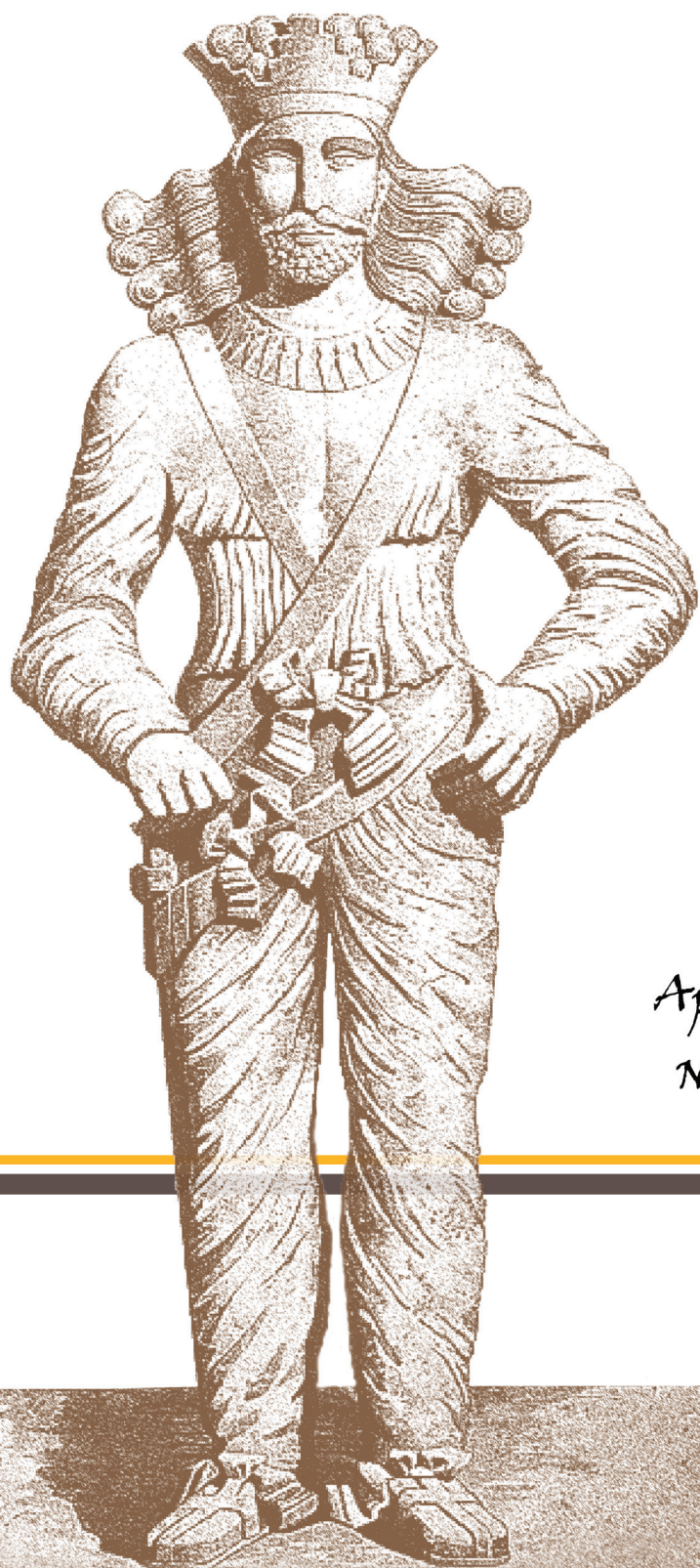


Appendix I
Glossary

Appendix I: Glossary

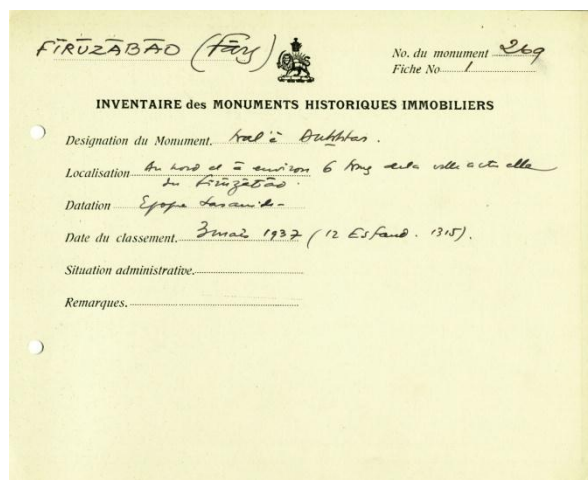
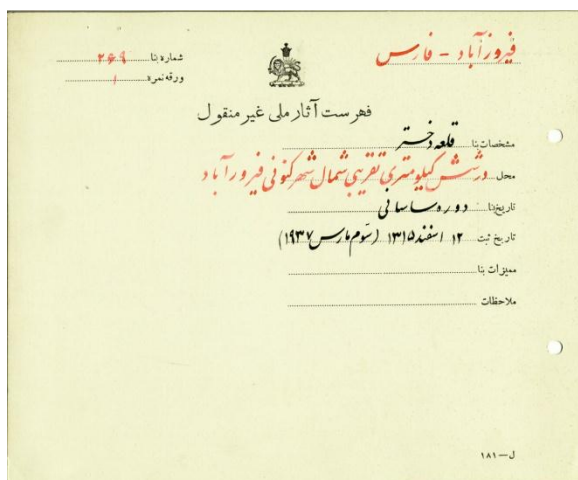
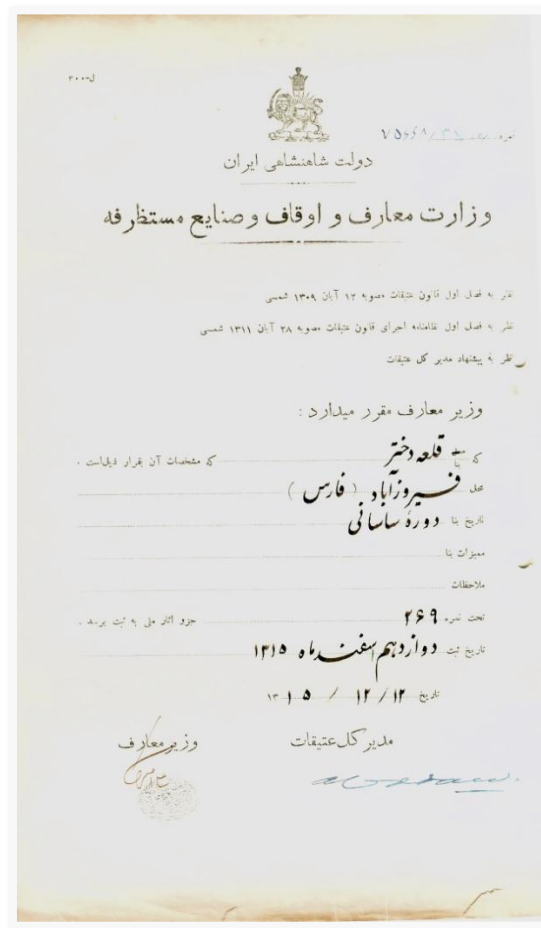
<i>Ayvān:</i>	Porch
<i>Anāhitā</i>	is the Old Persian form of the name of an Iranian goddess
<i>Arg</i>	citadel
<i>Chahartaqi:</i>	Four arches
<i>Hammam</i>	Bathhouse
<i>Naqarehkhaneh</i>	a place where the drums are beaten at fixed
<i>Sardab</i>	A basement or cellar is one or more floors of a building that are either completely or partially below the ground floor
<i>Shahr</i>	City
<i>Takht-I Neshin</i>	Probably the fire temple of Ardašīr I in the circular city of Ardašīr-Korra
<i>Tang-e</i>	Defile
<i>Tirbal</i>	Central tower
<i>Rabaz</i>	surrounding area of the city walls
<i>Khurreh</i>	Fars area had been divided into five districts
<i>sarooj</i>	a mixture of lime, soft sand and ash
<i>Divar-e gach</i>	gypsum wall
<i>Gach Gonbad</i>	gypsum dome



Appendix II
National Registration Documents

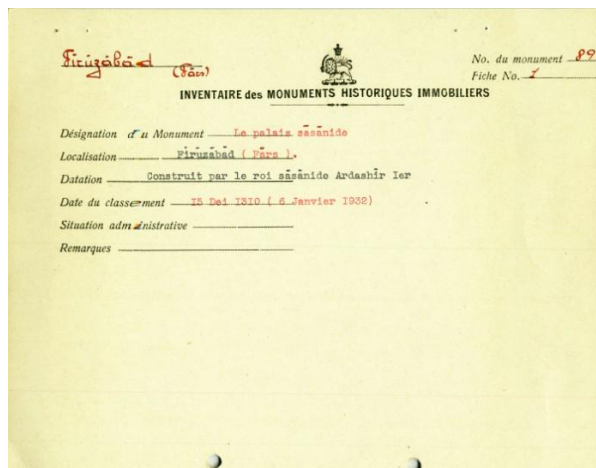
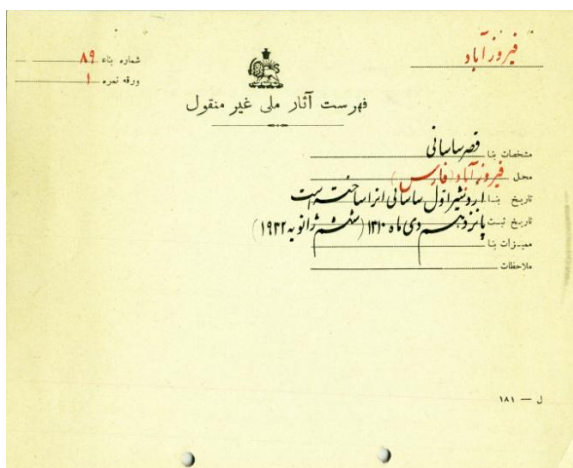
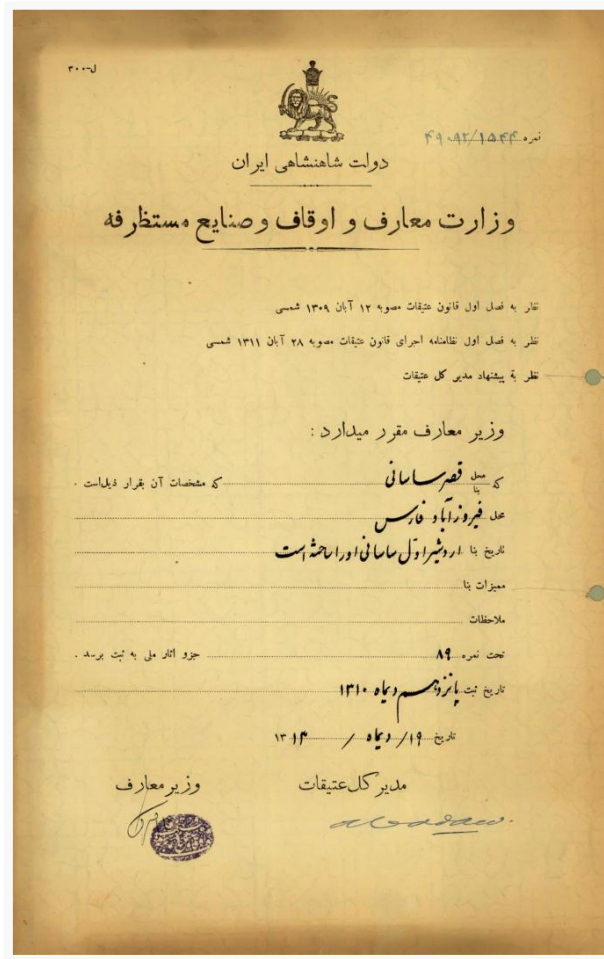
Appendix II: National Registration Documents

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Qal'eh Dokhtar	269	1936



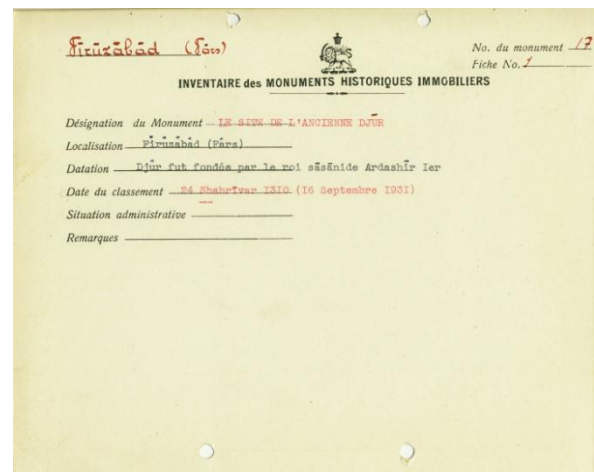
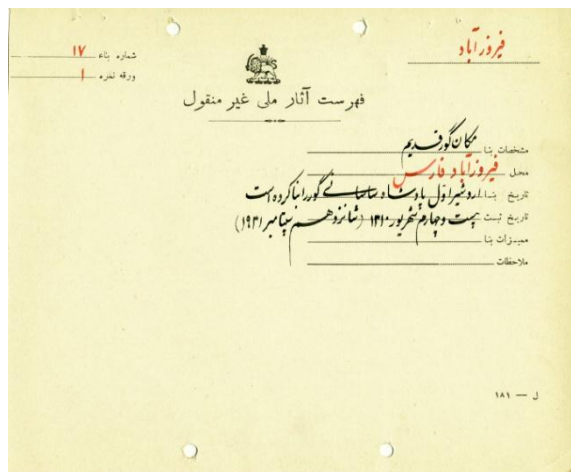
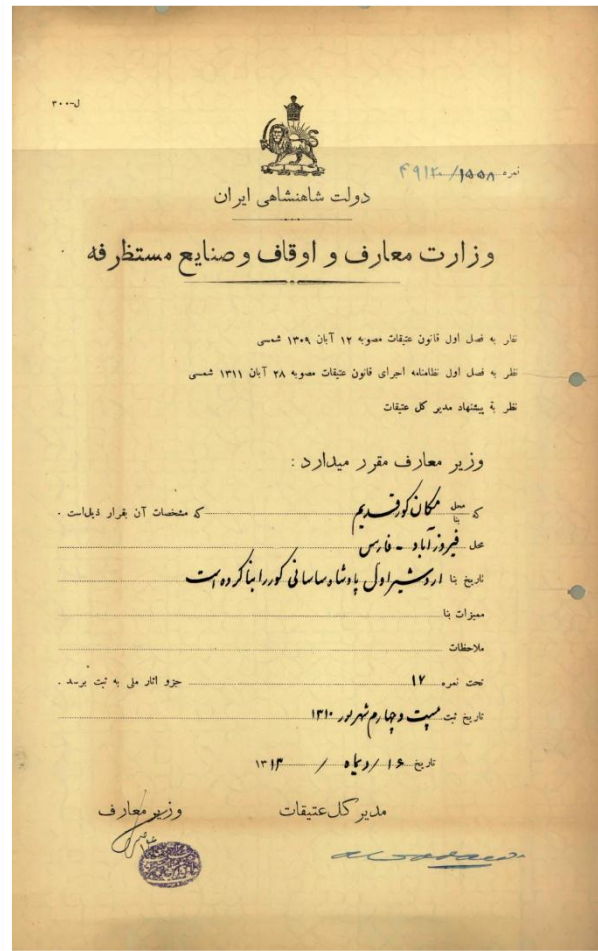
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Ardashir Palace	89	1931



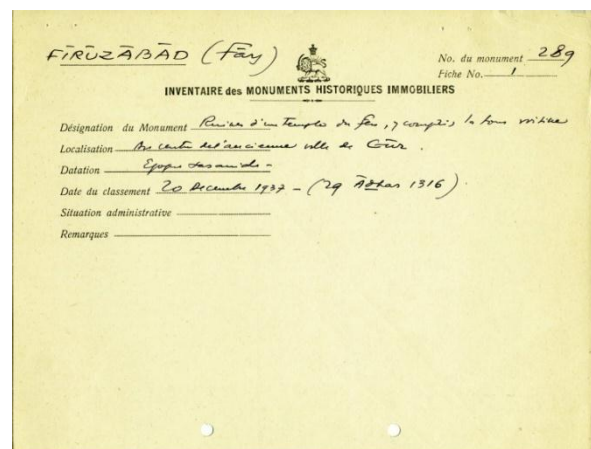
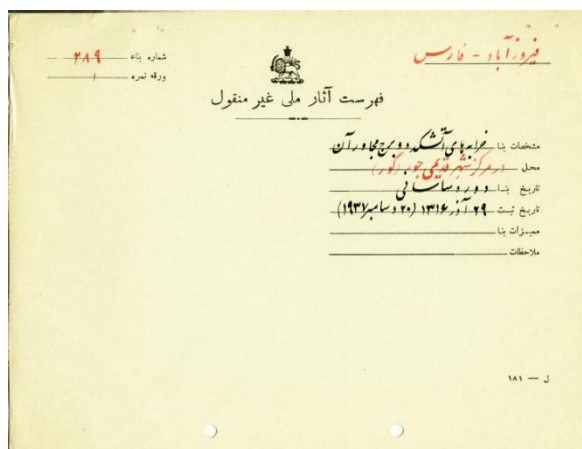
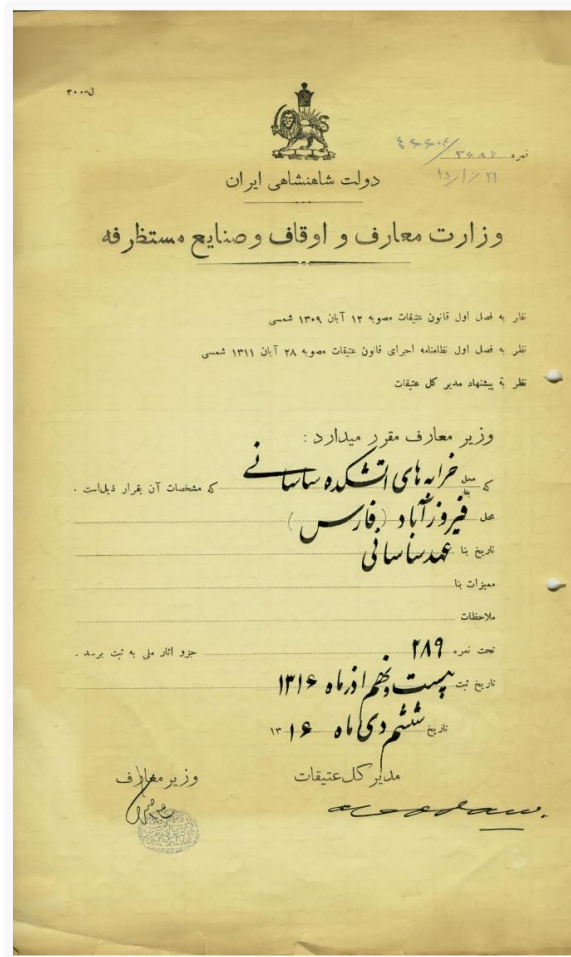
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Gur(Jur)	17	1931



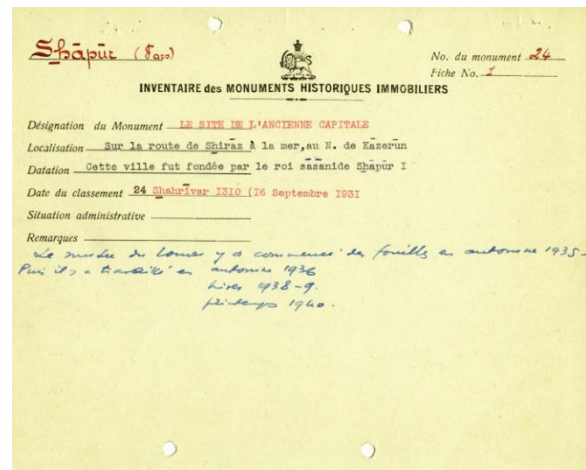
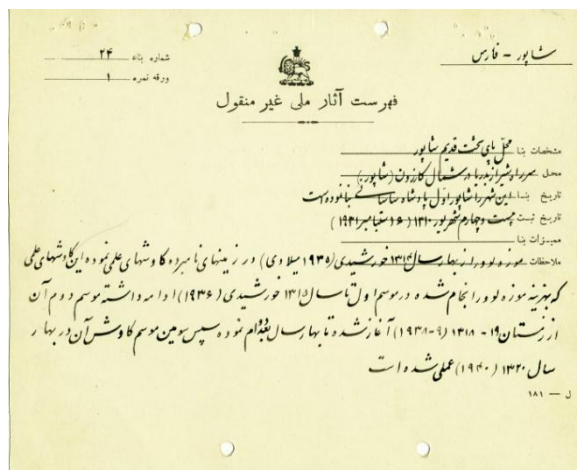
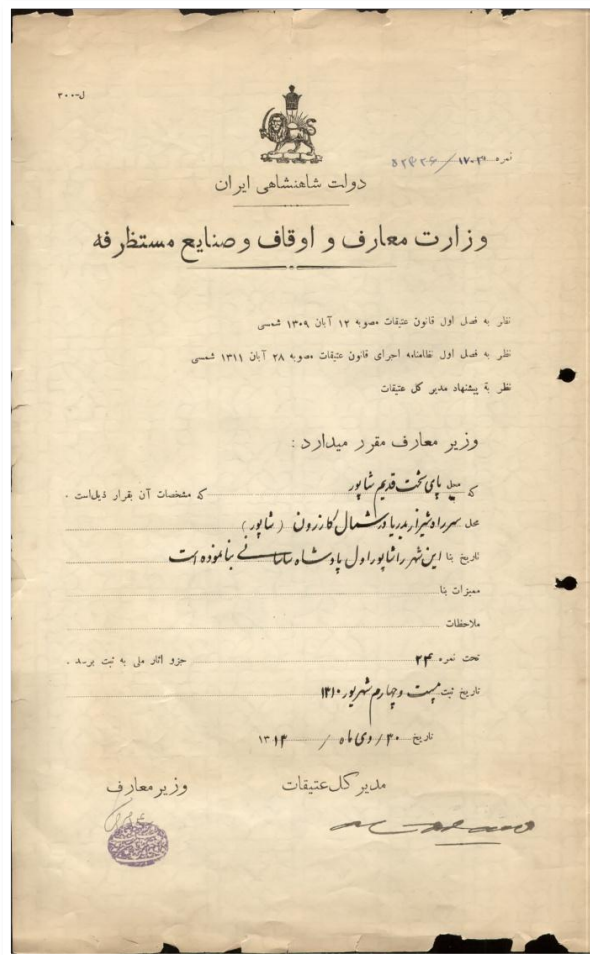
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Remain of a Sassanian Fire temple	289	1937



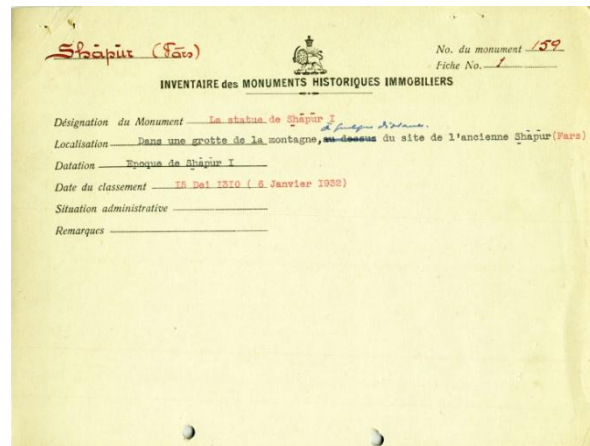
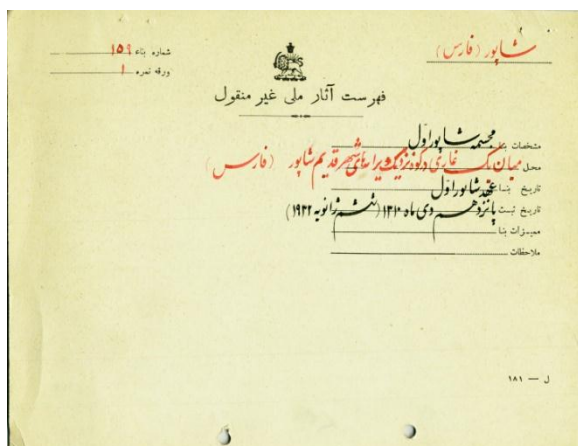
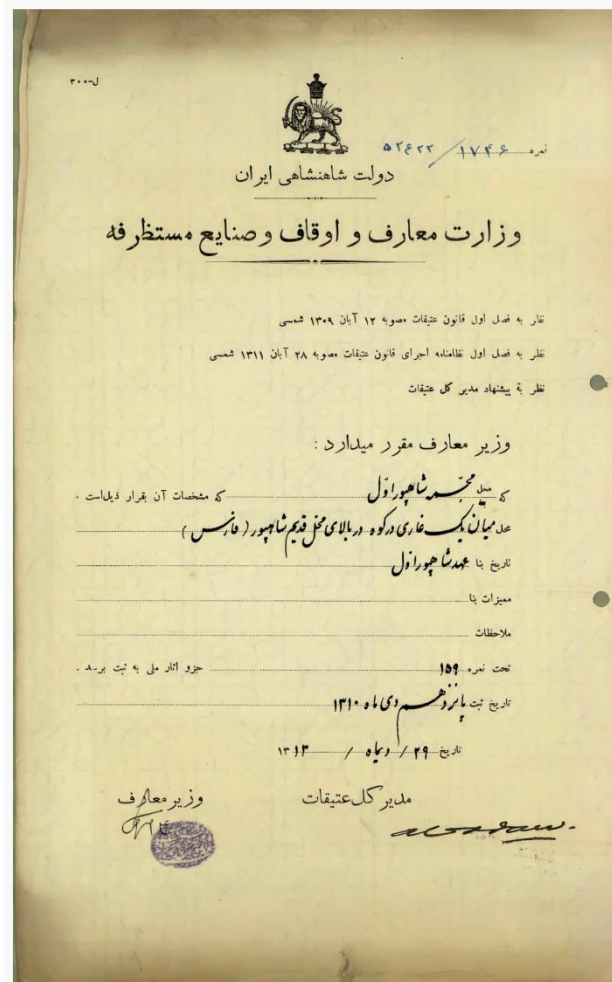
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Kazerun	Bishapur	24	1931



