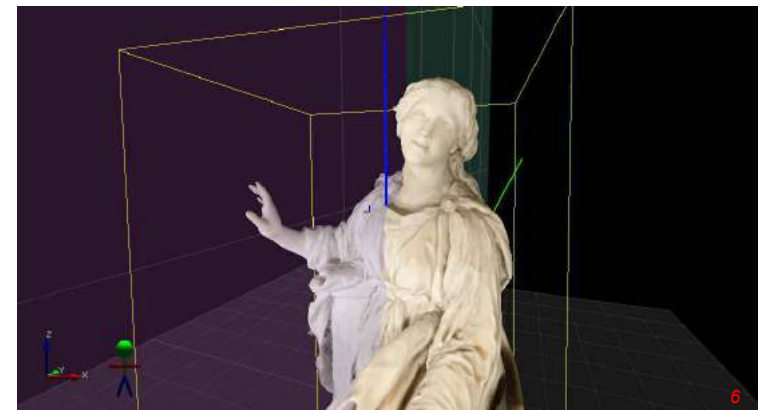
3D model - Positioning of the sculpture in the niche according to the orientation before the intervention; 2

3D model - New positioning of the statue in the niche; 3

General view of 3D model; 4

3D model of the niche without the statue; 5

3D model of the statue 6





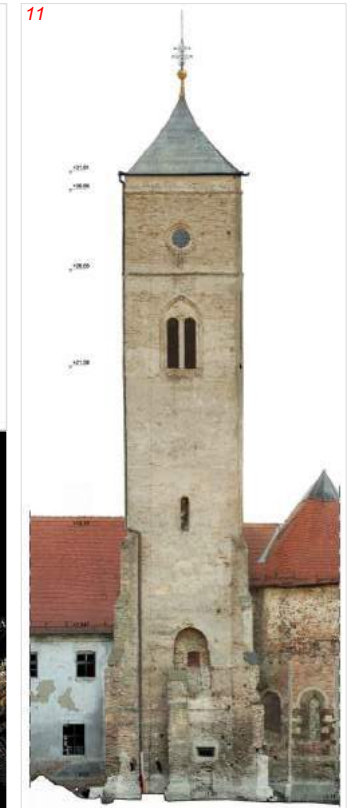
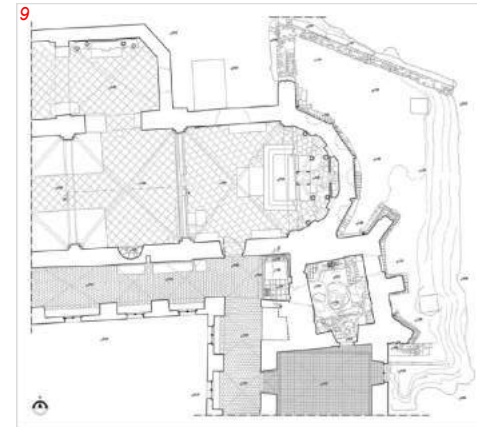
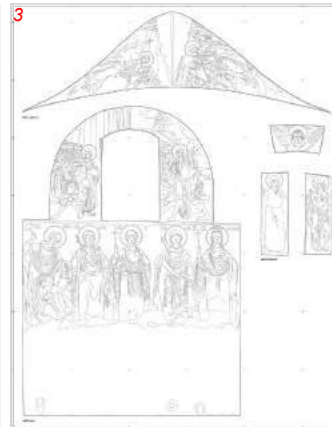
## Survey and documentation for conservation

Bojani, Kalemegdal, Bac - Serbia - Laser scanning survey in the framework of the training course "Control survey - 3D Laser scanning" and "Documentation for conservation - Graphical documentation", held at the Central Institute for Conservation (CIK) in Belgrade. 2011-2012

Between 2011 and 2012 the CEO of C.P.T. Studio, Arch. Pietro Gasparri held training in the CIK Belgrade for the technicians in the field of documentation and use of advanced technologies for surveying and conservation purposes. Besides the specific courses, he carried out the survey of some Serbian sites.