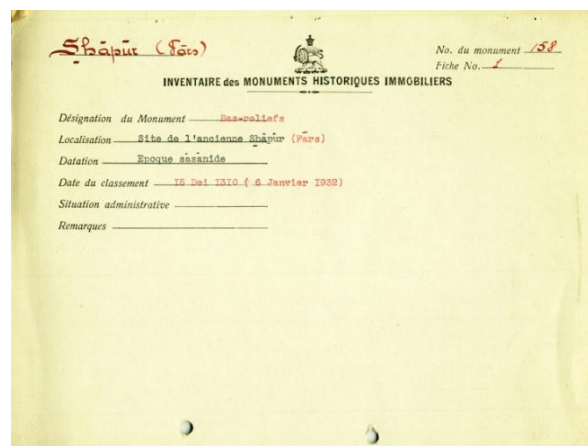
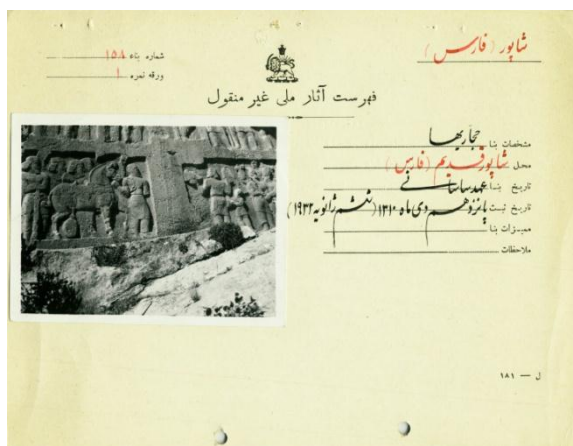
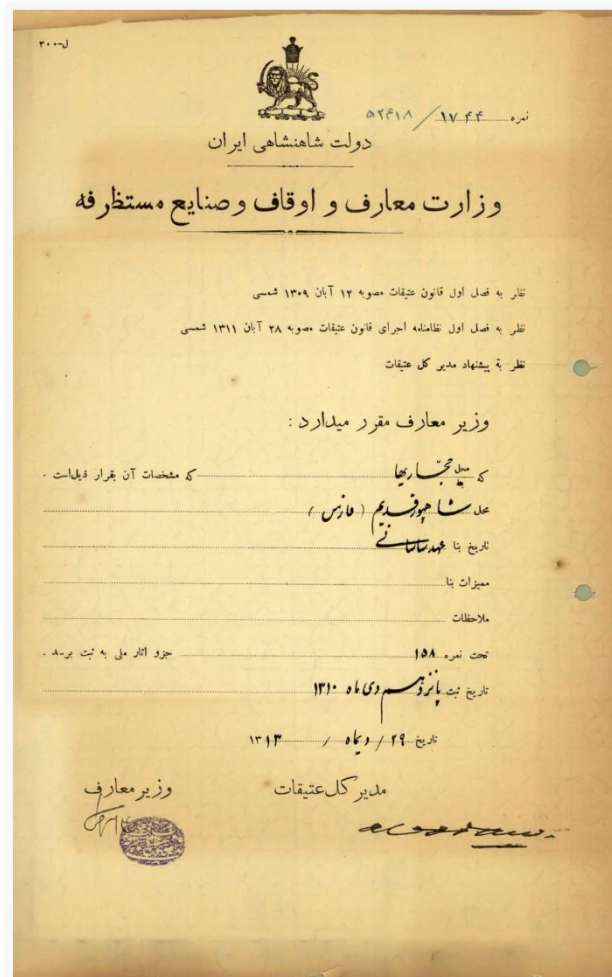
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Bishapur	Statue of Shapur I	159	1931



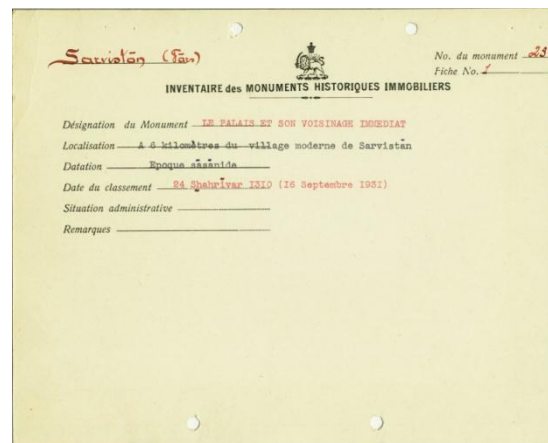
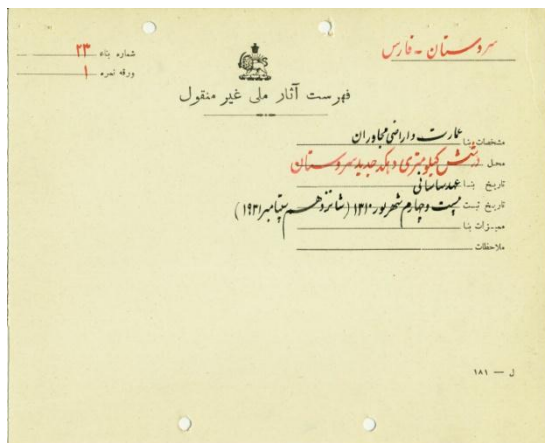
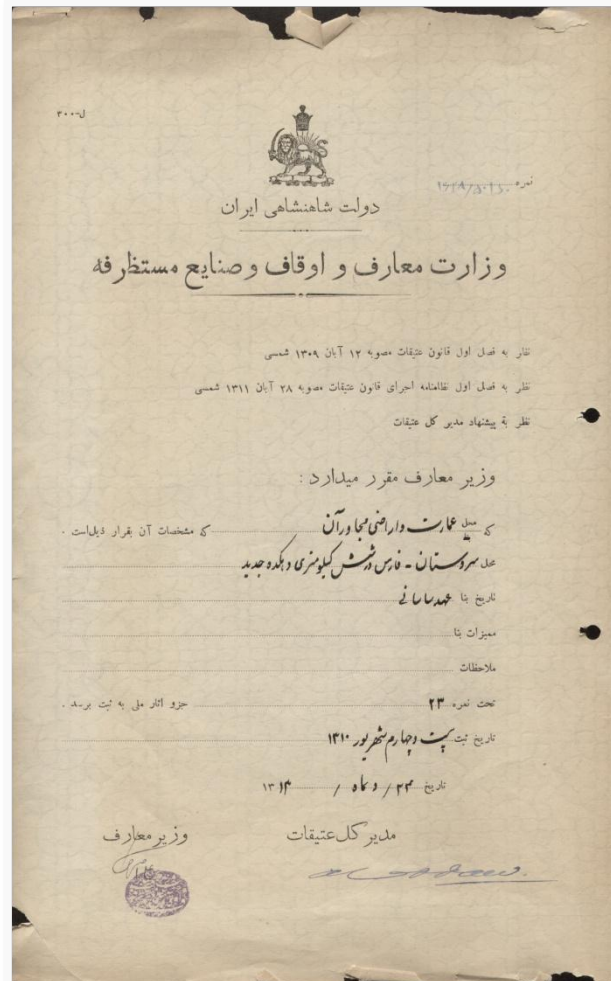
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Bishapur	Reliefs	158	1931



Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Sarvestan	Sarvestan Monument	23	1931



Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Reliefs	268	1936

۷۵۶۶۶/۳۰۰۰

دولت شاهنشاهی ایران

وزارت معارف و اوقاف و صنایع مستظرفه

تأری به فعل اول قانون عتیقات ۱۳۰۸ آبان ۱۲ شمسی
نظر به فعل اول نظامنامه اجرای قانون عتیقات ۱۳۱۱ آبان ۲۸ شمسی
نظر به پیشنهاد مدیر کل عتیقات

وزیر معارف مقرر میدارد:

که با و نقش برجسته
علی فیروزآباد در ساحل رست شک آب (فارس)
تاریخ بنا
میزان بنا
ملاحظات
نقطه ۲۶۸
تاریخ ثبت دوازدهم بهمن ماه ۱۳۱۵
تاریخ ۱۳/۱۲/۱۵
وزیر معارف
مدیر کل عتیقات

۴۶۸ شماره بنا
۱ ورقه شماره

فیروزآباد - فارس

فهرست آثار ملی غیر منقول

مختصات بنا: دو نقش برجسته
محل: در نزدیکی روستای شک آب در ساحل رست
تاریخ بنا: دوره ساسانی
تاریخ ثبت: دوازدهم بهمن ماه ۱۳۱۵
میزان بنا
ملاحظات

FIRUZABAD (Fars)

No. du monument ۲۶۸
Fiche No. ۱

INVENTAIRE des MONUMENTS HISTORIQUES IMMOBILIERS

Designation du Monument. Deux Bas-reliefs sculptés.

Localisation. Sur le plan de la route de Fars à Shiraz, à ۱۵ km de Fars, sur la rive droite du canal de Fars à Shiraz.

Datation. Époque Sassanide.

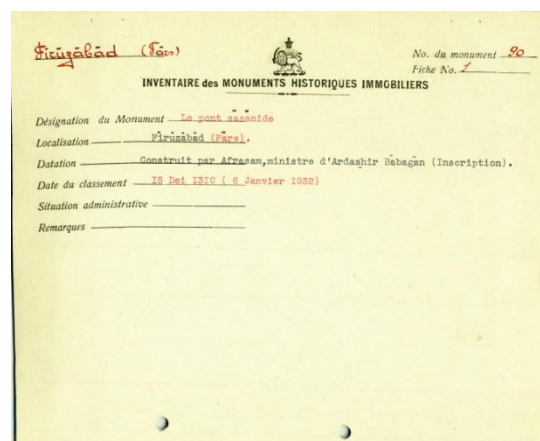
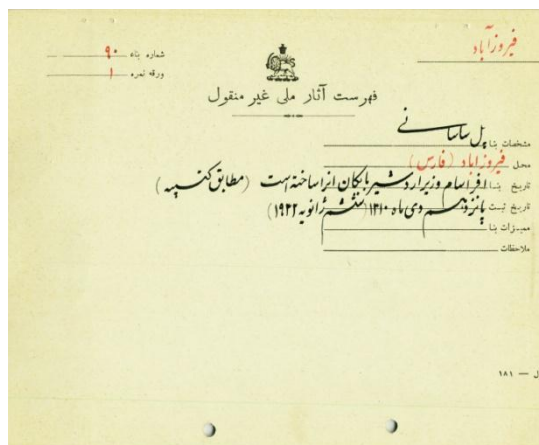
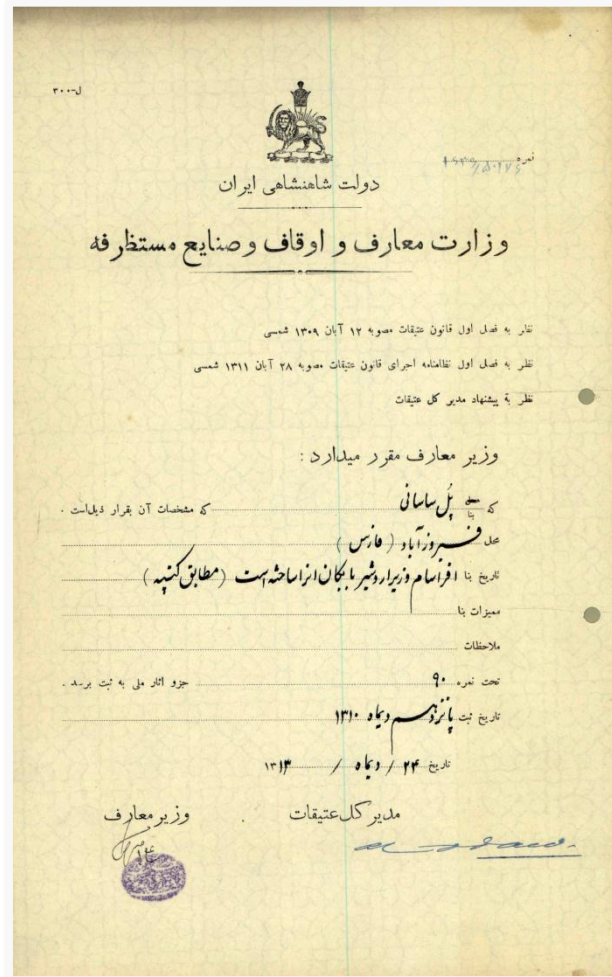
Date du classement. 30 août 1936. (12 Elshav 1315).

Situation administrative.

Remarques. Le plan de la route de Fars à Shiraz, à ۱۵ km de Fars, sur la rive droite du canal de Fars à Shiraz. Le second relief est en partie détruit par l'effacement.

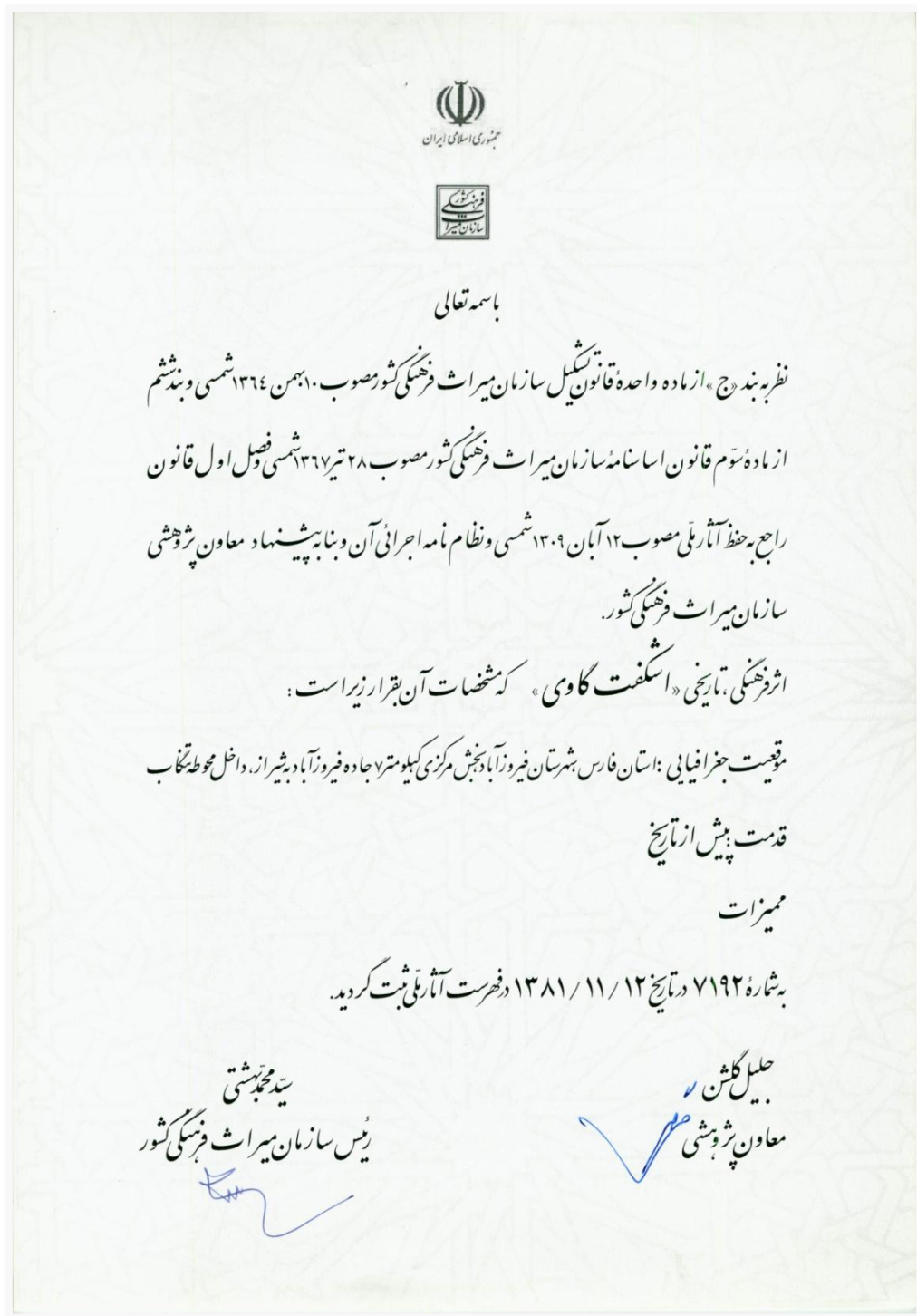
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Sassanid Bridge	90	1931



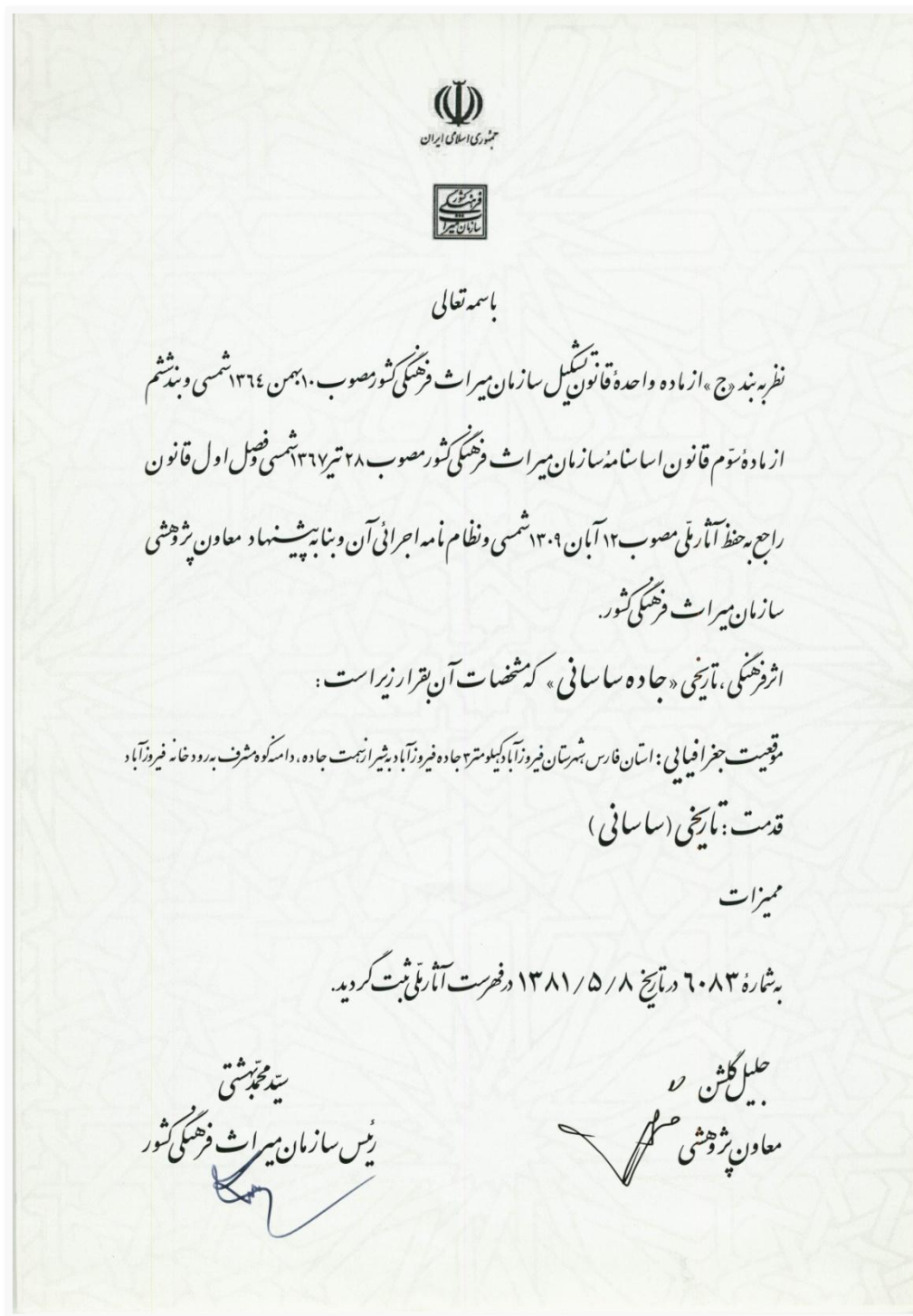
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Eshkaft-e Gavi	7192	2002



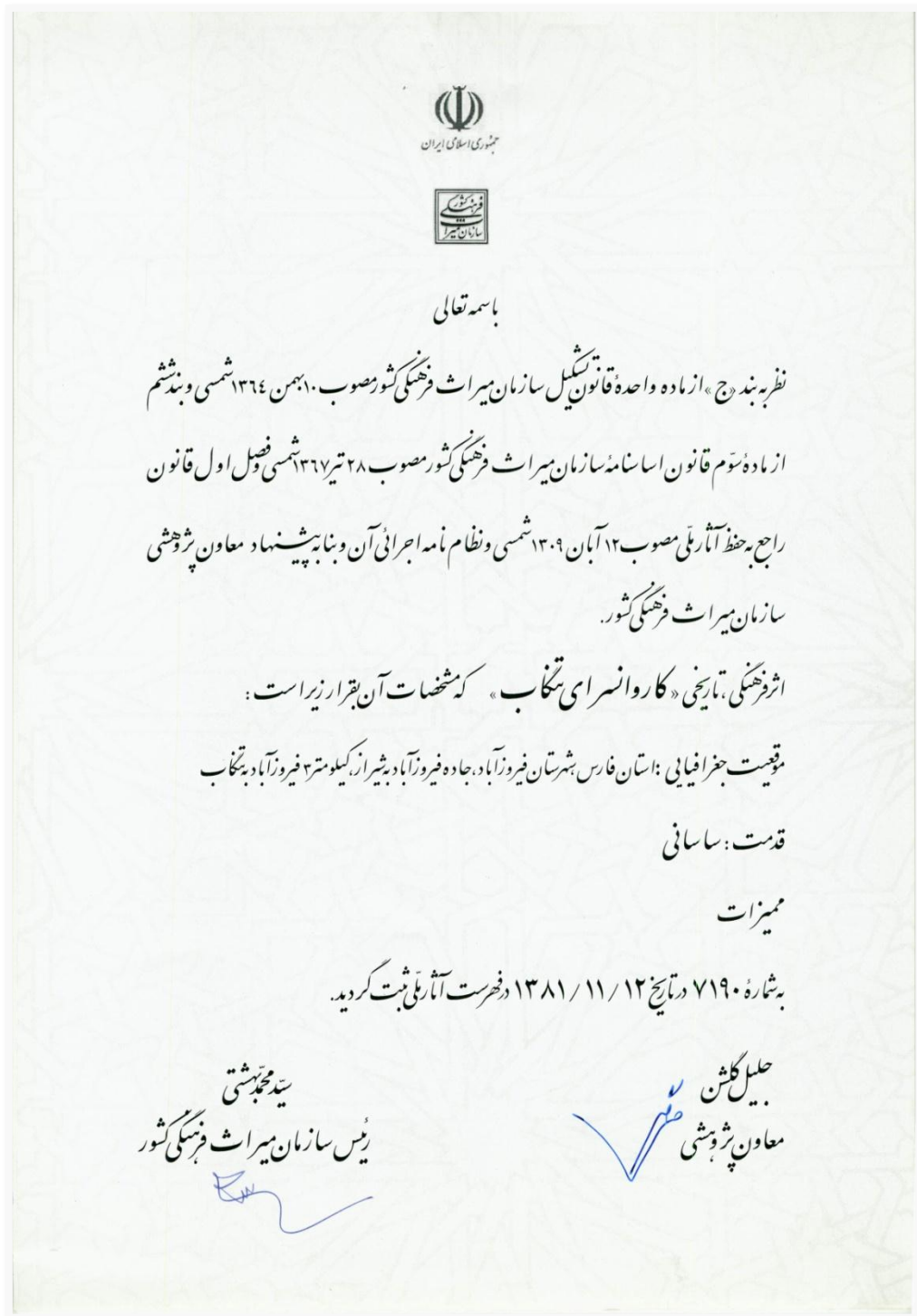
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Sassanid Bridge	6083	2002



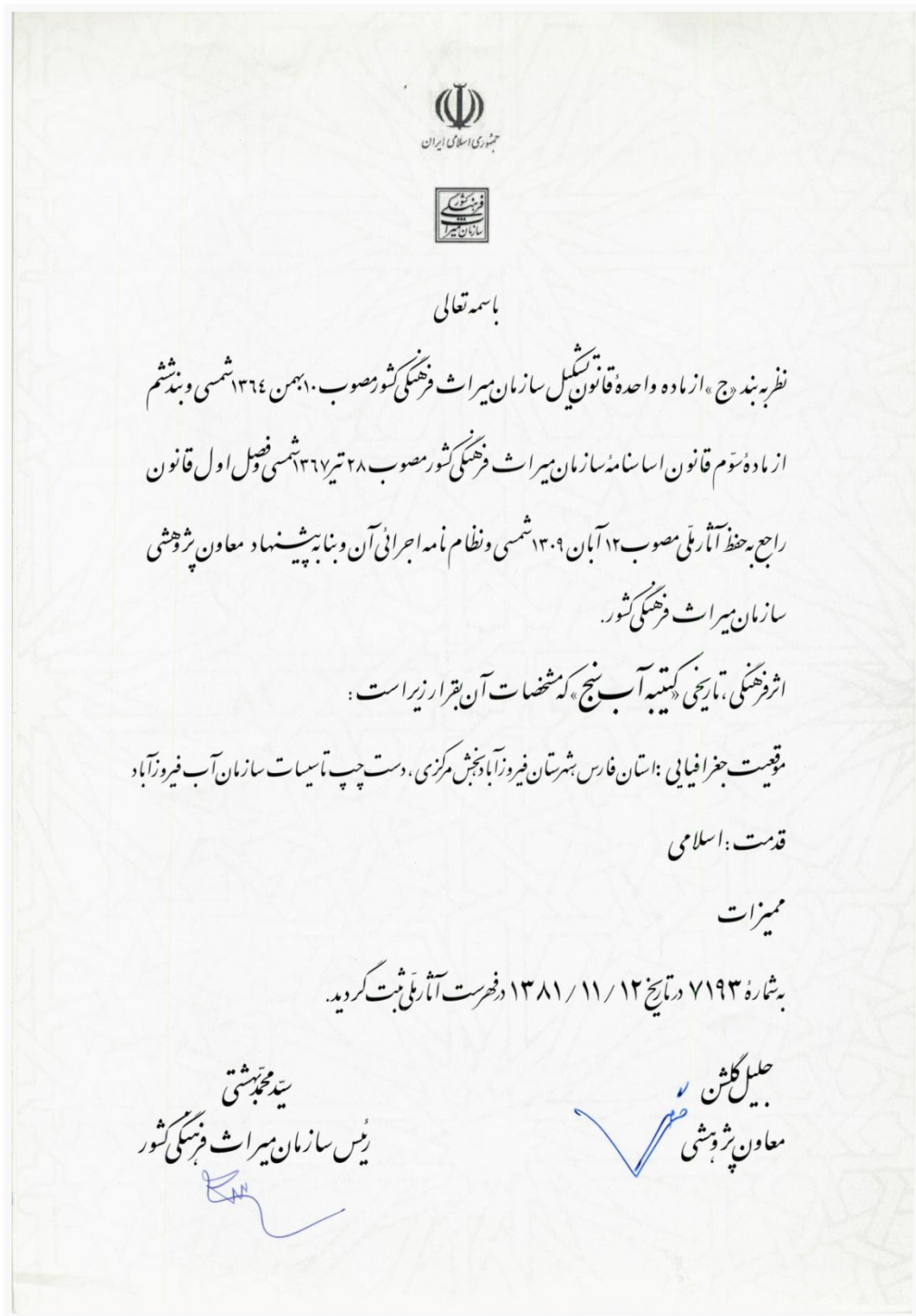
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Tang-i Ab Karevansaray	7190	2002



Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Absanj Inscription	7193	2002



Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Mehr-Narseh Inscription	19317	2007

(پ)

ریاست جمهوری
سازمان میراث فرهنگی و گردشگری

« باسمه تعالی »

در اجرای ماده ۱ از قانون تشکیل سازمان میراث فرهنگی و گردشگری و نظریه بند (ج) از ماده واحده قانون تشکیل سازمان میراث فرهنگی کشور، مصوب ۱۰ بهمن ۱۳۶۴ شمسی و بند ششم از ماده سوم قانون اساسنامه سازمان میراث فرهنگی کشور، مصوب ۲۸ تیر ۱۳۶۷ شمسی و فصل اول راجع به حفظ آثار ملی مصوب ۱۲ آبان ۱۳۰۹ شمسی و نظام نامه اجرایی آن و بنا به پیشنهاد مدیرکل دفتر ثبت میراث فرهنگی و طبیعی؛

اثر فرهنگی، تاریخی « کتیبه مهر نرسه » که مشخصات آن بقرار زیر است:

موقعیت جغرافیایی: استان فارس - شهرستان فیروزآباد بخش مرکزی - دهستان امه آباد - روستای اشکده - ۵ جاده فیروزآباد، بهیر از جنب نقش برجسته بختیاری اردشیر بابکان

قدمت: ساسانی

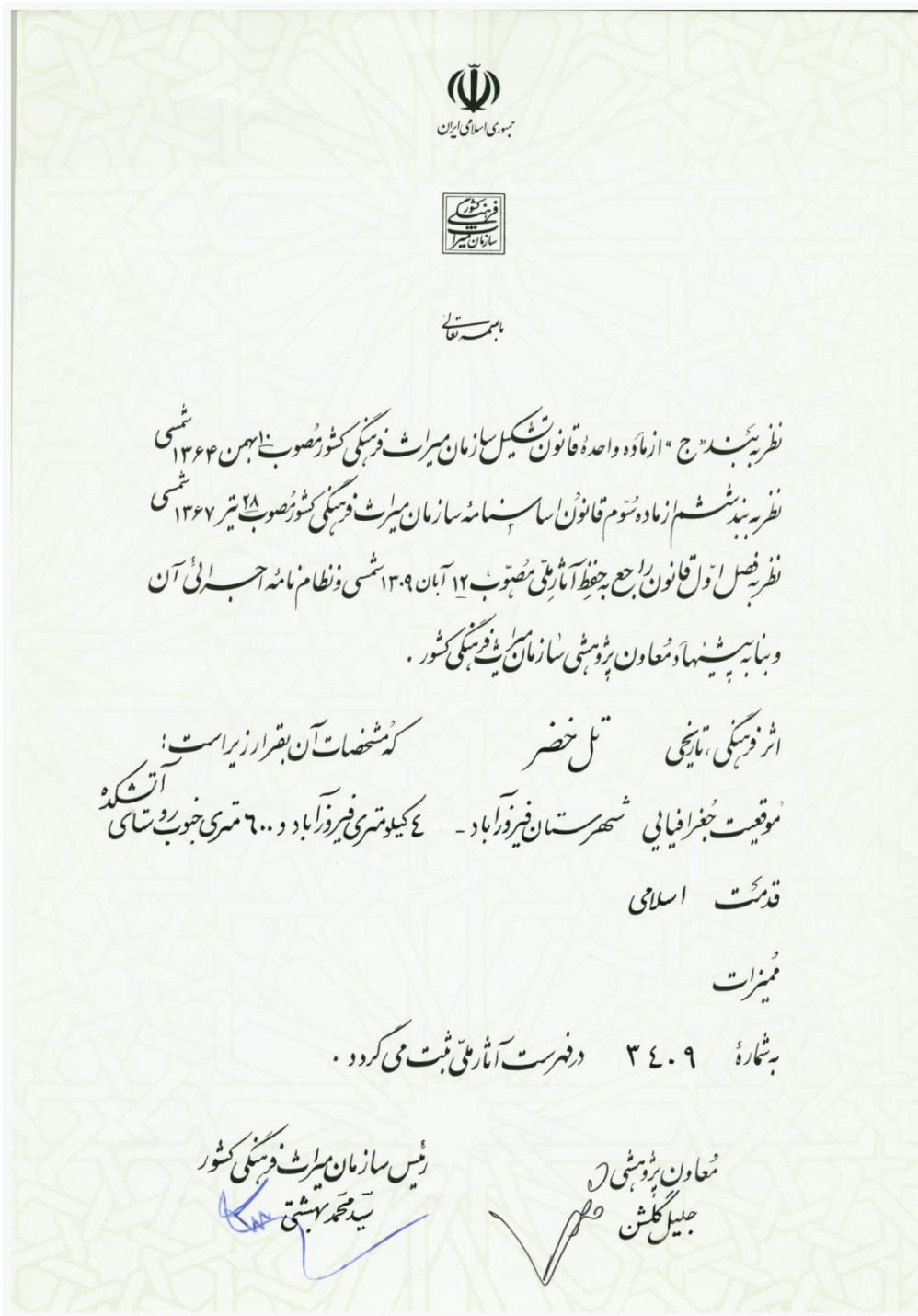
به شماره ۱۹۳۱۷ در تاریخ ۱۳۸۶/۰۵/۰۱ در فهرست آثار ملی ثبت گردید. رک

فریبرز دولت آبادی
معاون میراث فرهنگی

حسینعلی کیل
مدیرکل دفتر ثبت آثار تاریخی، فرهنگی و طبیعی

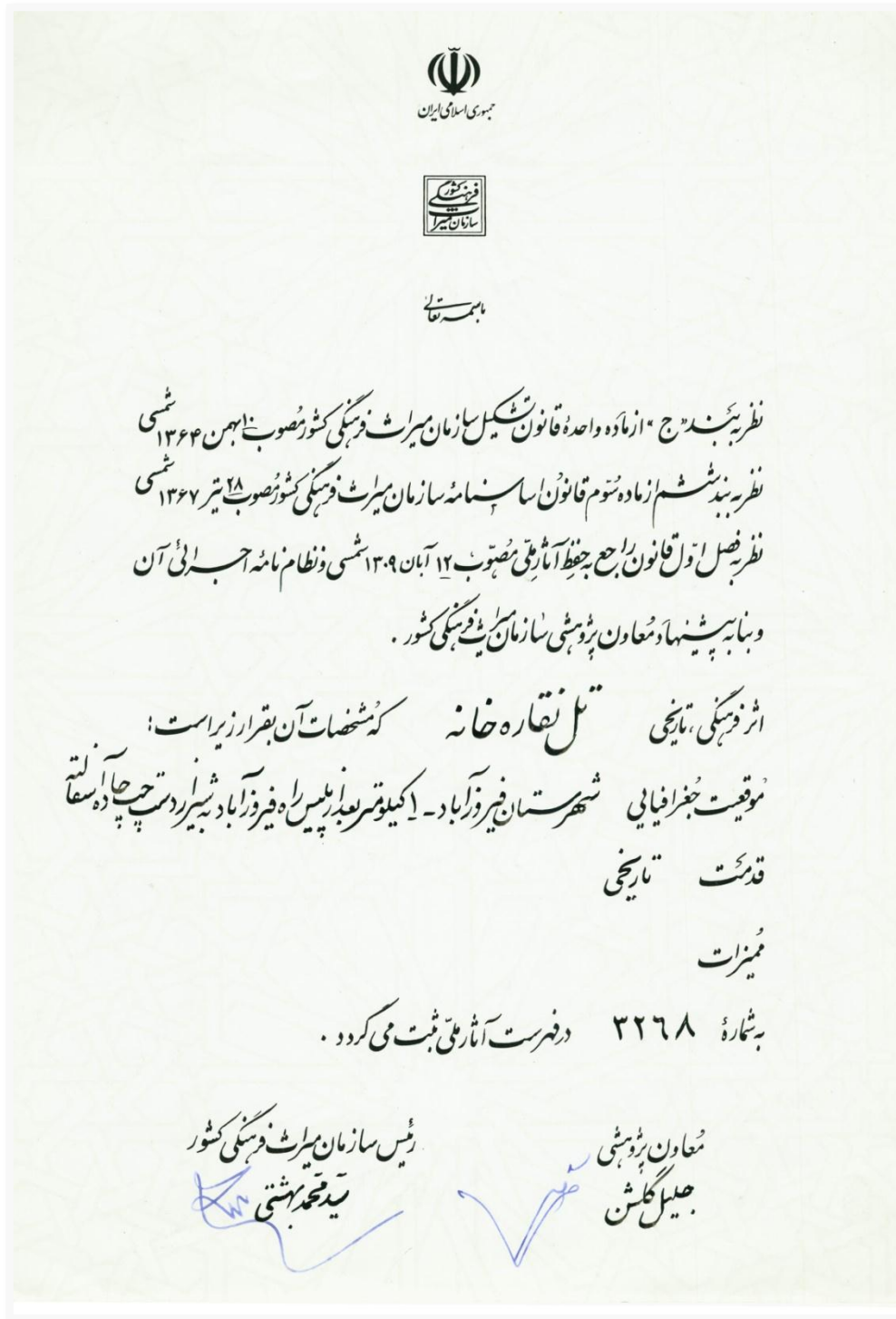
Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Toll-e Khezr	3409	2000

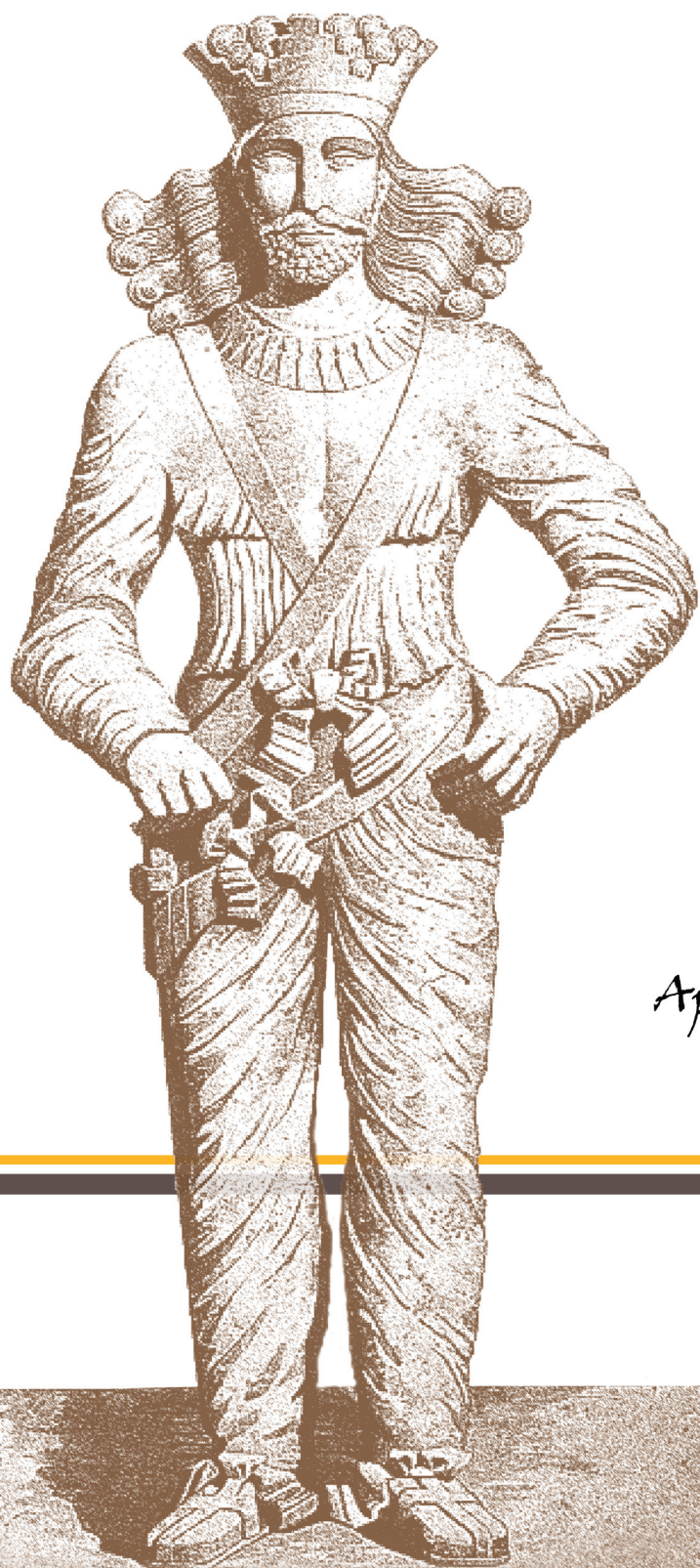


Source: Document Center of ICHHTO

Province	City	Property	National Registration No.	Year of Registration
Fars	Firuzabad	Toll-e Nagharekhaneh	3268	2000



Source: Document Center of ICHHTO



Appendix III

3D Mesh Documents

Appendix III:**3D Mesh Documents Based on Laser Scanner Data of Qal'eh Dokhtar & Sarvestan**

- The project was performed on Summer 2011 & 2012.
- Regarding the necessity to perform laser scanning operations in research and repair projects of monuments, surveying of this important issue in regional difficult conditions with accuracy of 0.1 mm lasted for about 15 working days. The phases of information process and supplying required products were fulfilled as soon as possible and submitted to the employer. Compiling laser scanning method by means of scanner and surveying by total station cameras of this location have provided the experts of these consulting to use more accurate coordinates and the control points made around Ghal-e Dokhtar & Sarvistān Monument for preparing plans and maps.
- Phases of Processing and Preparing Products:
 1. Processing and integrating super points resulted from output of laser scan machine, filtration, noises removal and additional complications.
 2. Preparing Mesh from super points (changing point to 3-D surface and model).
 3. Providing consecutive cuts in various height and axis and also required architectural plans.
 4. Drawing 3-D model in cyclone, Poly works Geo magic and Auto cad software.
 5. Preparing ortho photo images.
 6. Sheet classification and locating products by architectural team of company Specifications of Laser Scan Machine.

Laser scan machine Z+F model 5006h made by Germany in accuracy of 0.1 mm and points density for more than 1.000.000 points per second is one the most powerful and accurate machines in the world which is specifically applied in the field of documentation of historical monuments.
- The agents of performing project:
 1. Mr. Hooman Meghdadian, Managing Director
 2. Mr. Hadi Parvaei, Deputy of Managing Director
 3. Mr. Pooyan Meghdadian, Project Manager
 4. Mr. Meysam Mehrtash, Manager of Laser Scanning Sector
 5. Mr. Milad Khani, Expert of Laser Scanning Sector
 6. Mr. Hamed Khani, Expert of Surveying Unit
 7. Ms. Nayereh Noorizadeh, Expert of Surveying Unit
 8. Ms. Mahshad Solati as Expert of Architecture Unit
- Naghsh Avaran Toos Consulting Engineers co.
Tehran Office: Apt.2 , No.6 , Omid Alley, Tavanir St. , Valiasr St. , Tehran , Iran
Tell: +98 21 88206740-1
Fax: +98 21 88206742
Email: pmeghdadian@yahoo.com
www.natce.com

Technical Data

The imaging 3D laser measurement systems are applicable in the fields of digital planning of factories, industrial plants, architecture, protection of historic monuments, landscape and virtual reality. They are based upon the Z+F spot Laser Measurement System LARA.



Lasersystem			
Laser safety class	3R (ISO EN 60825-1)		
Beam divergence	0.22 mrad		
Beam diameter	3 mm circular (1 m distance)		
Ambiguity interval	79 m		
Min. range	0.4 m		
Resolution range	0.1 mm		
Data acquisition rate	≤ 1,016,027 pixel/sec		
Linearity error up to 50 m ¹	≤ 1 mm		
Range noise	black 10 %	grey 20 %	white 100 %
Range noise, 10 m ¹²	1.2 mm rms	0.7 mm rms	0.4 mm rms
Range noise, 25 m ¹²	2.6 mm rms	1.5 mm rms	0.7 mm rms
Range noise, 50 m ¹²	6.8 mm rms	3.5 mm rms	1.8 mm rms
Temperature drift (-10°C to -45°C)	negligible due to internal reference		



Deflection Unit	
System vertical	rotating mirror
System horizontal	rotating device
Field of view vertical	310°
Field of view horizontal	360°
Resolution vertical	0.0018°
Resolution horizontal	0.0018°
Accuracy vertical ¹	0.007° rms
Accuracy horizontal ¹	0.007° rms
Scanning speed	≤ 50 r/s (3,000 r/min) max.

Resolution		Scanning time		
Resolutions	Pixel/360° horizontal & vertical	low quality 50 rps	normal quality 25 rps	high quality ⁵ 12,5 rps
„preview“ ³	1,250	13 sec.	25 sec.	50 sec.
„middle“	5,000	50 sec.	1:40 min.	3:20 min.
„high“	10,000	1:41 min.	3:22 min.	6:44 min.
„super high“	20,000	3:22 min.	6:44 min.	13:28 min.
„ultra high“ ⁴	40.000	-	13:38 min.	26:36 min.