### Notes:

- Objective of the assignment: Workshop for the conservation of wall painting;
- Client: Italian Ministry of Foreign Affairs (MAE), General Directorate for International Cooperation (DGCS); Istituto Superiore per la Conservazione e il Restauro (ISCR)



Lesson in CIK, Belgrade; 1

Bojani Monastery: drawings, orthophotos, 3D model; 2-4

Charles VI Gate: picture, orthophotos, 3D models; 5-8

Bac Monastery: drawings, orthophotos, 3D model 9-11





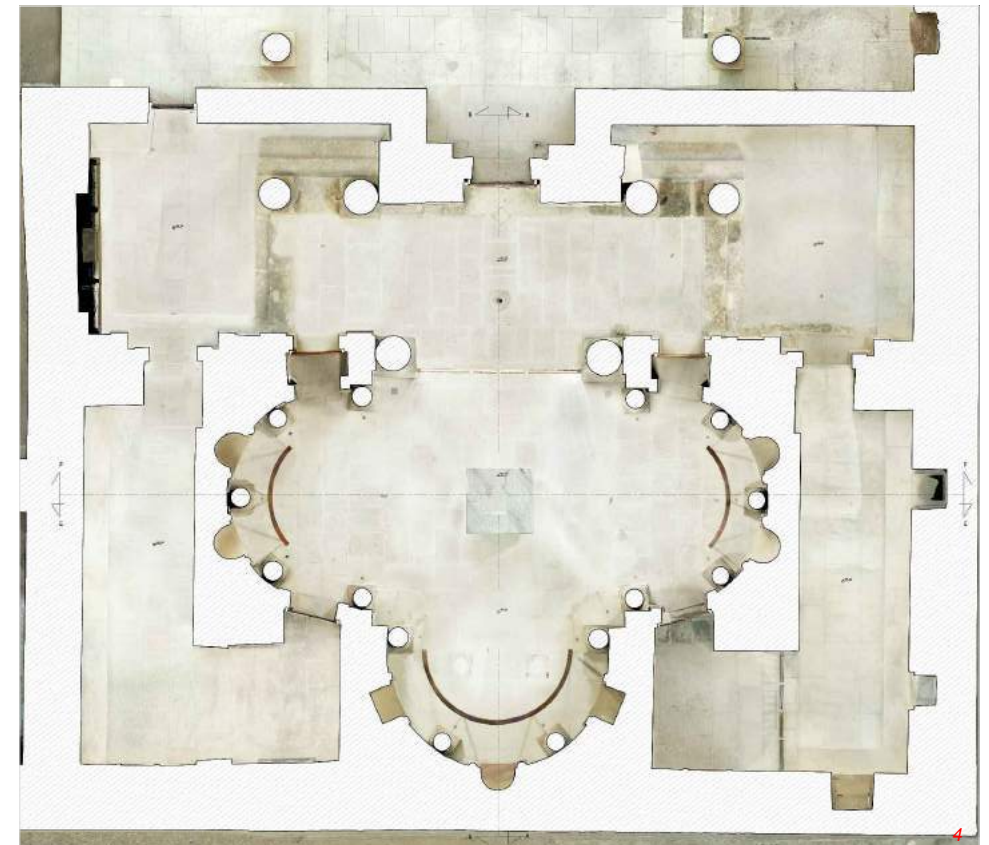
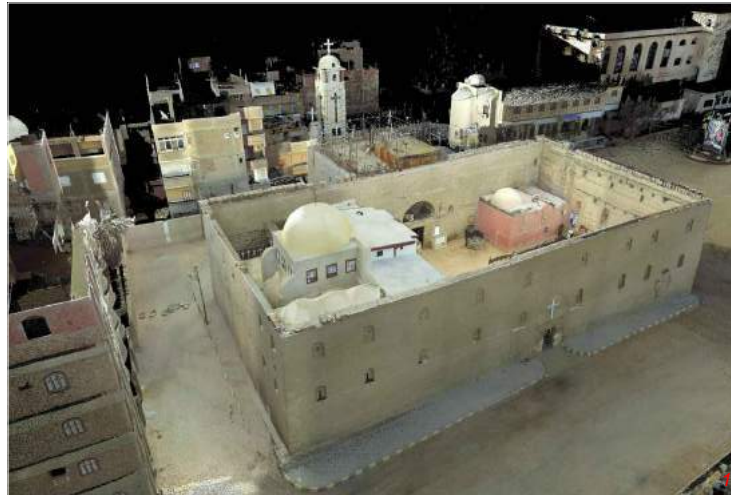
## Architectural survey- Integrated survey technology

*Red Monastery - Sohag - Egypt. Architectural survey  
by Laser Scanner technology. 2015*

In May 2015 we undertook the survey of the whole Red Monastery complex. The work aimed to document the condition of the complex at that time, focusing on the triconch, the extraordinary space created by three apses entirely decorated. The images here are directly extracted from the points clouds 3D model. To get better results, the model was integrated with supplementary photographic texture (obtained by high resolution pictures), re-projected on the 3D model during the post-processing phase.