Z+F IMAGER® 5006h

General	
Tilt measurement	Resolution: 1/1,000° Accuracy (zero point): 1/500°
Communication	Ethernet / W-LAN
Data storage	internal HDD (60 GB)
Integrated operation panel	> Keypad: 6 Buttons ; > Display: 4 Lines
Data interface	Ethernet / USB 2.0

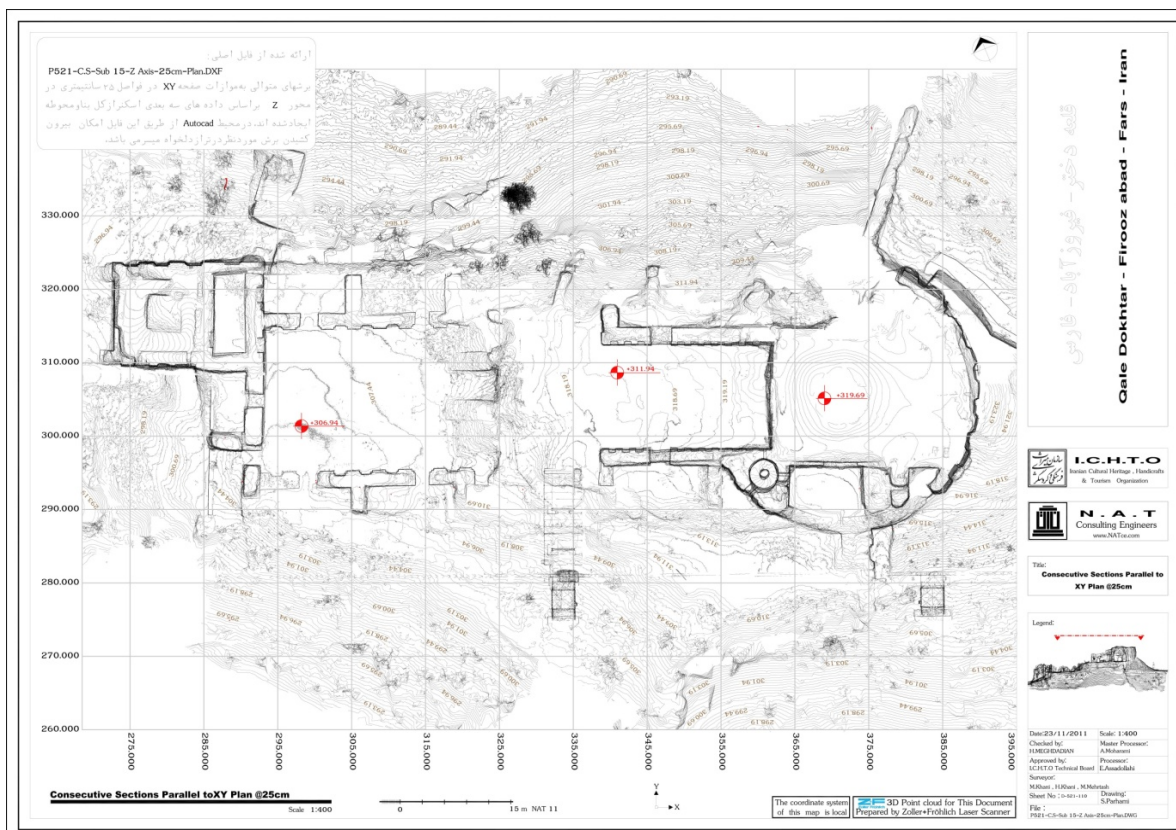
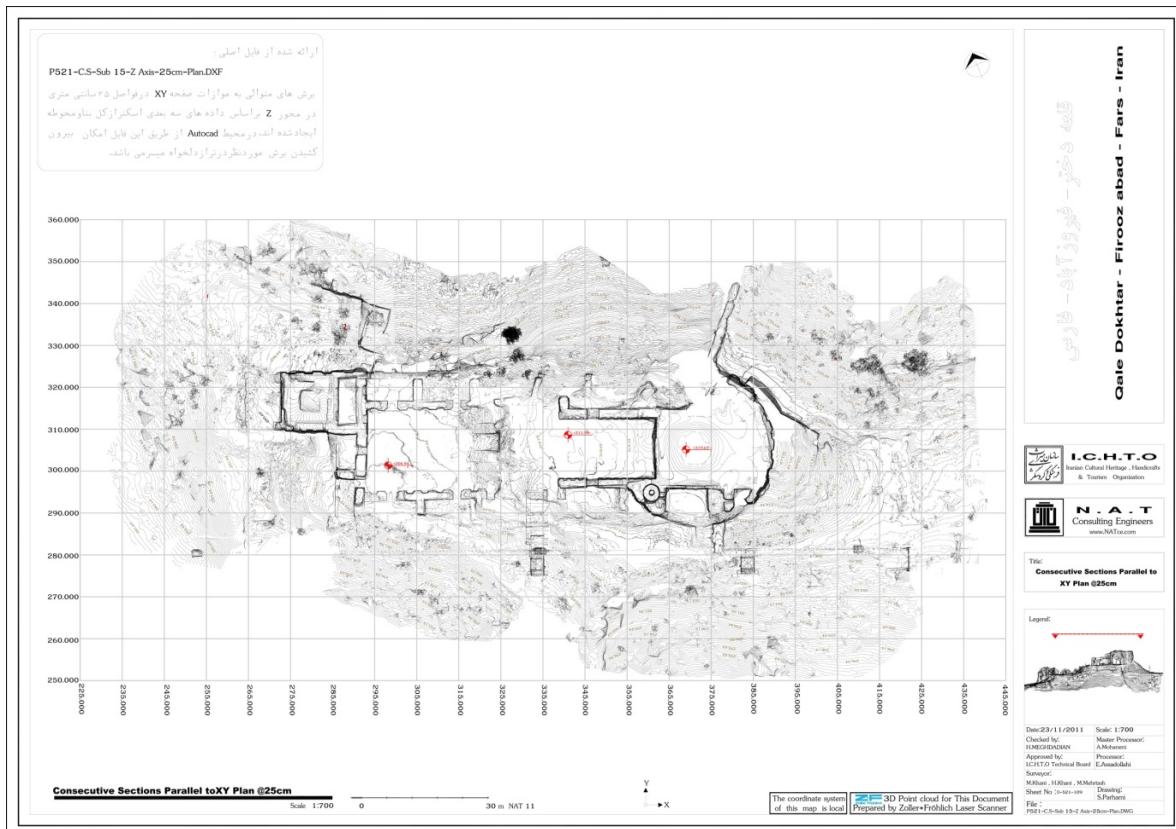
Power supply	
Input voltage	24V DC (scanner) / 90-260V AC (power unit)
Power consumption	65 W max.
Battery life time	2.5 h typ. (changeable battery pack) 4 h (external battery (TRAPP - 15 - 24)

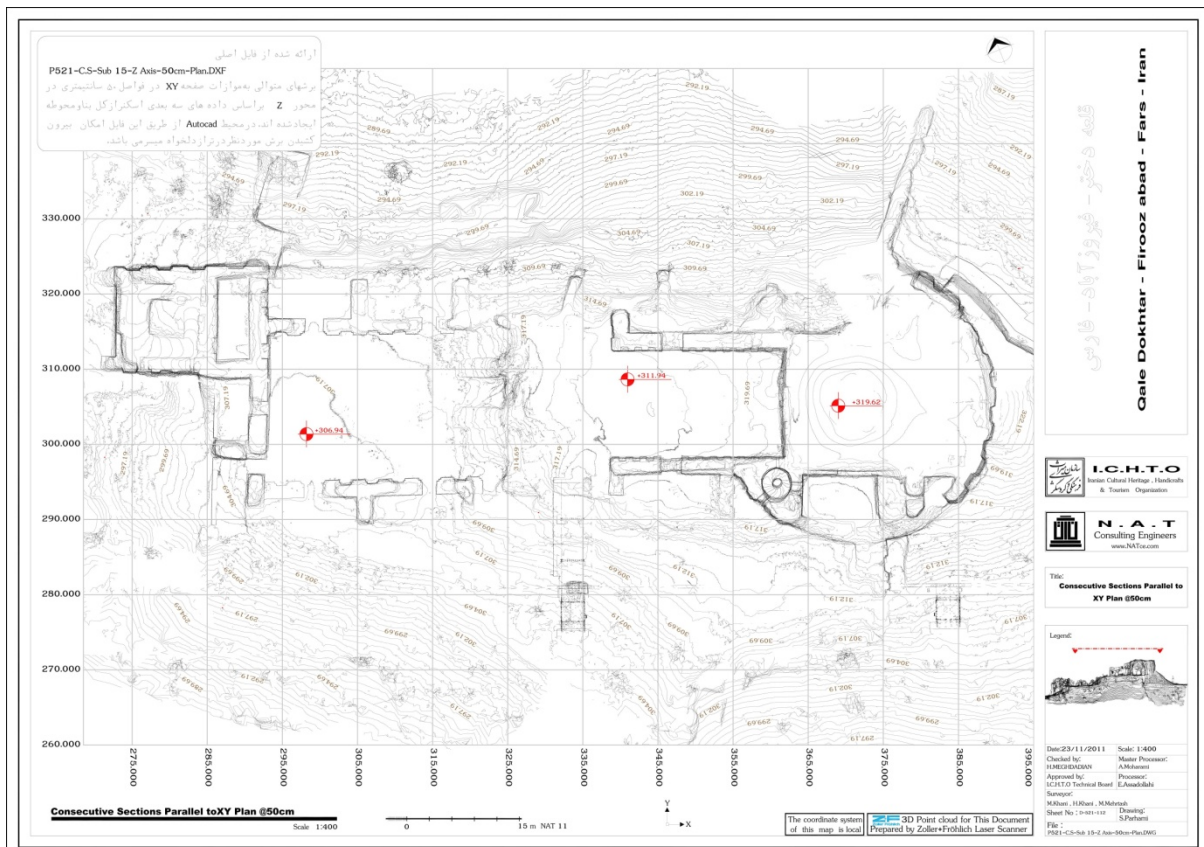
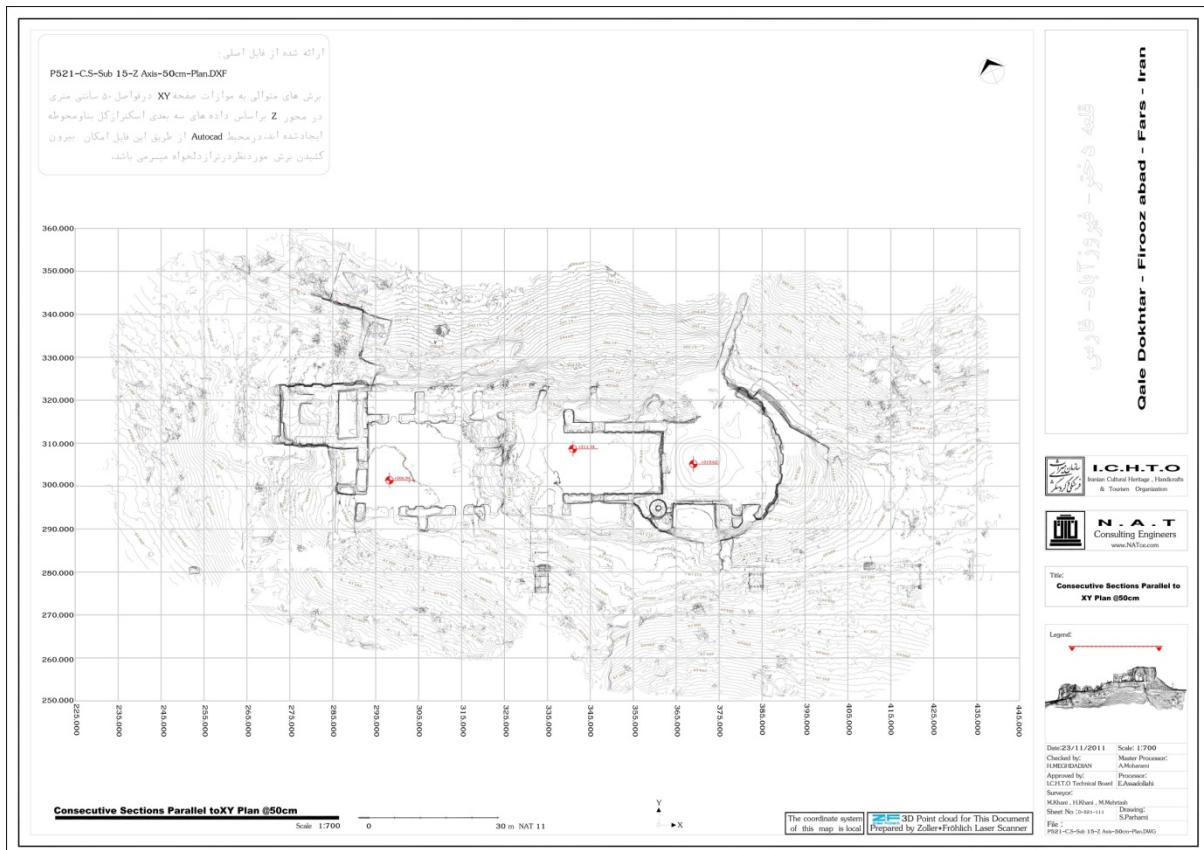
Ambient conditions	
Calibrated temperature	-10 °C to +45 °C
Storage temperature	-20 °C to 50 °C
Illumination	all conditions from darkness to daylight
Humidity; Dust/air humidity	non-condensing
Target reflectivity	no retro-reflectors

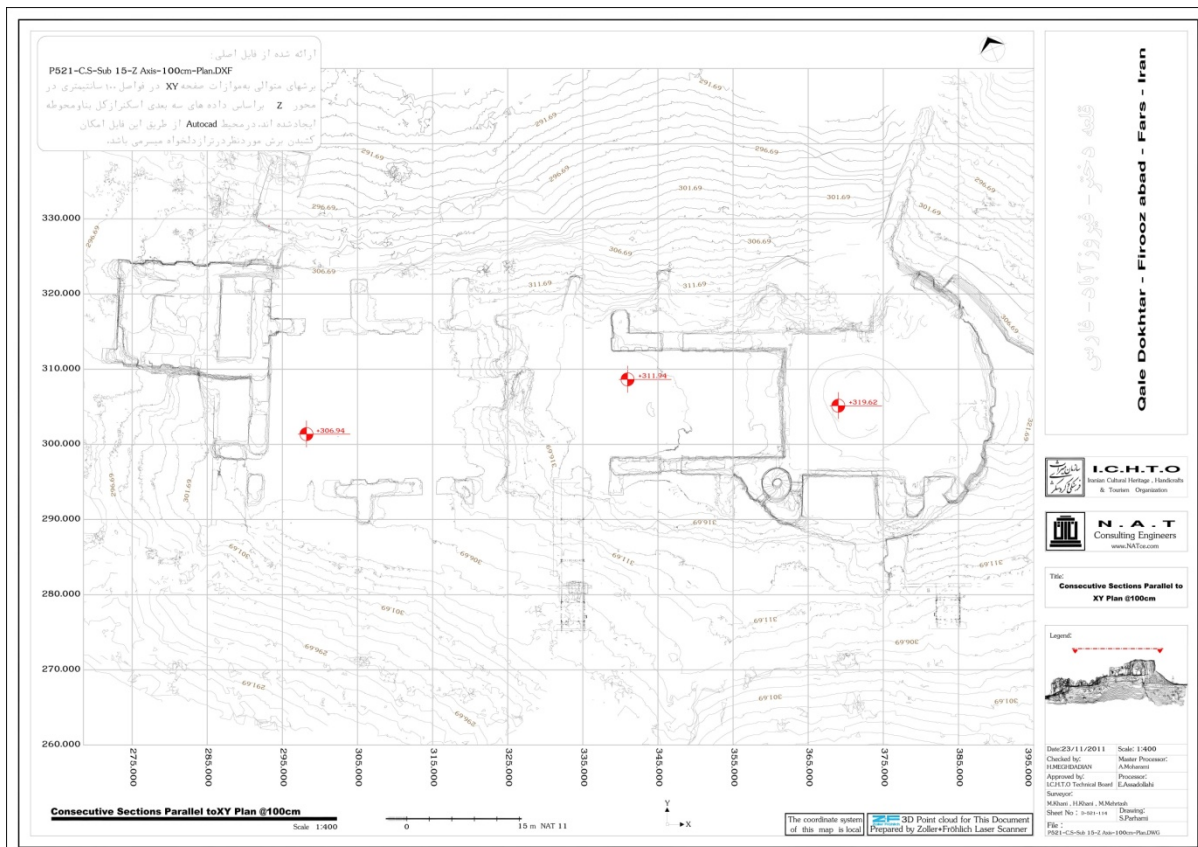
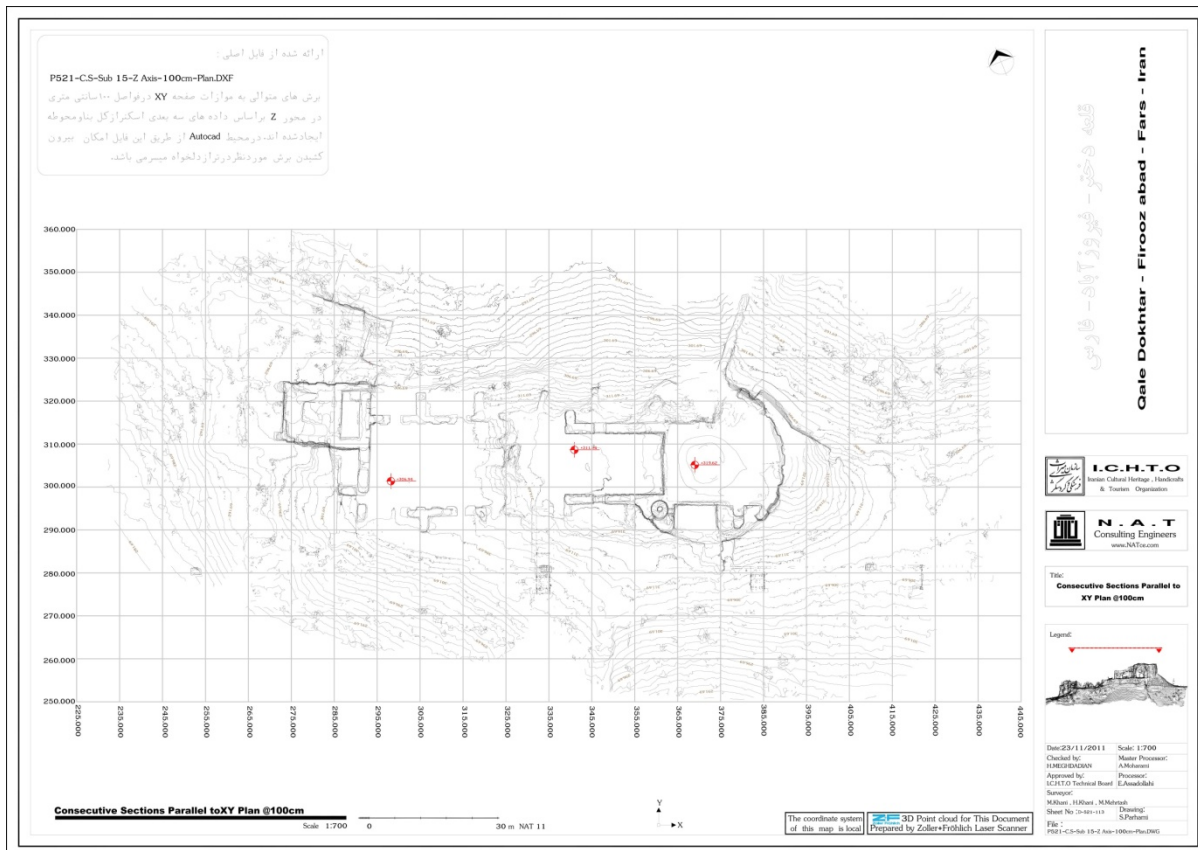
Dimensions and weights	
Scanner: (w x d x h)	286 x 190 x 412 mm
Weight	14 kg
Bottom of scanner to horizontal axis	242 mm
Tripod:	
Height	approx. 800 - 1,400 mm
Diameter	approx. 1,200 mm
Weight	9 kg

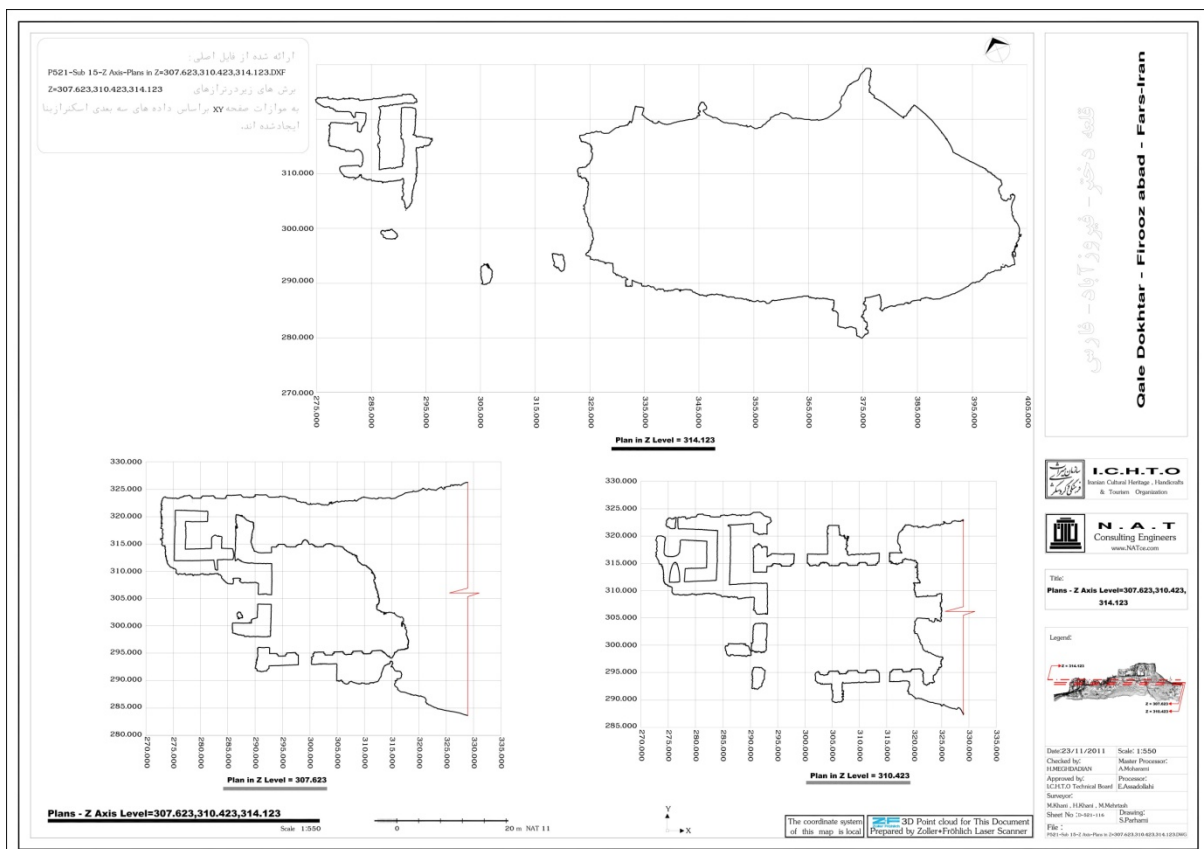
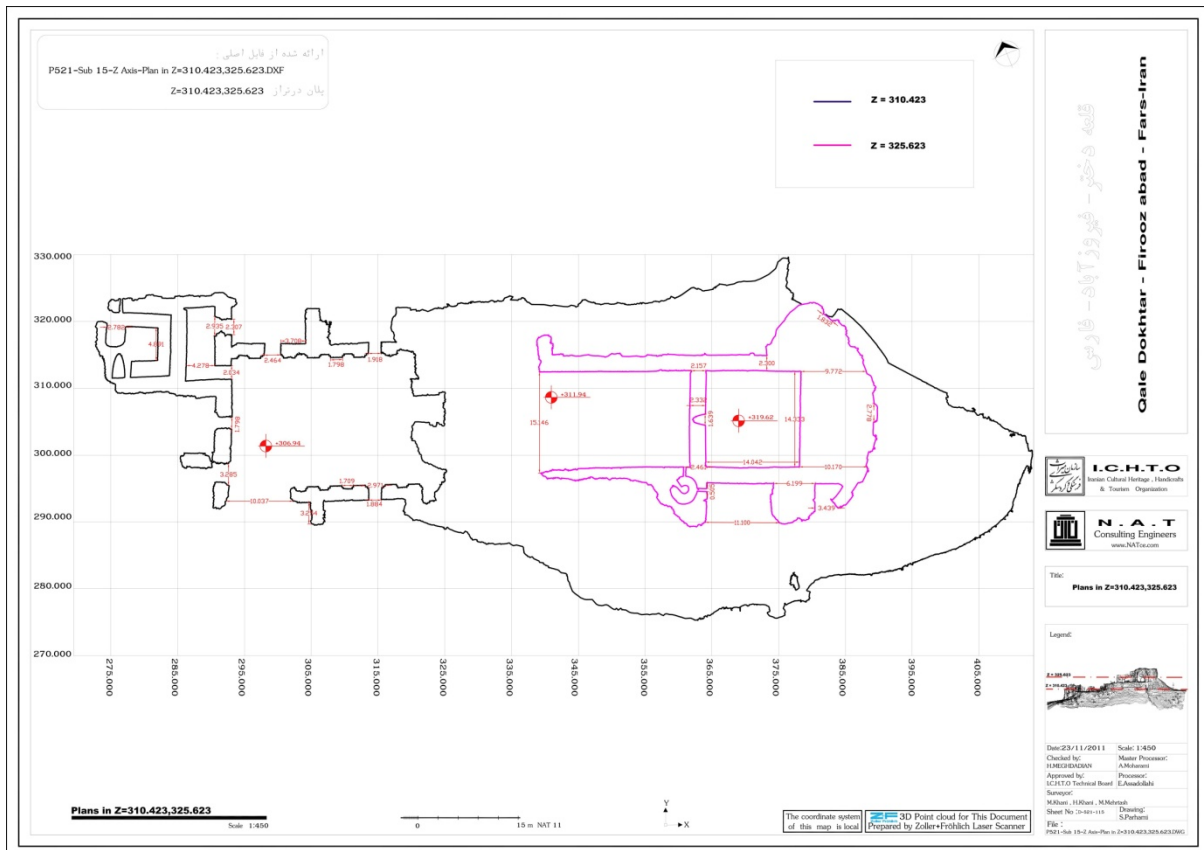
1. detailed explanation on request – please contact info@zf-laser.com
2. data-rate of 127 000 pxl / sec., 1 sigma range noise, unfiltered raw data, in high power mode
3. not recommended for exact measurements, should only be used as an overview
4. only recommended for selection scans, as the data will be too large for further post processing.
Resolution of 100,000 pxl/360° for selections
5. Doubling ("less quality") and halving ("high quality") of the data rate (pixels / sec), increases the range noise on each pixel theoretically by 40% ("less quality") or decreased it by 40% ("high quality") in comparison the "normal quality". Related to the roughness of the measured surface, the difference in reality can be less, especially when scanning objects with bright surfaces in short distances, e.g. indoor.



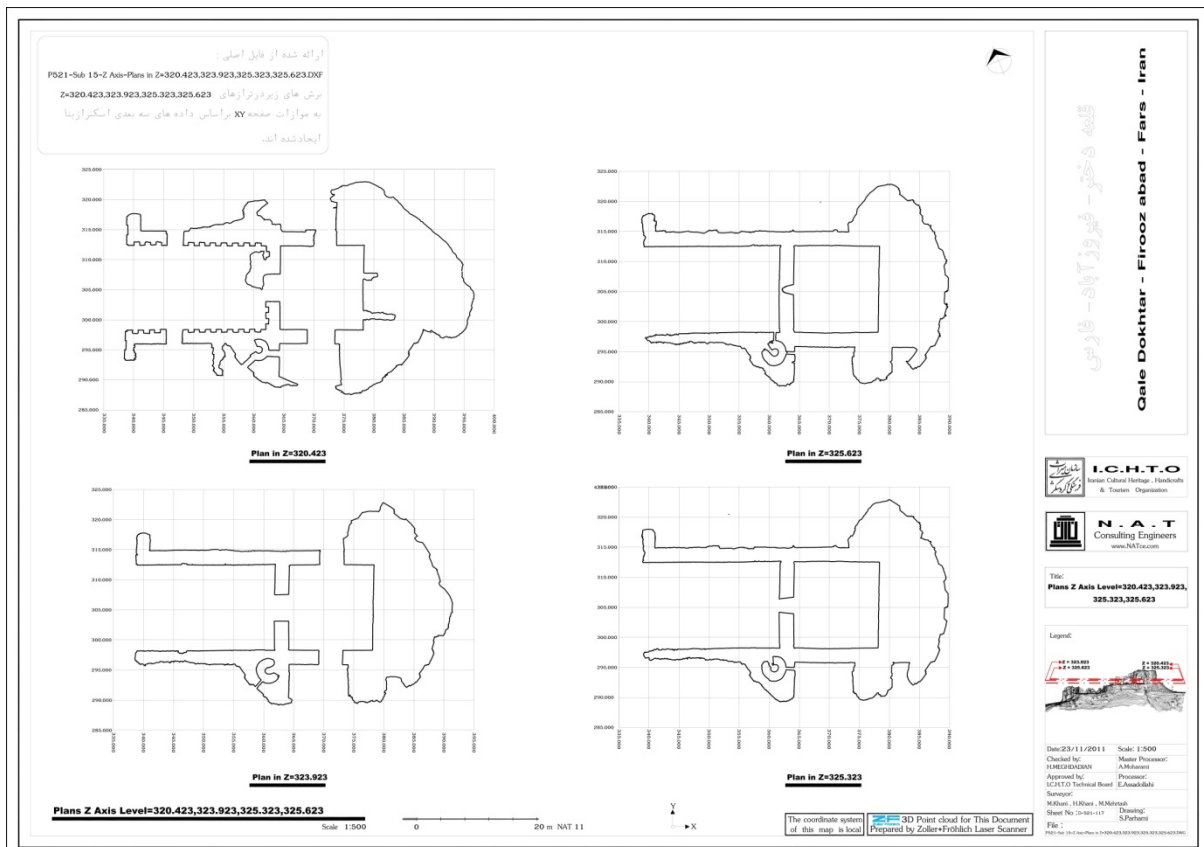
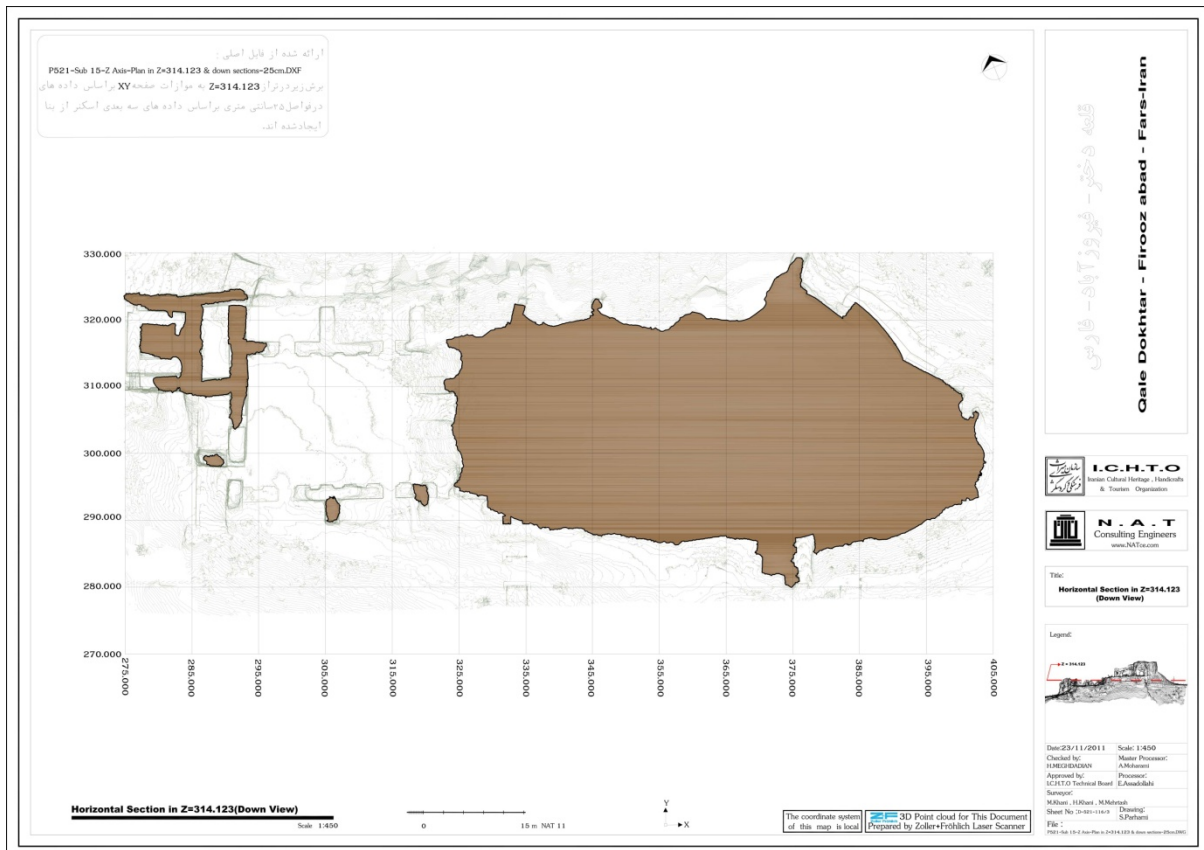


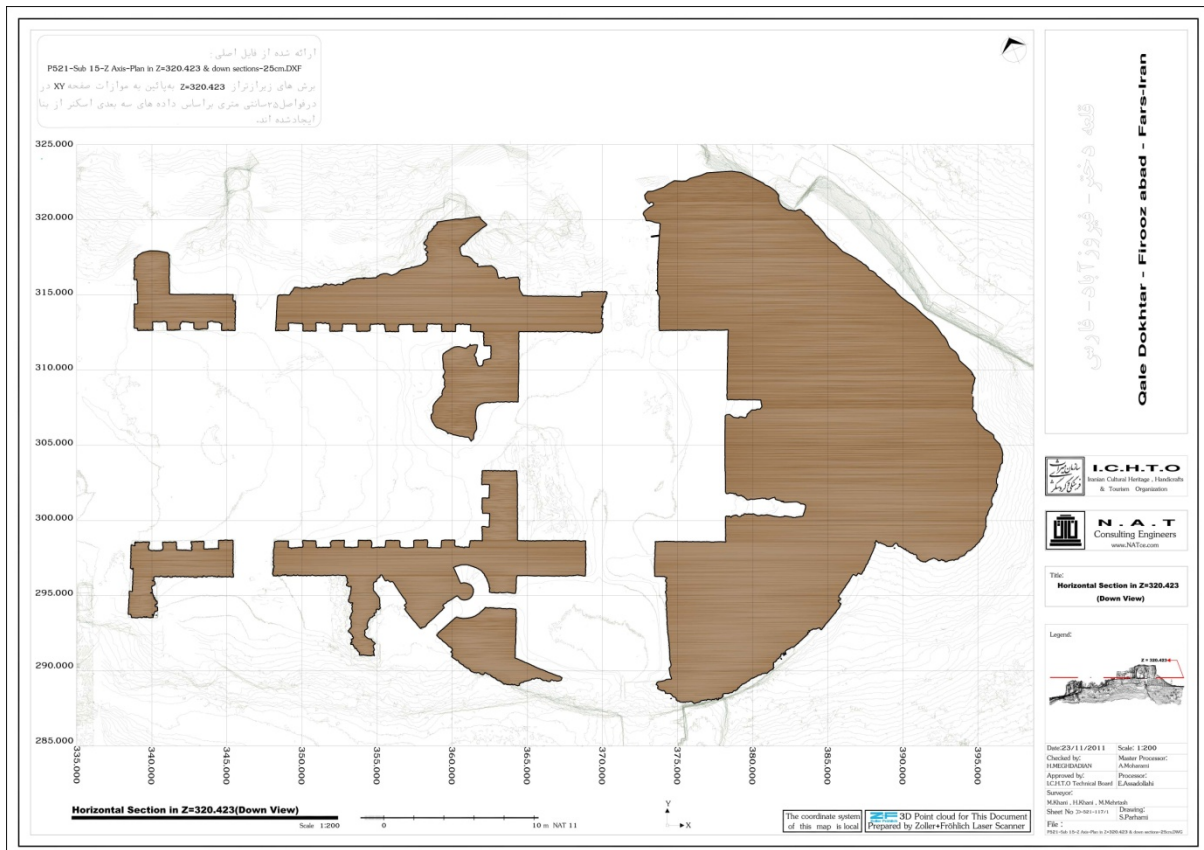


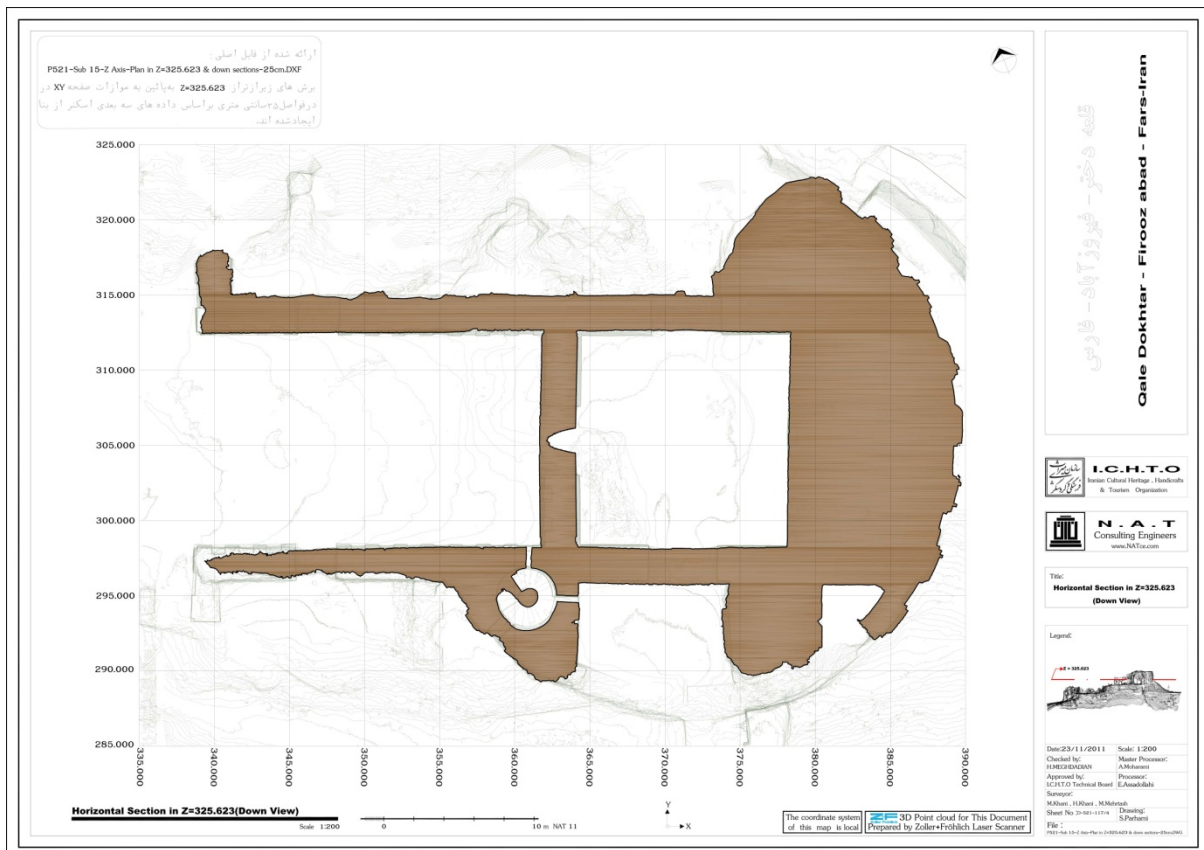


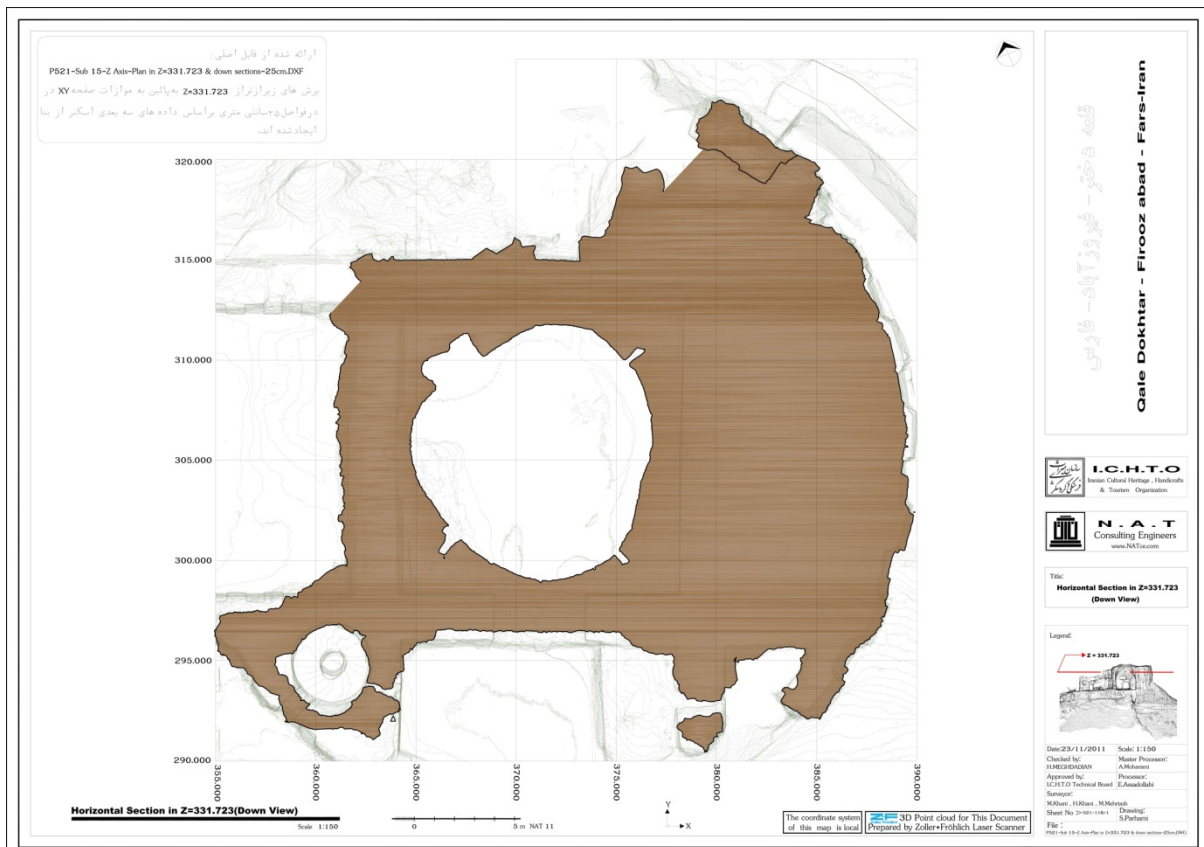


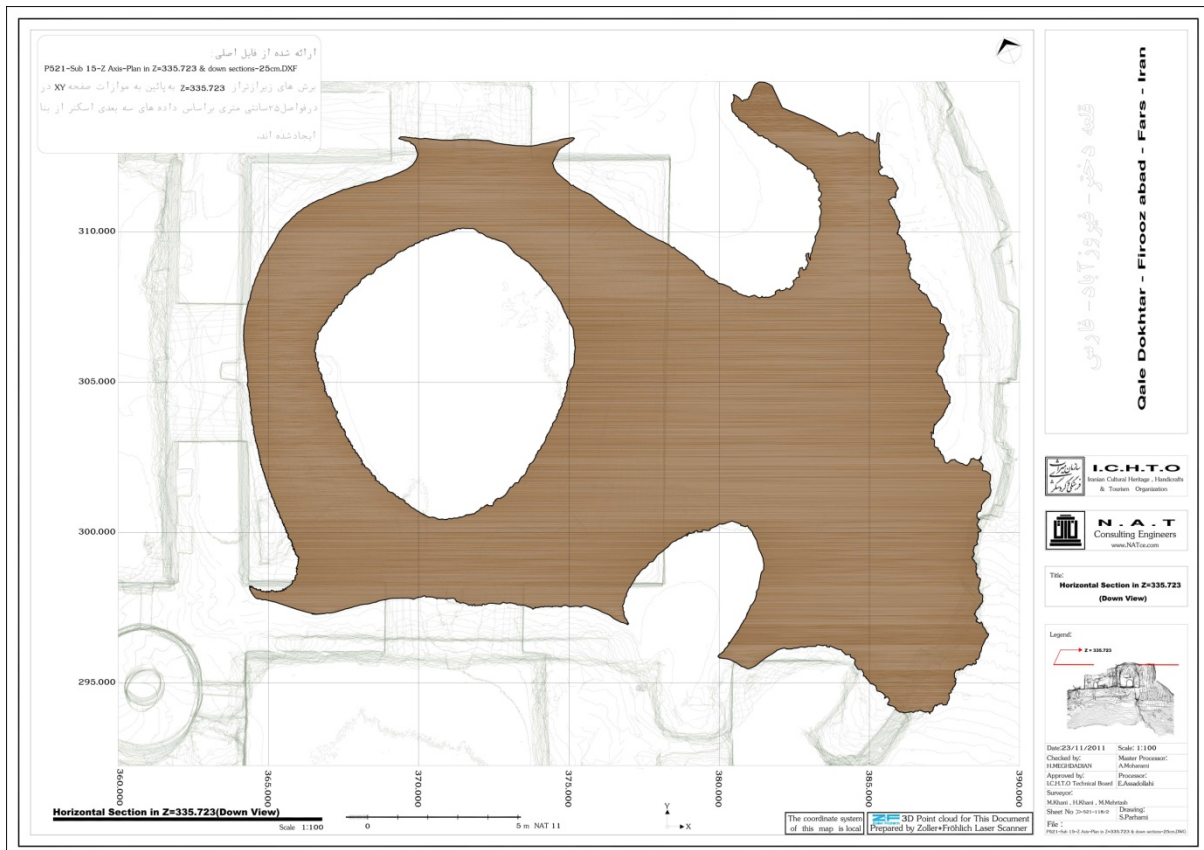


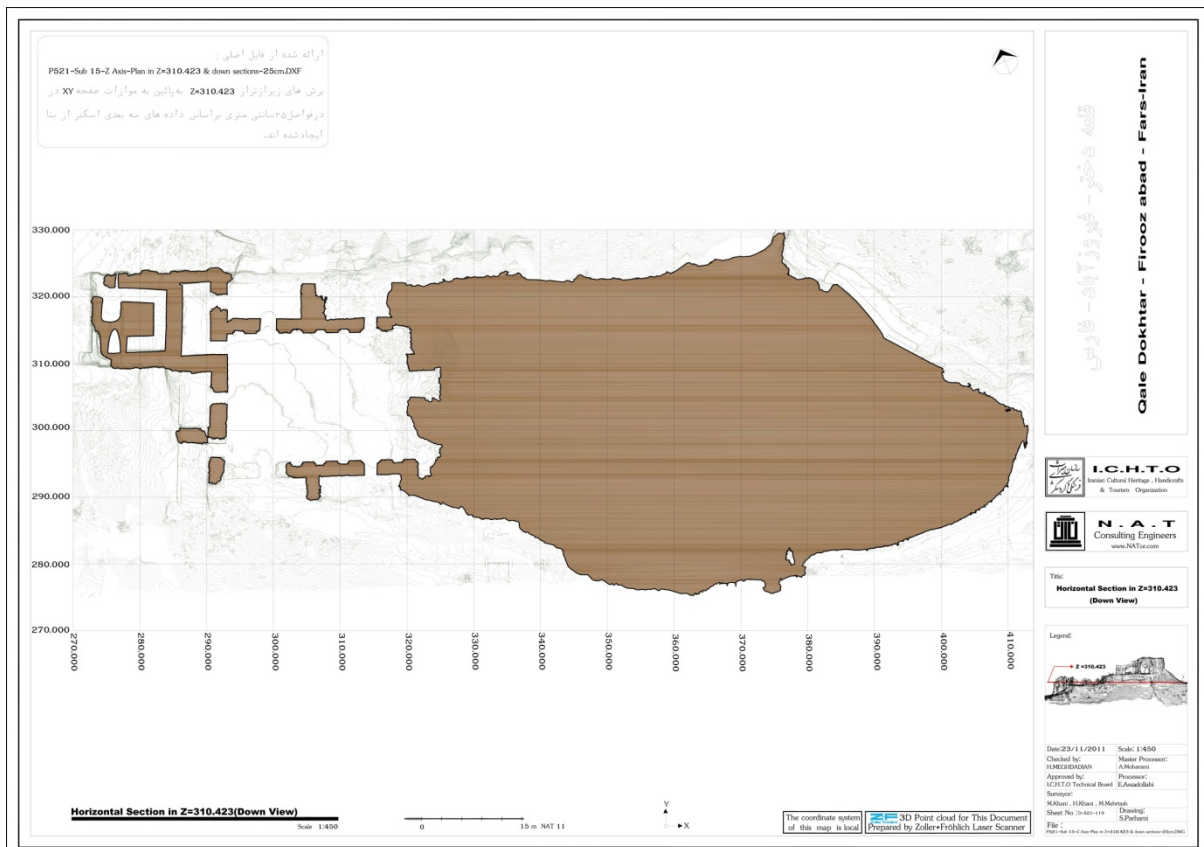
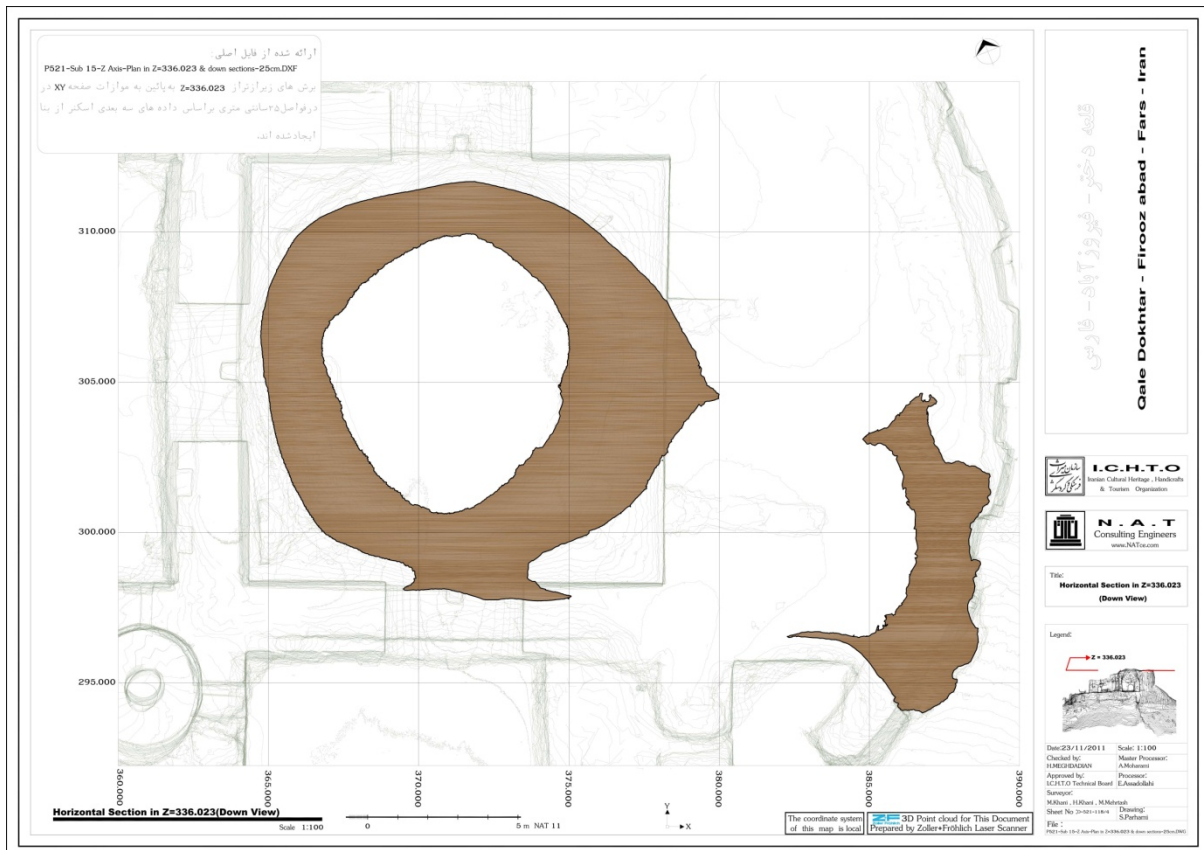