**Notes:**

- Objective of the assignment: Architectural survey of the Red Monastery;
- Client: ARCE - American Research Center in Egypt



3D model; 1

3D model; 2

Orthophotographic cross section; 3

Triconch - plan; 4





## Architectural survey- Integrated survey technology

*Red Monastery - Sohag - Egypt. Architectural survey  
by Laser Scanner technology. 2015*

The integrated methodology of 3D scans, topographic surveys and direct surveys ensures maximum results in terms of accuracy and speed. The whole field work was carried out in 7 working days by two technicians. The points clouds acquired by laser scanners were registered in a single three-dimensional model. All two-dimensional drawings (plans, sections, elevations) and three-dimensional views were extracted from the global 3D model.

### Notes:

- Objective of the assignment: Architectural survey of the Red Monastery;
- Client: ARCE - American Research Center in Egypt



3D model; 1

3D model; 2

Triconch - 3D model 3

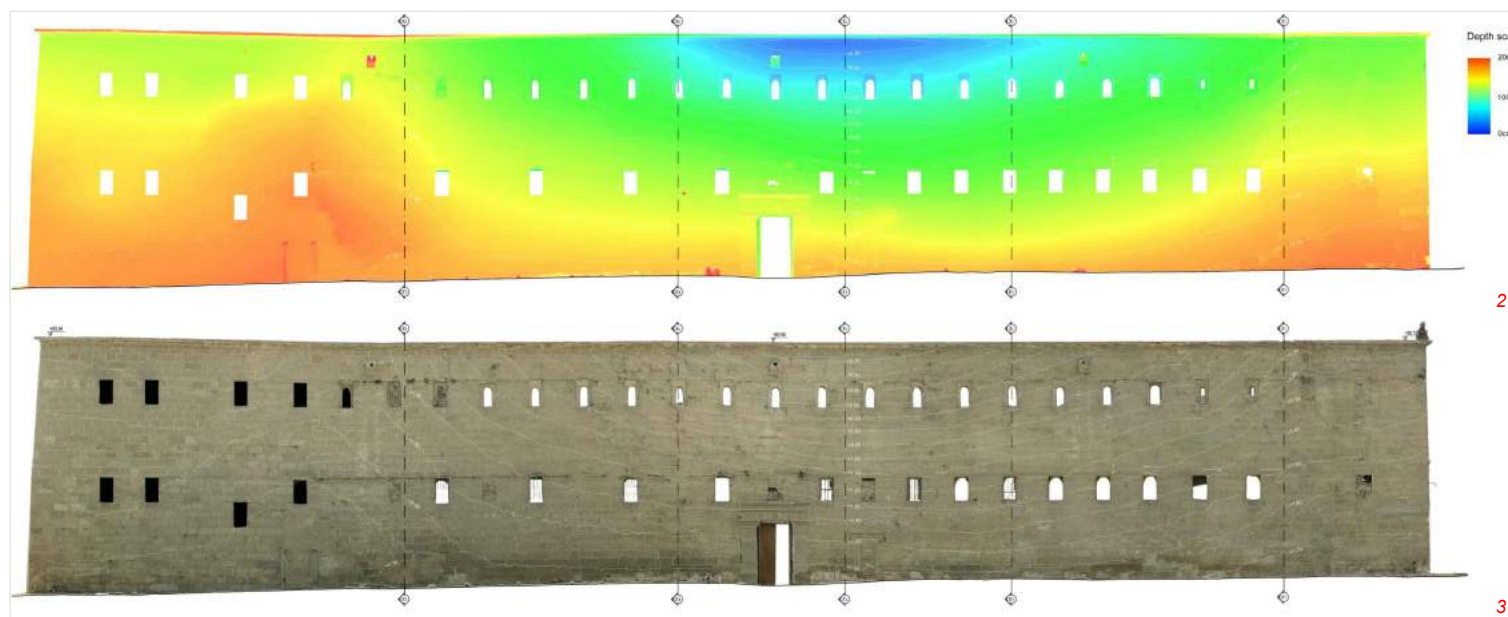
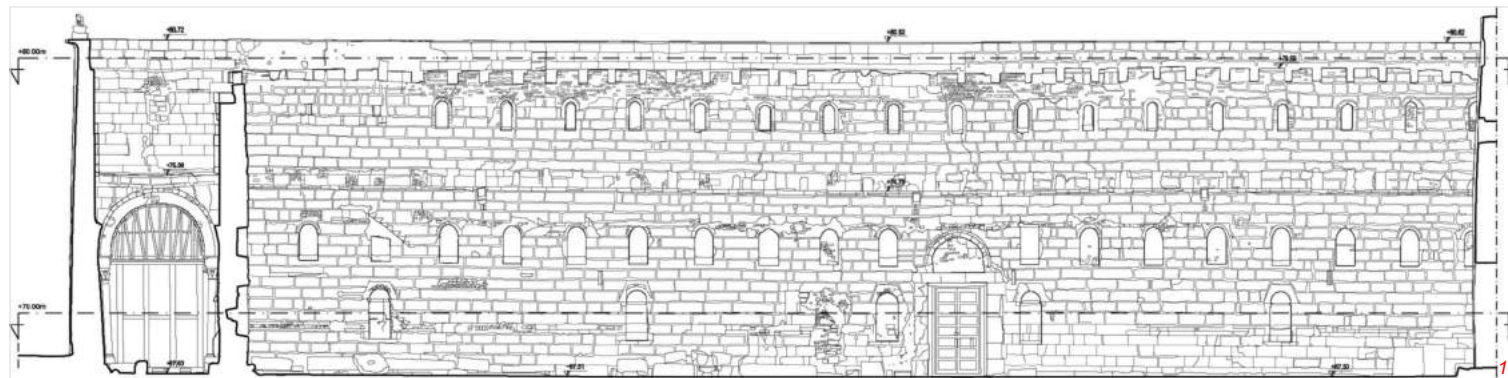
## Architectural survey- Integrated survey technology