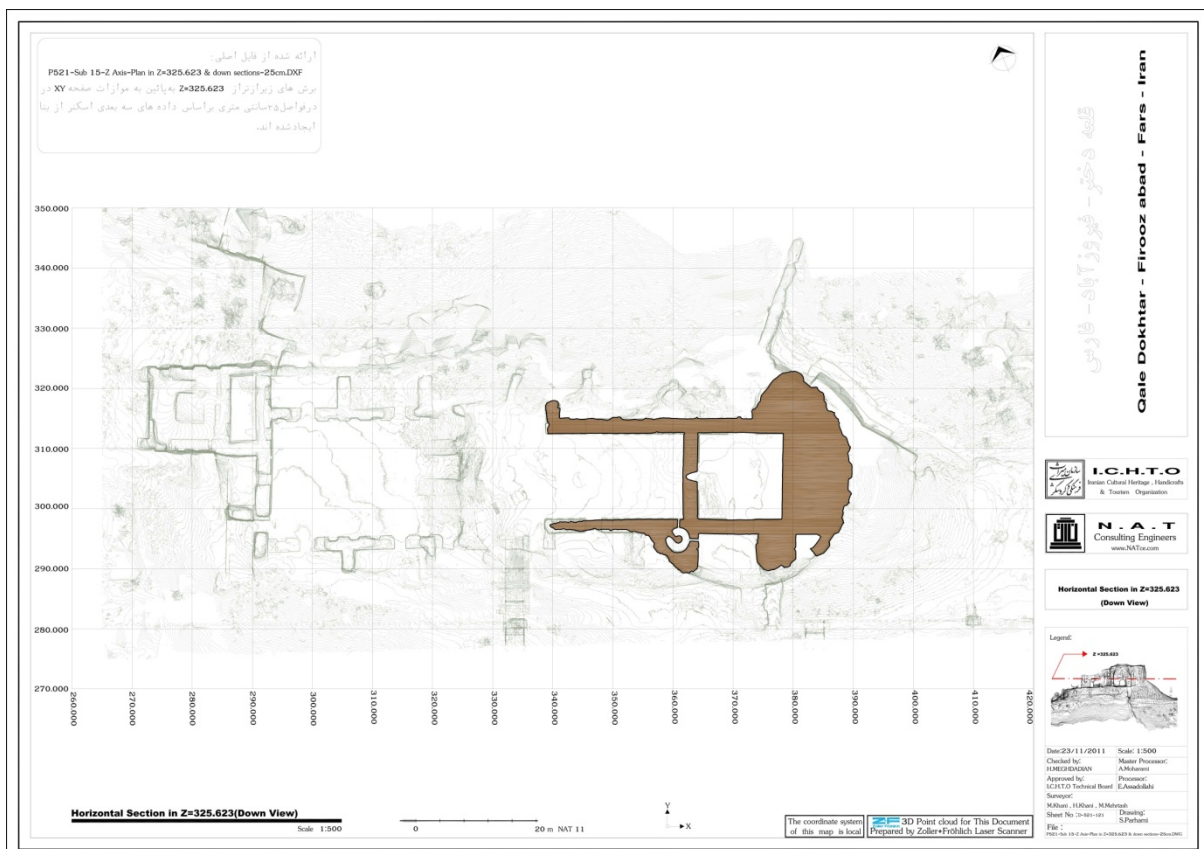
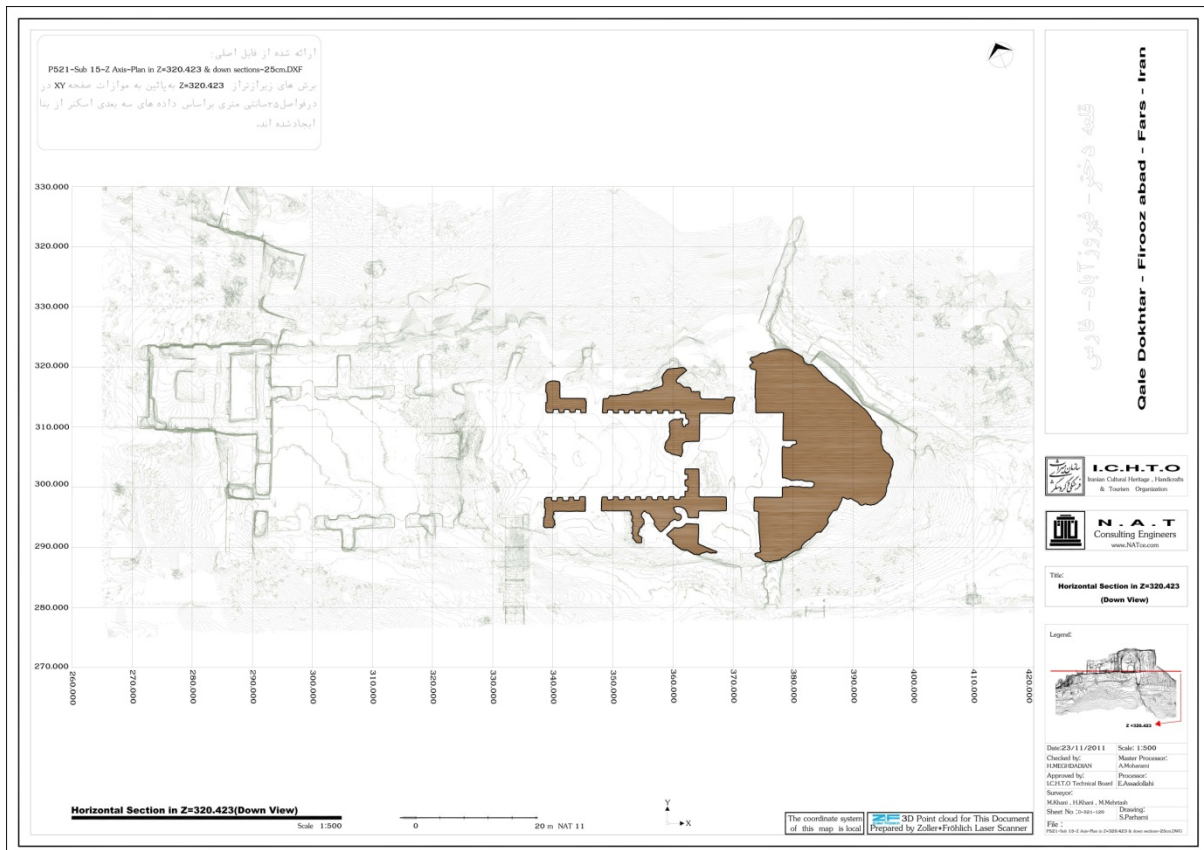


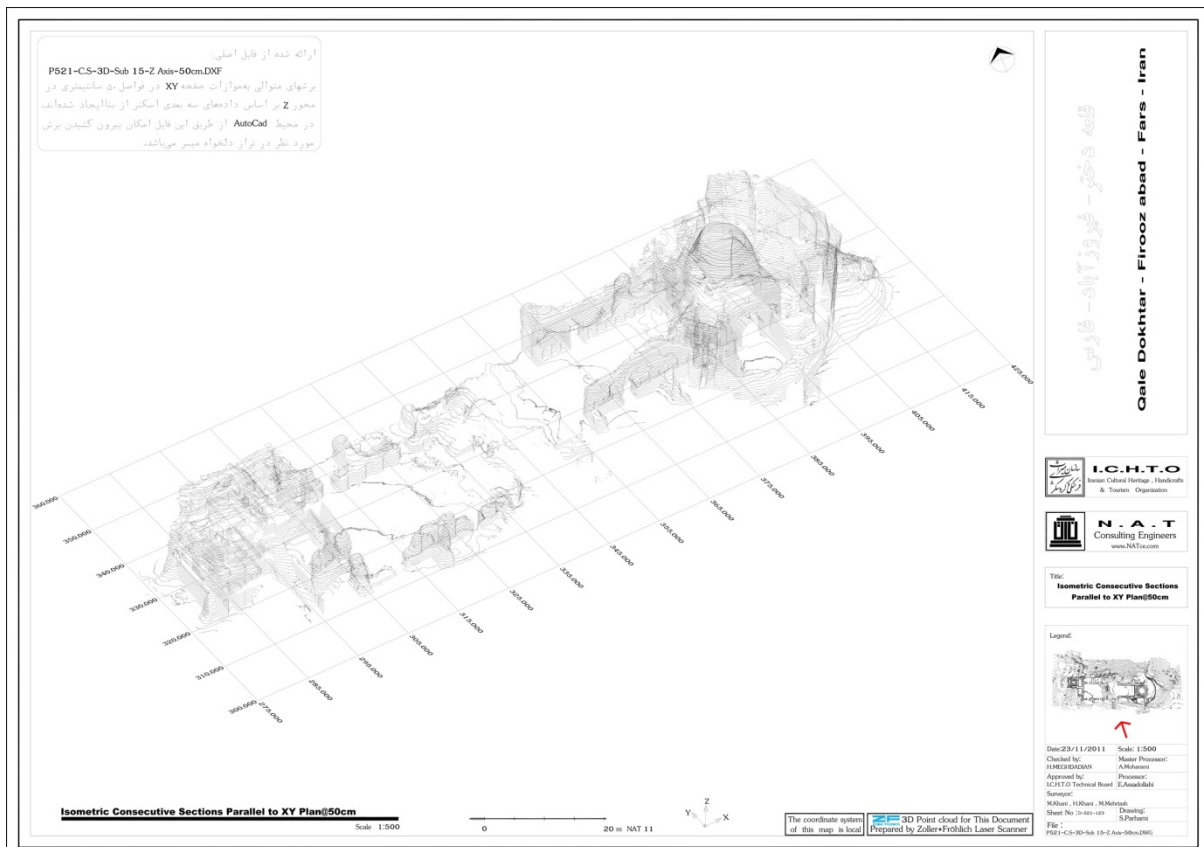
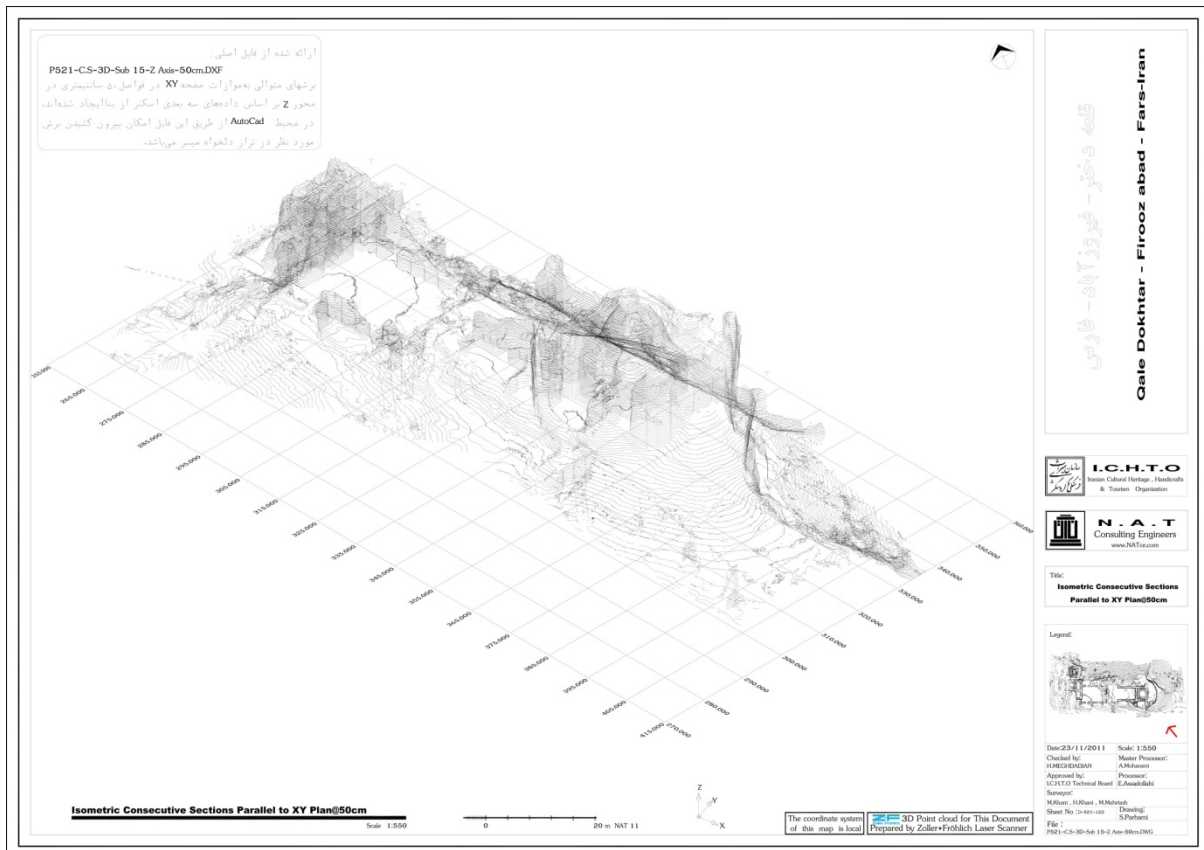


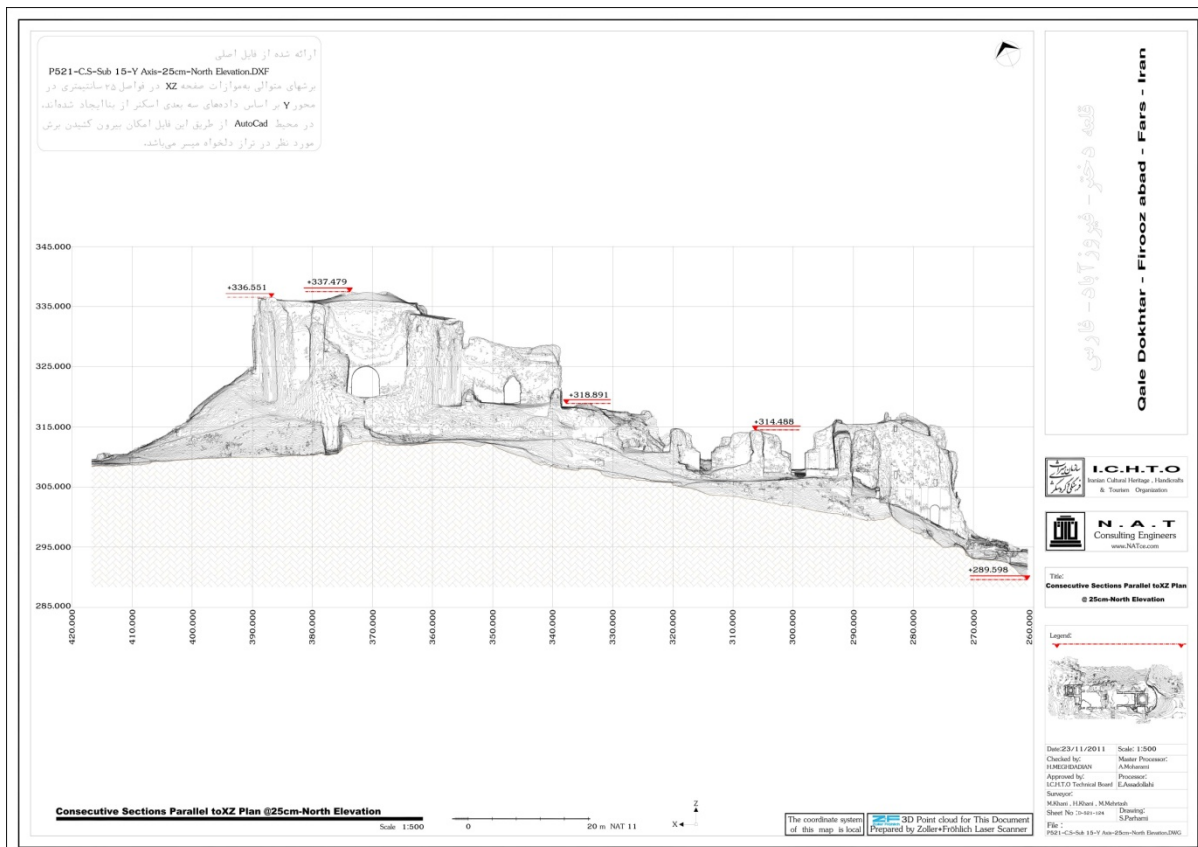
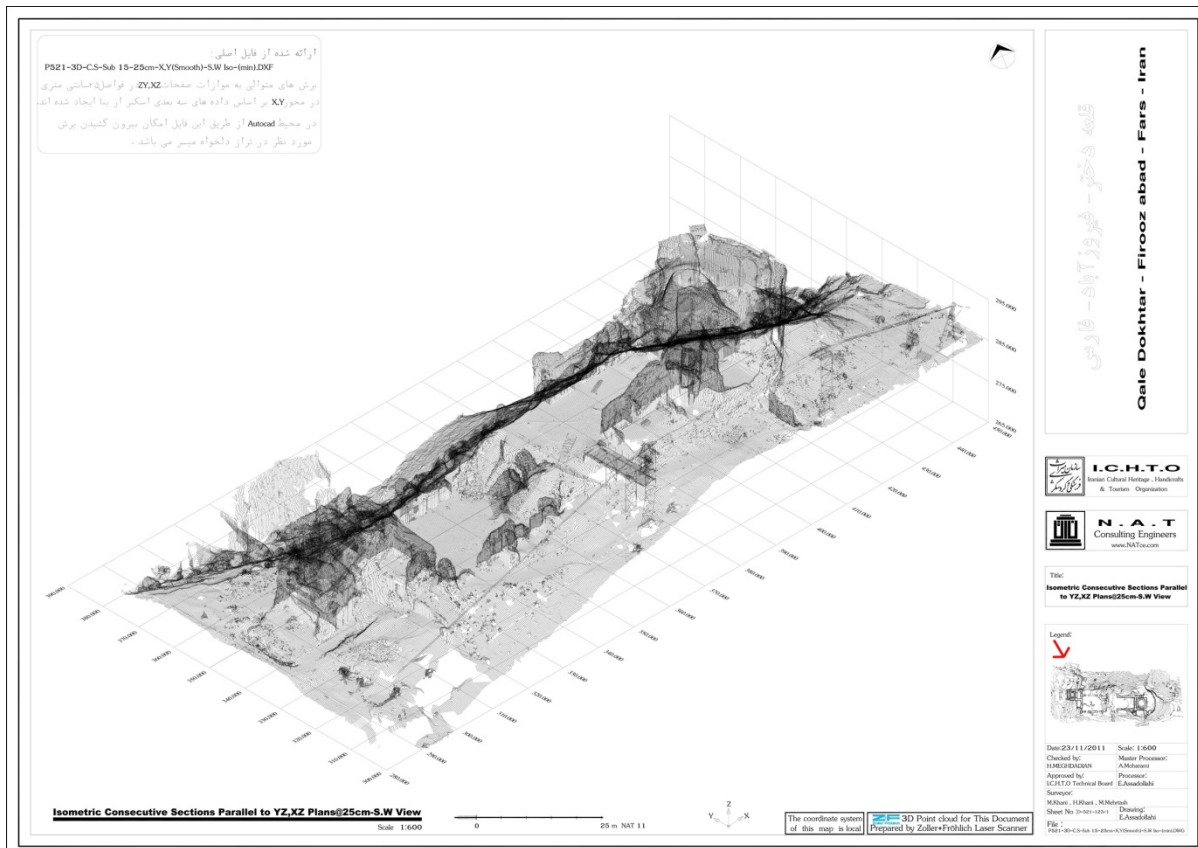


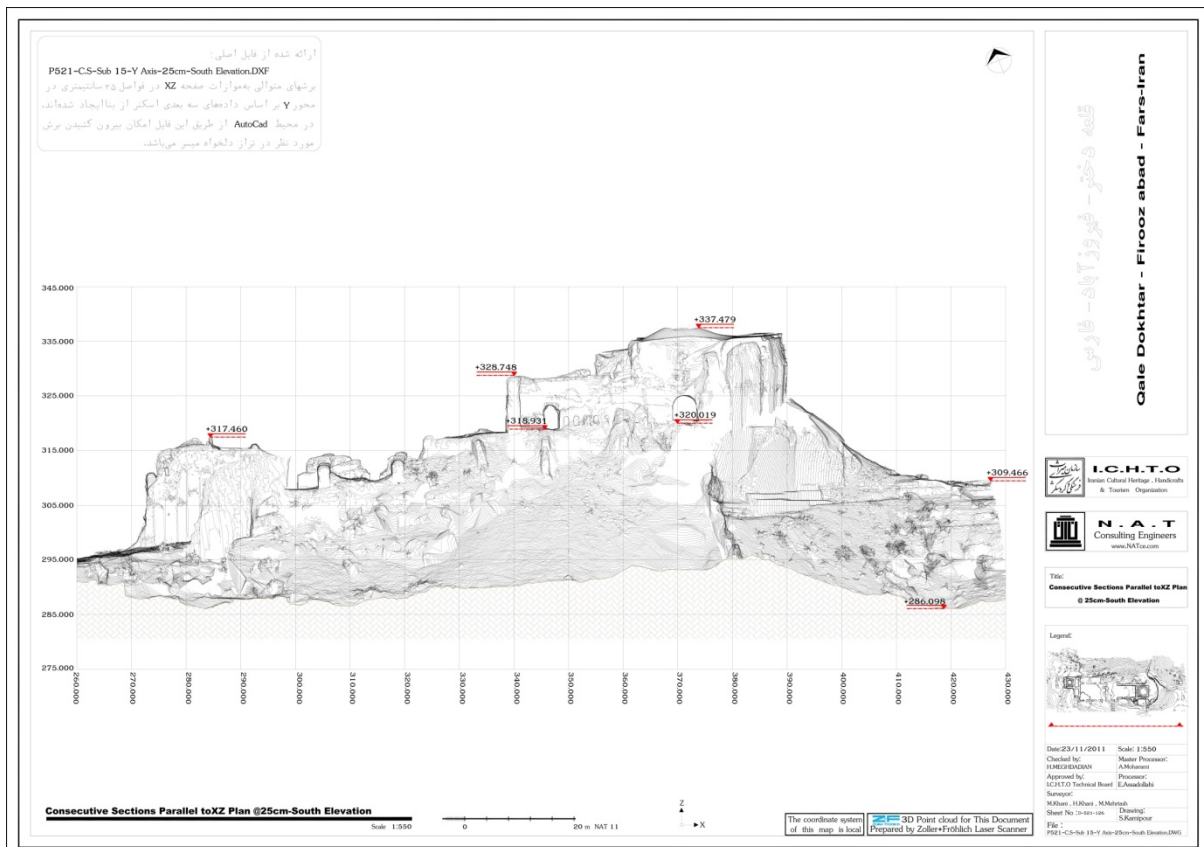
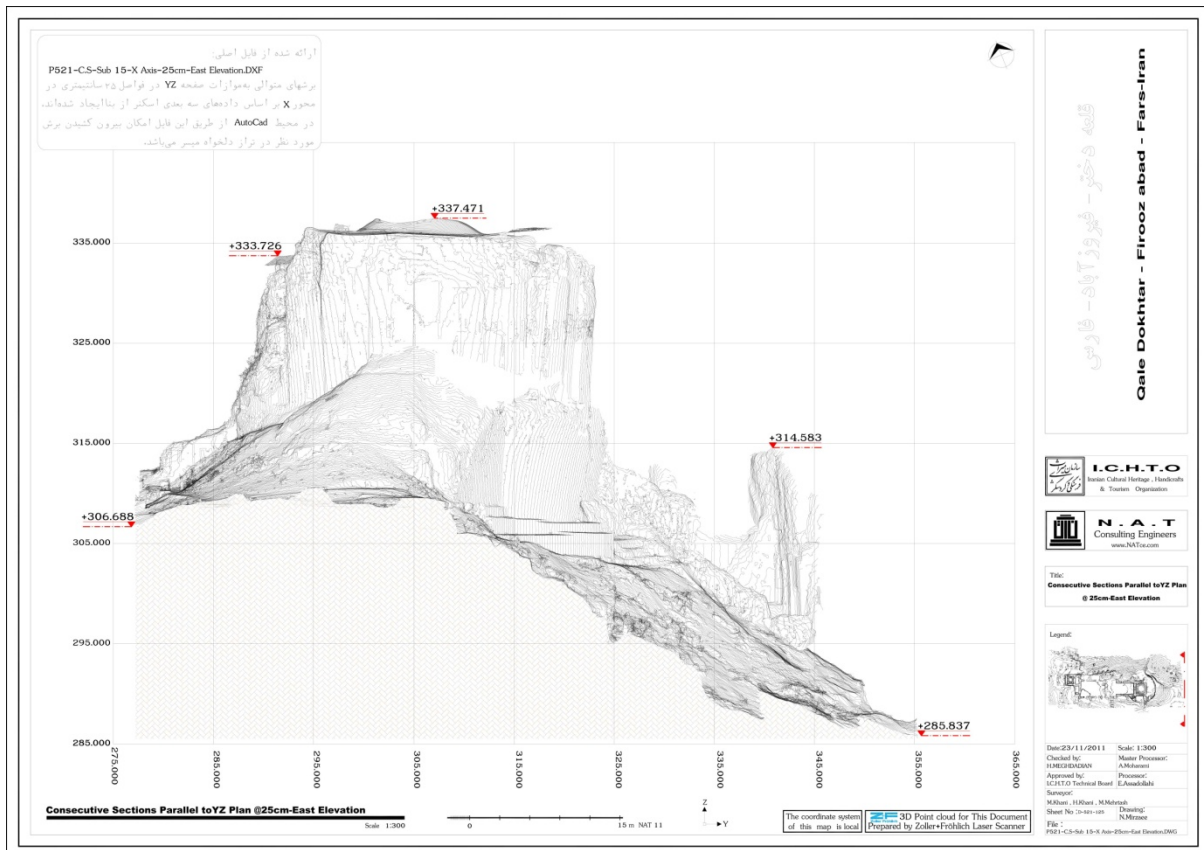


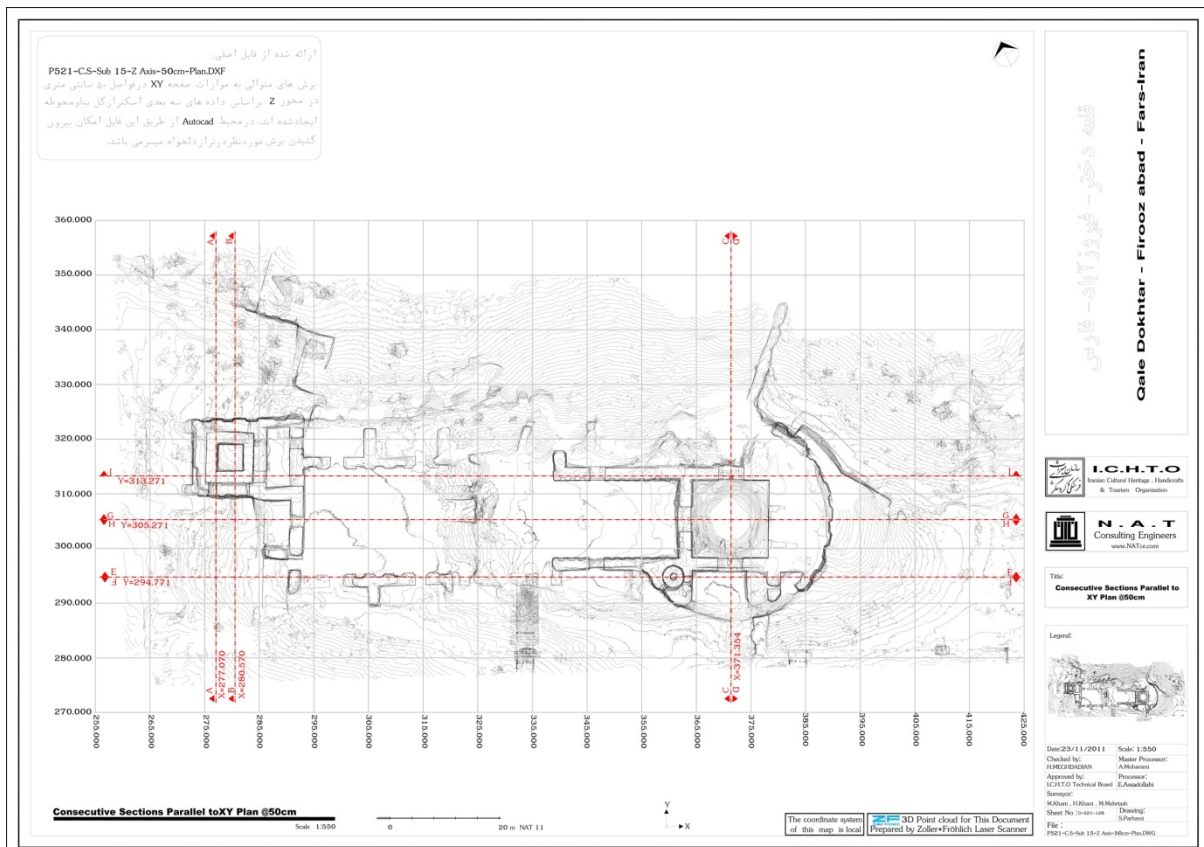
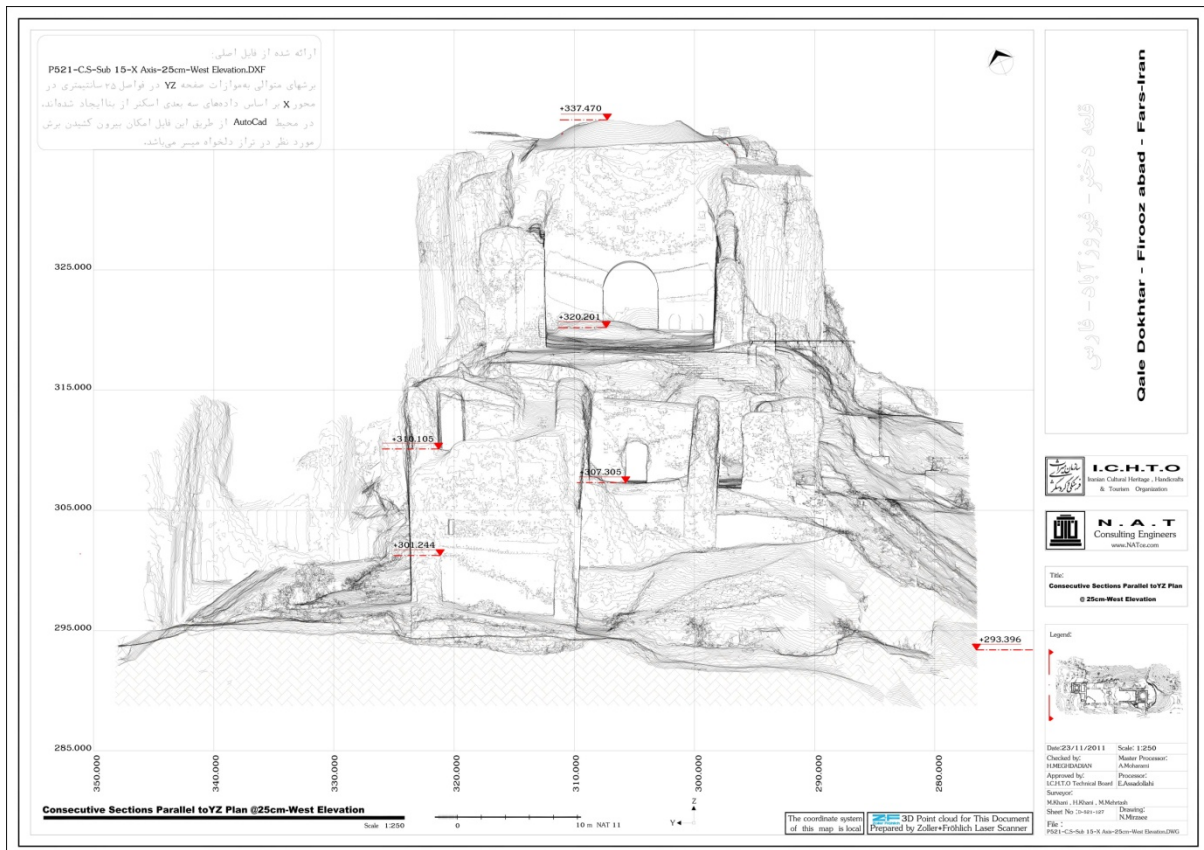


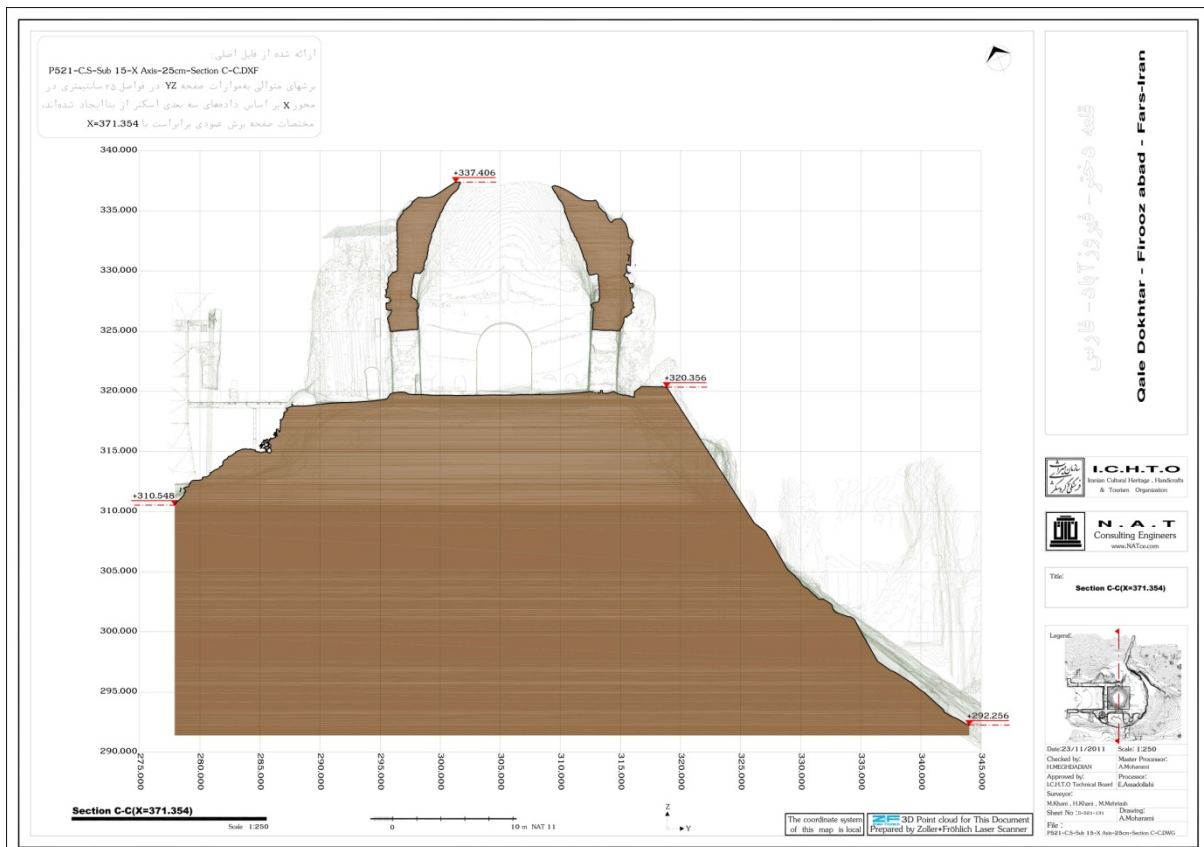
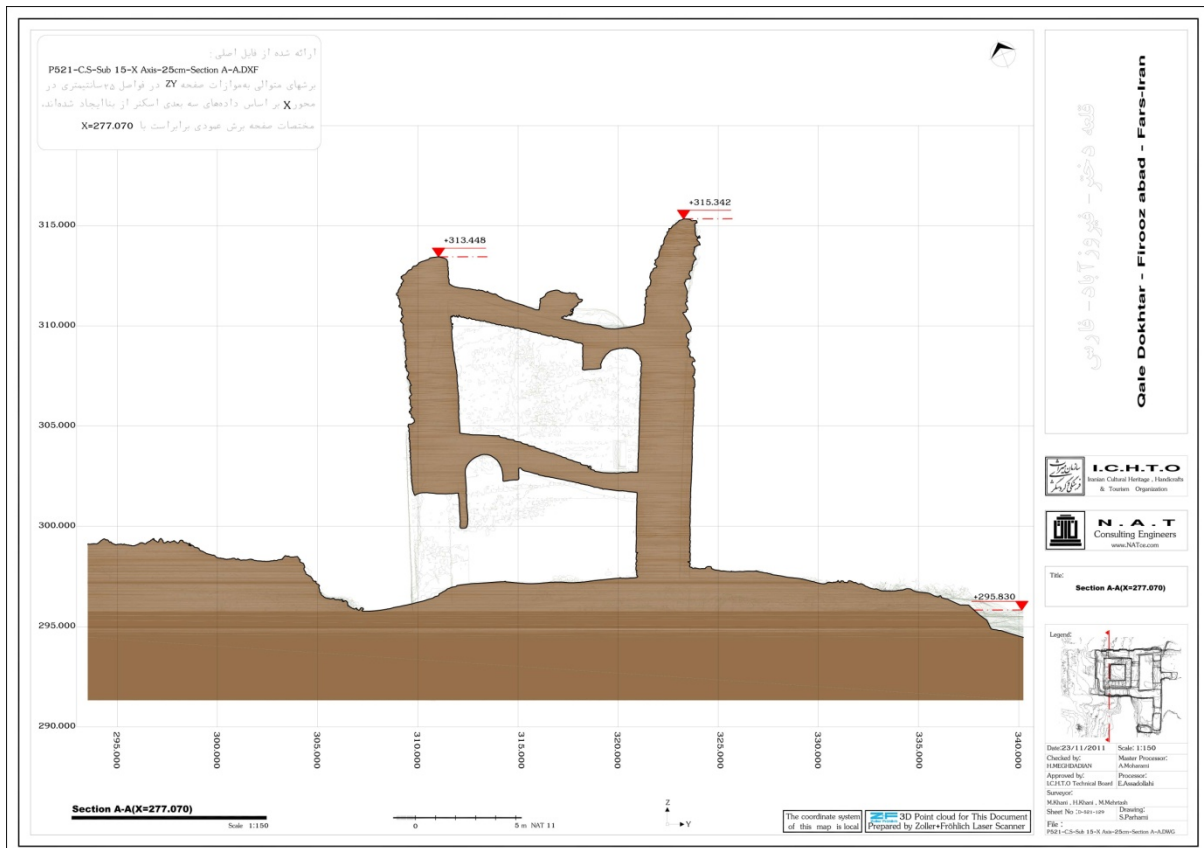


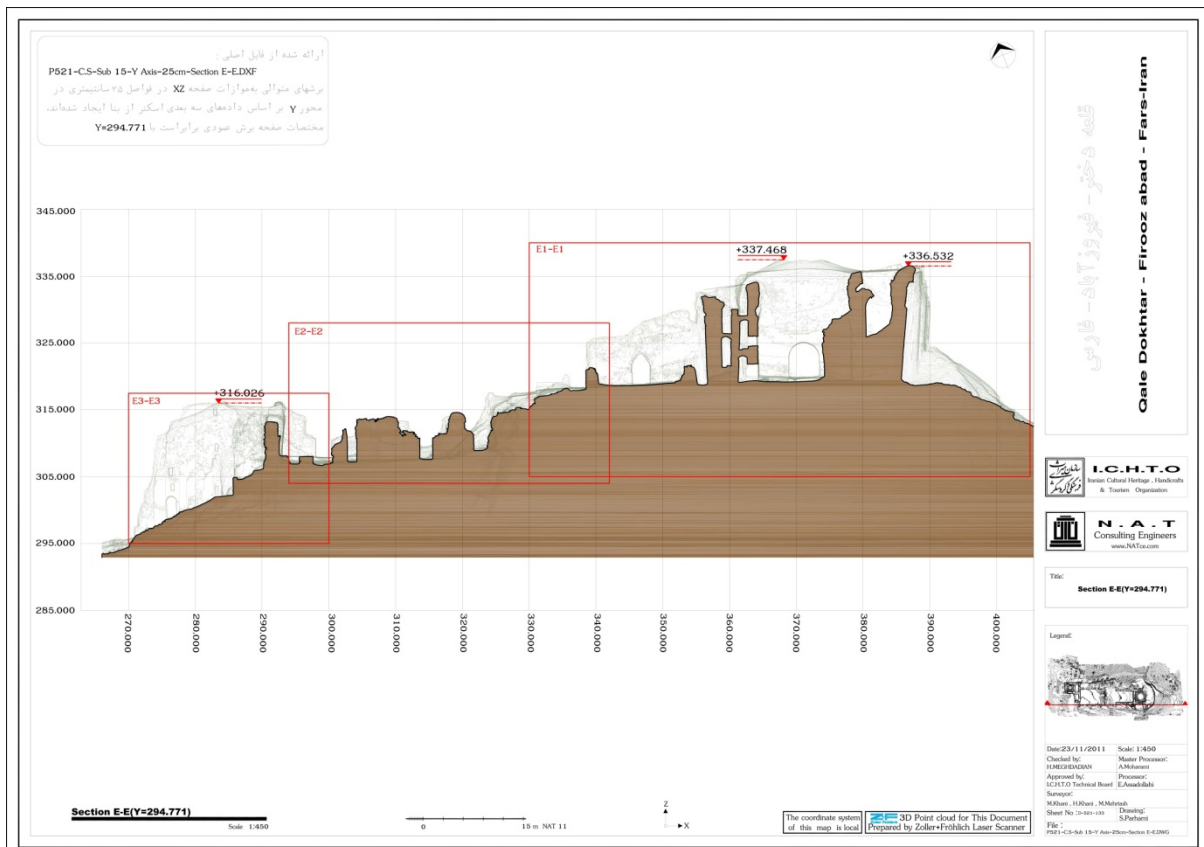
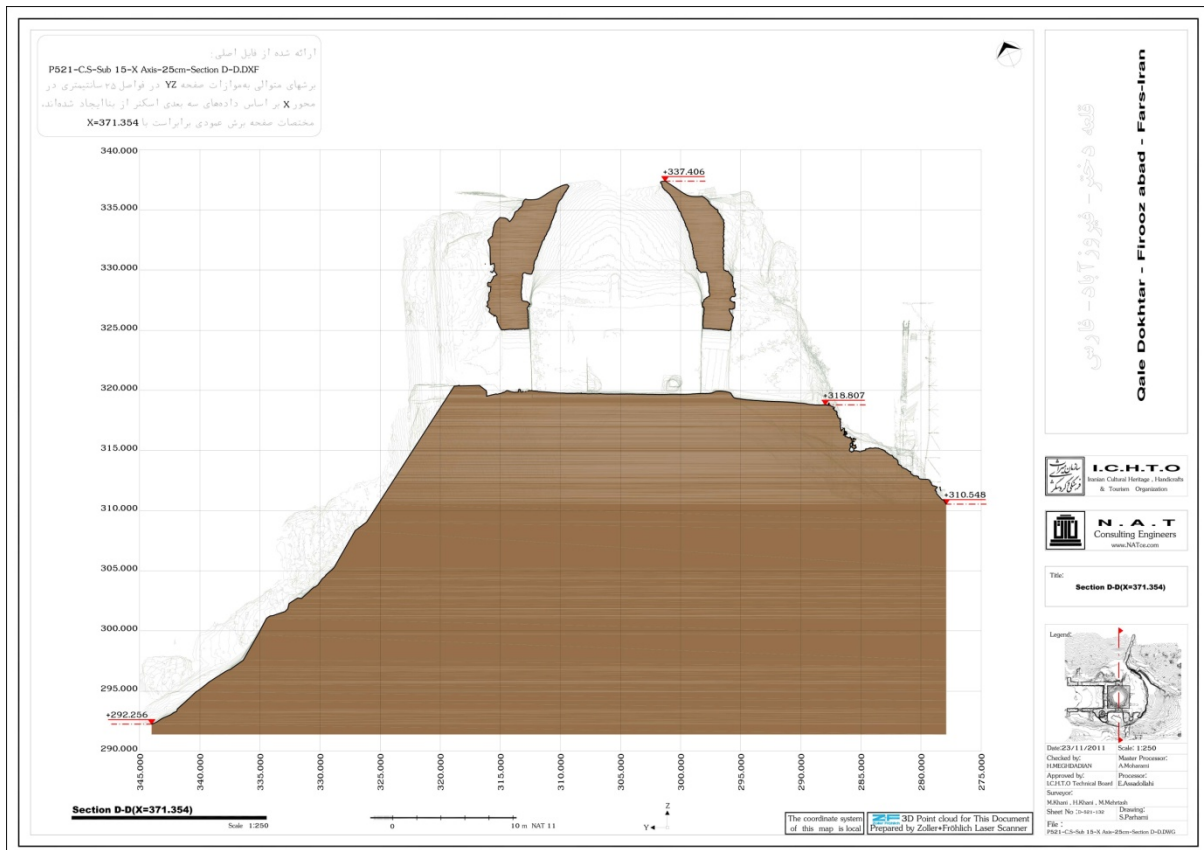


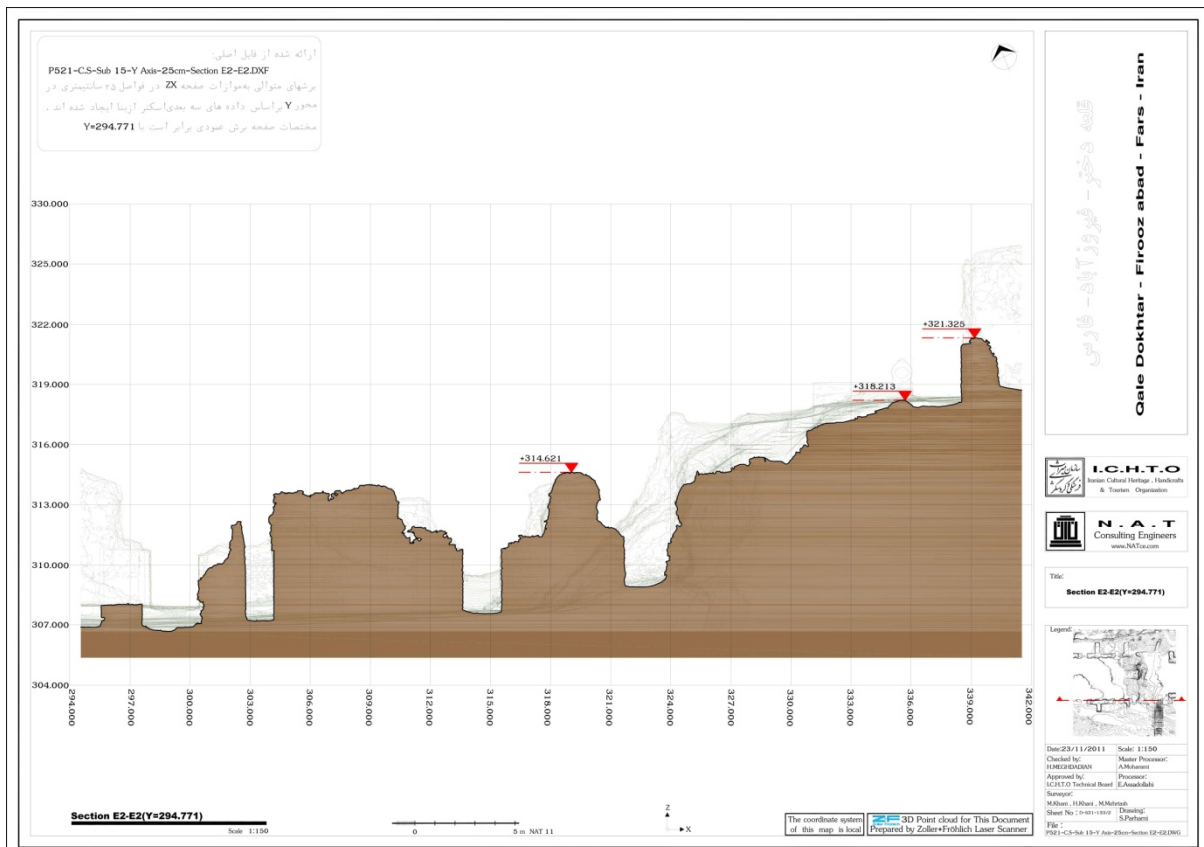
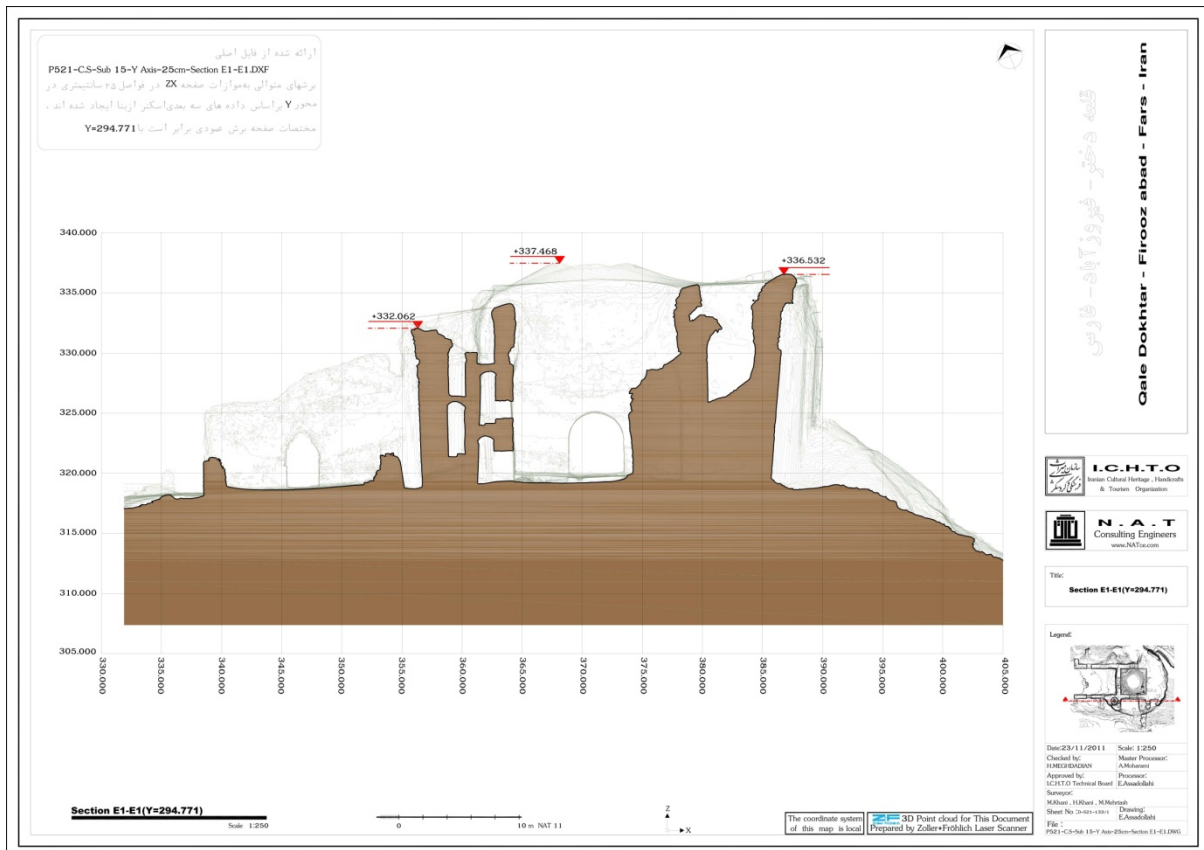