*White monastery - Sohag - Egypt. Laser scanner survey of the north facade. 2015*

The topographic and laser scanner survey of the north wall of the White Monastery aimed to the architectural drawing of the wall, but also to the documentation of its deformation. Thus, we used specific software to produce the contour lines describing the out of plumb and deformation phenomena affecting the wall (fig. 2-3).

### Notes:

- Objective of the assignment: Measured survey of the north elevation of the White Monastery;
- Client: White Monastery Conservation Project - Yale University



Cad drawing of the elevation; 1

Analysis of wall deformation; 2

Orthophotographic elevation; 3

Cross section - RGB colour point cloud 4

3D model; 5

3D model; 6





## Three-dimensional survey

Trevi Fountain - Roma - Italy. 3D survey. 2014-2015

Between April 2014 and September 2015 we carried out the survey and graphic restitution of the Trevi Fountain in Rome. The survey was meant to provide a graphical basis to develop the conservation project of the whole monument.

Images here on the right illustrate the field work carried out by laser scanner technology and photogrammetry. The methodology ensures precision and speed of data processing. From the three-dimensional model the drawings for the documentation of the conservation work were produced: front and lateral elevations, plans, two cross sections and details.

### Notes:

- Objective of the assignment : 3D survey and restitution of all the elevations, sections and plans of the fountain.

- Client: CBC Conservazione Beni Culturali s.c.



3D model 1

Field survey 2

Field survey 3

Elevation extracted from the 3D model 4





## Three-dimensional survey

Trevi Fountain - Rome - Italy. 3D survey 2014-2015

The purpose of the survey was to provide details of each architectural element composing the fountain. This paper shows the orthophotos of detail of individual sculptures. The statues' details were directly extracted from the point cloud, and the orthophotos' resolution allowed to print at 1:20 scale.

### Notes:

- Objective of the assignment : 3D survey and restitution of all elevations, cross sections and plans of the fountain.
- Client: CBC Conservazione Beni Culturali s.c.



2

3D model - low resolution point cloud

1

Oceano statue - detail - high resolution point cloud

2

Triton statues - detail - high resolution point cloud

3



3