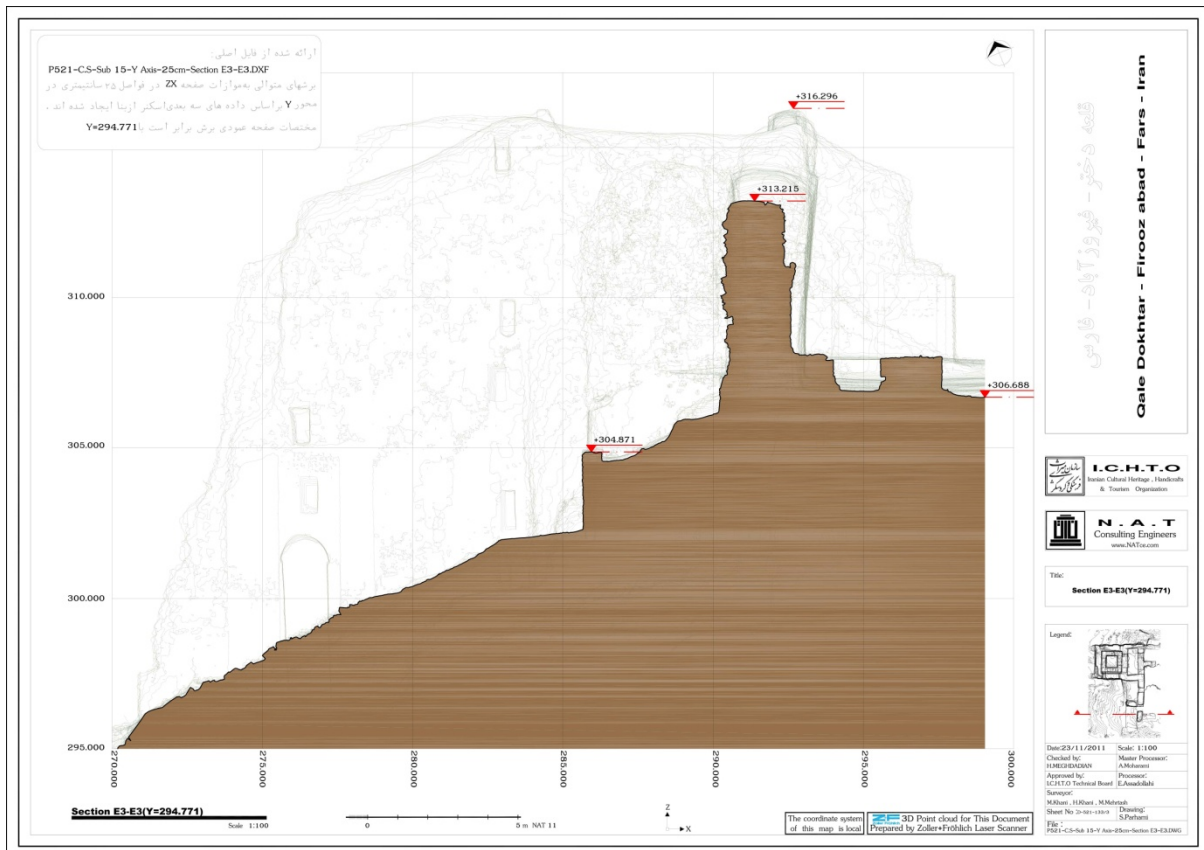


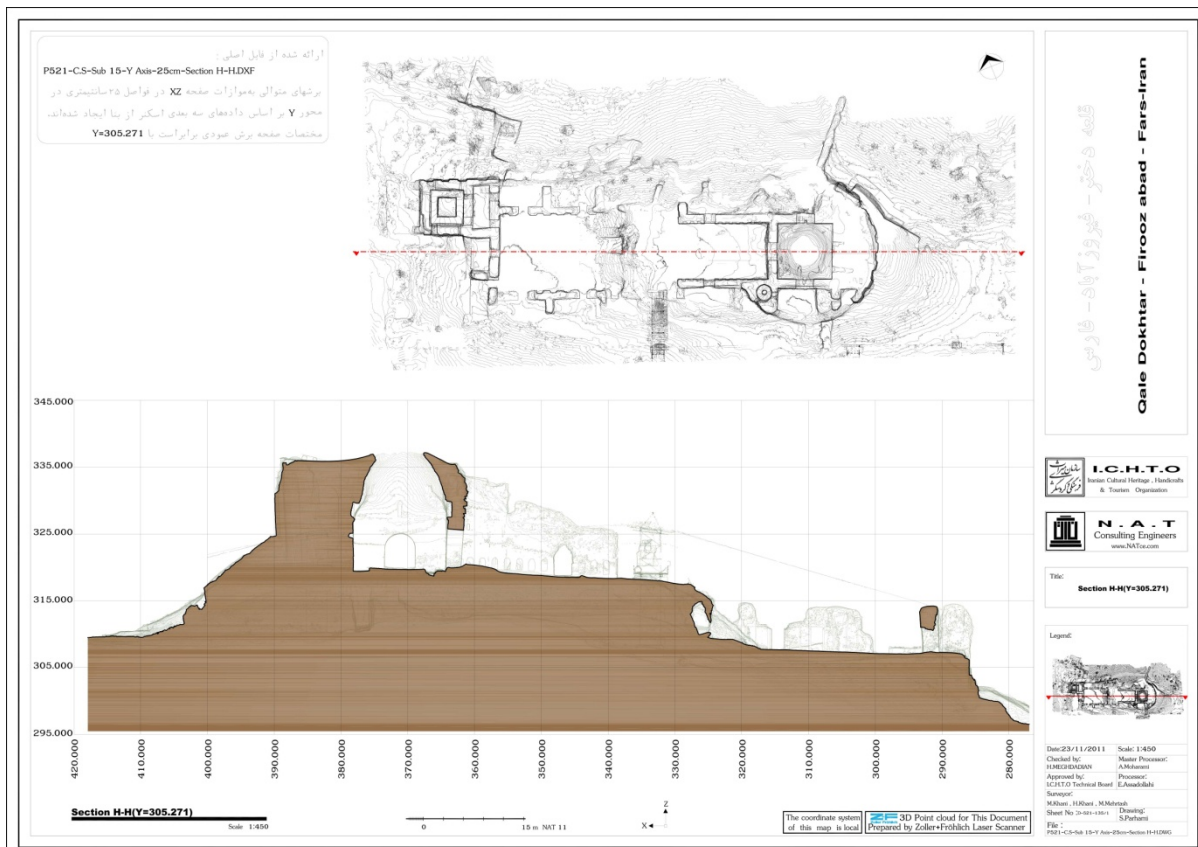
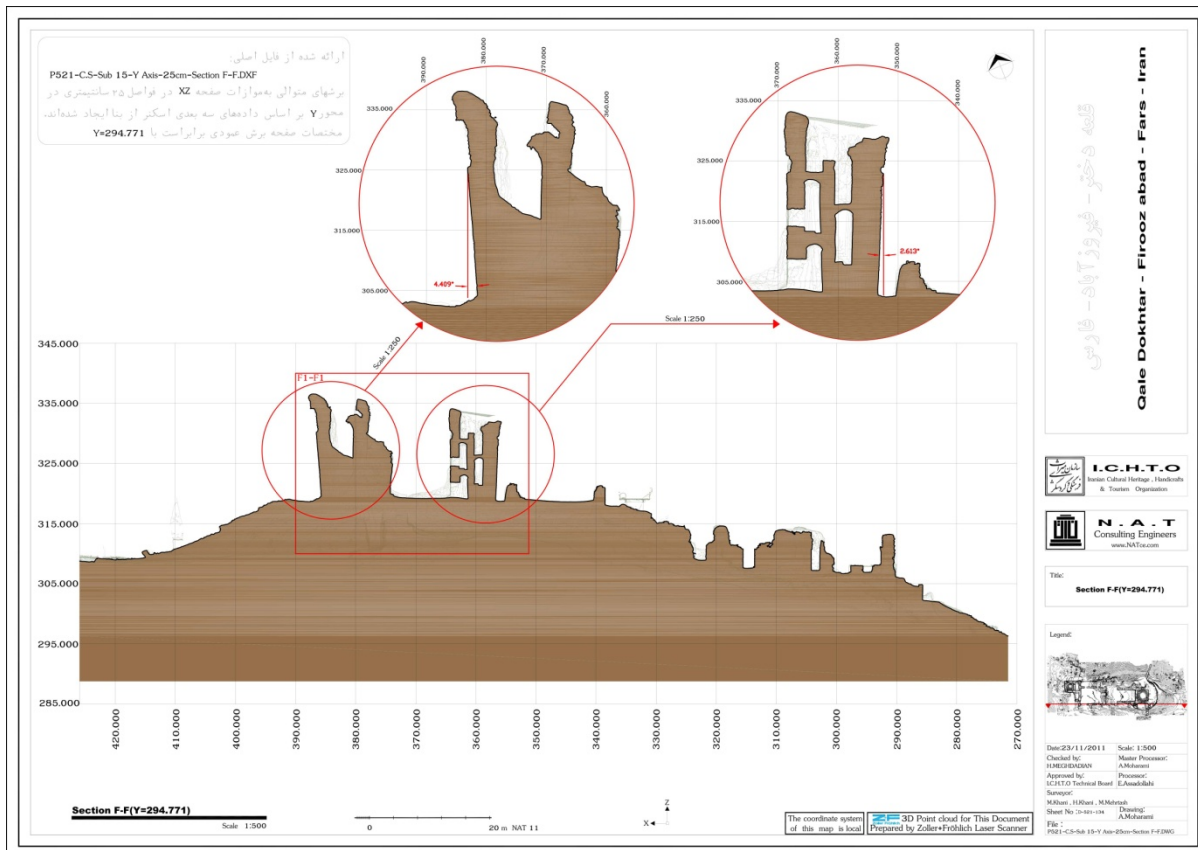


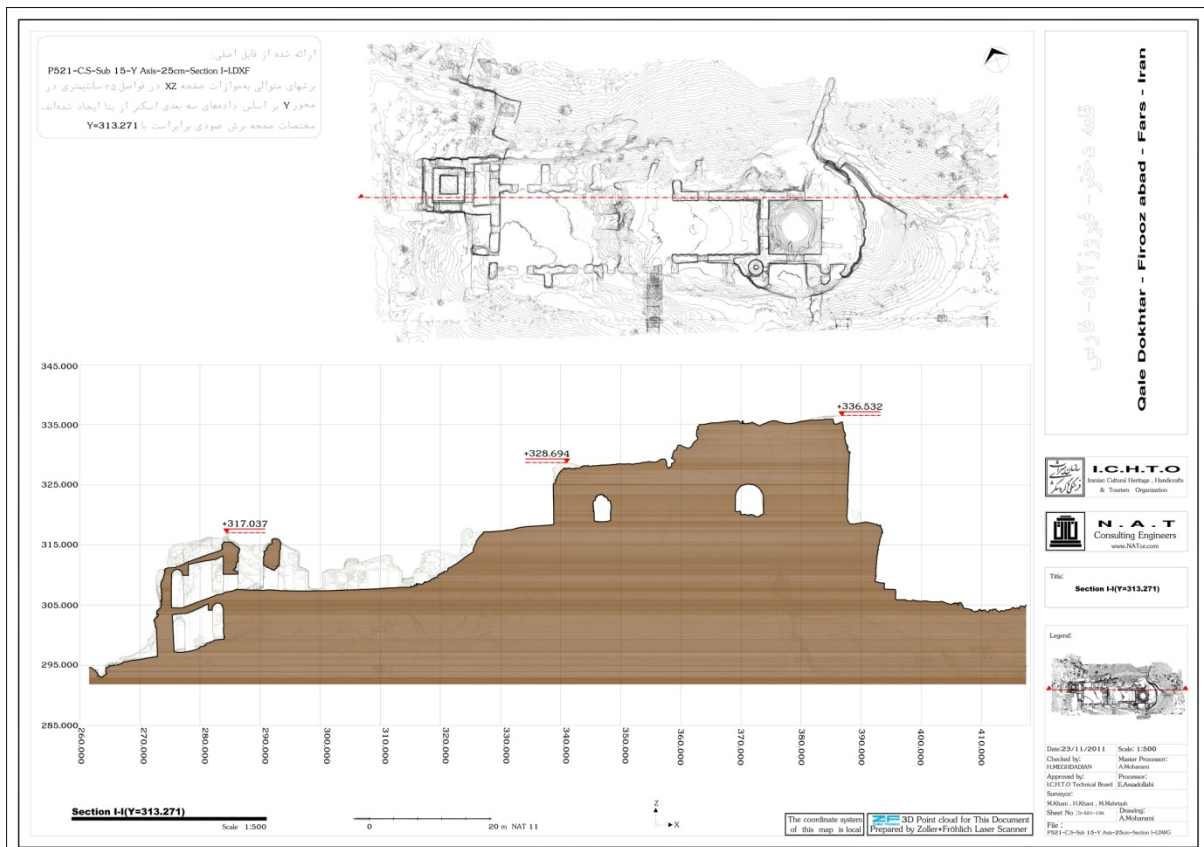
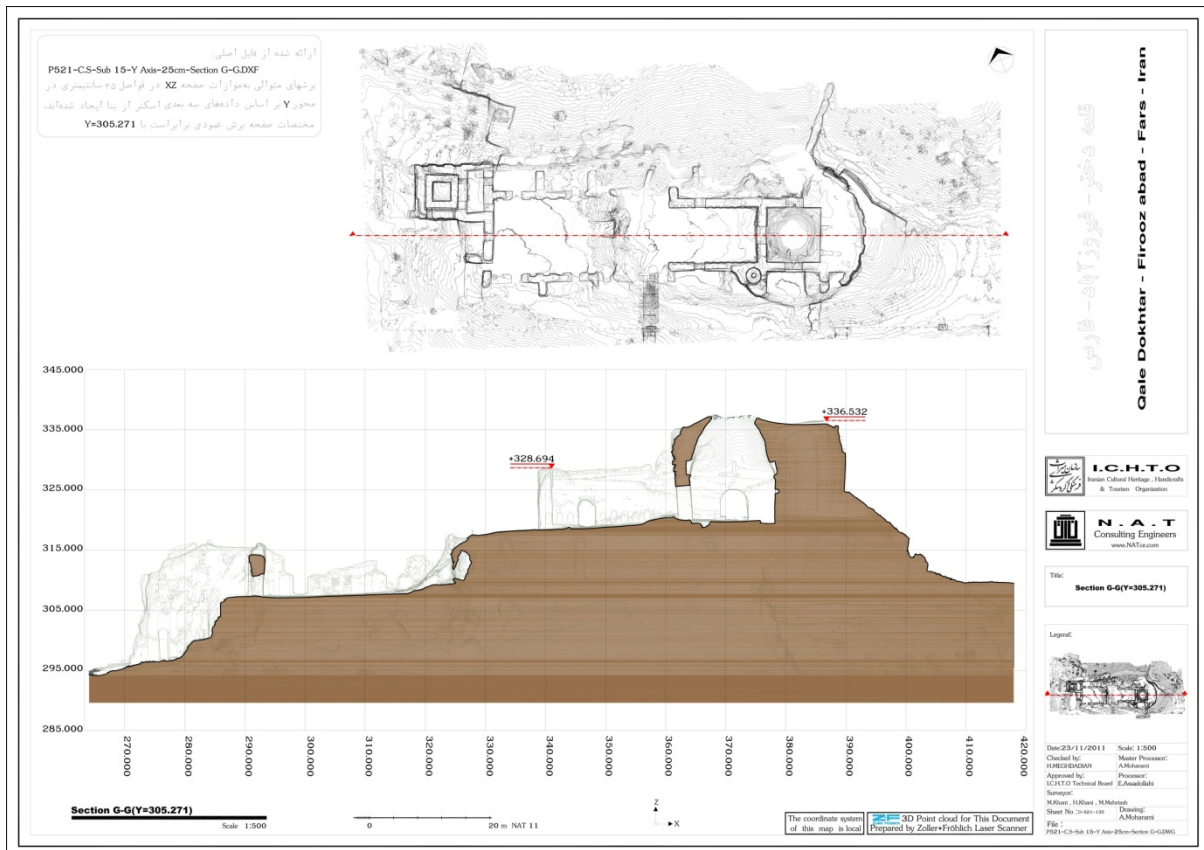


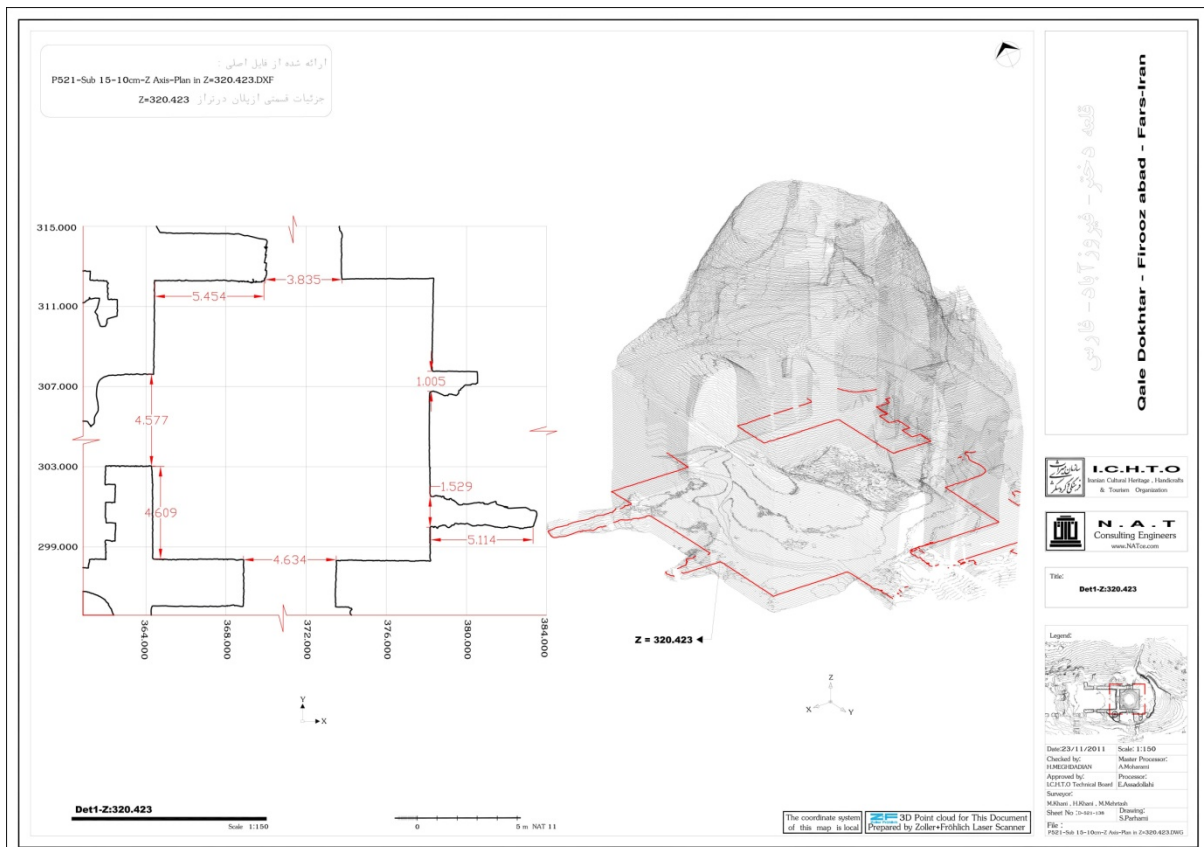
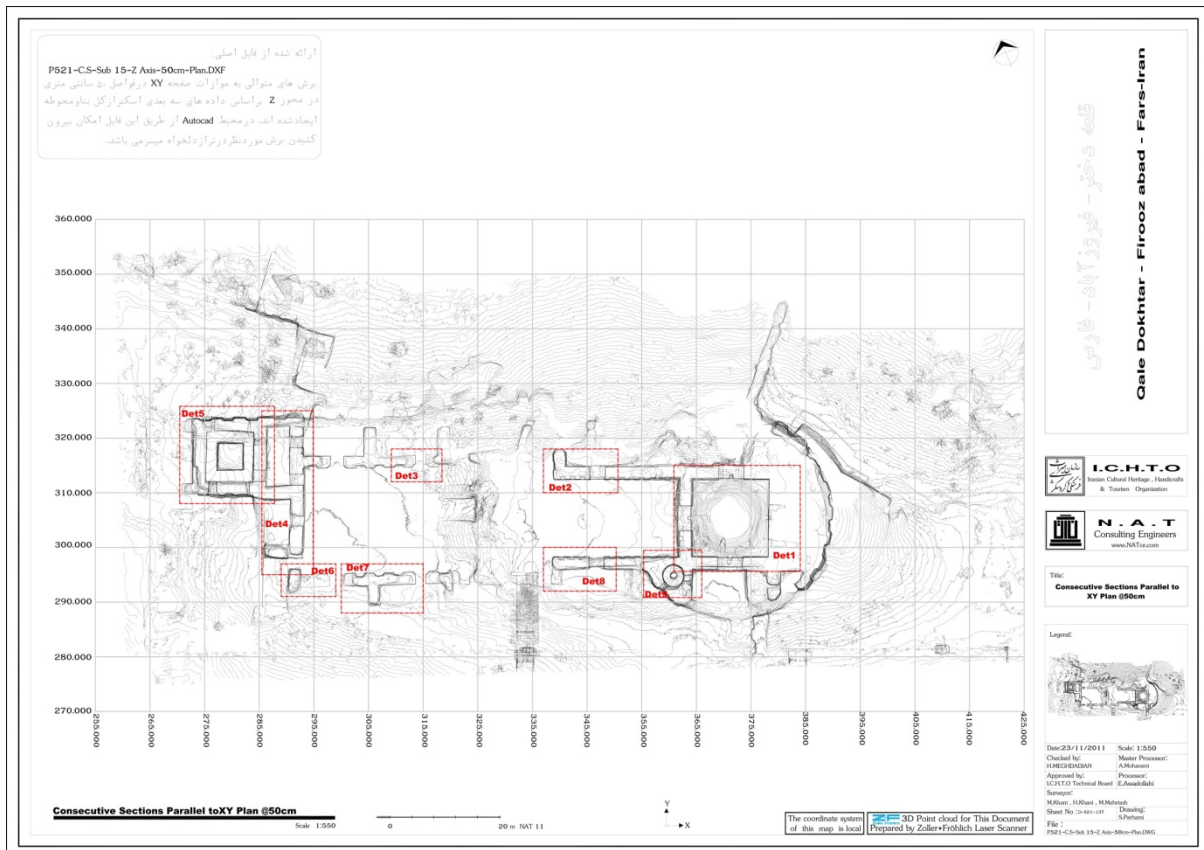


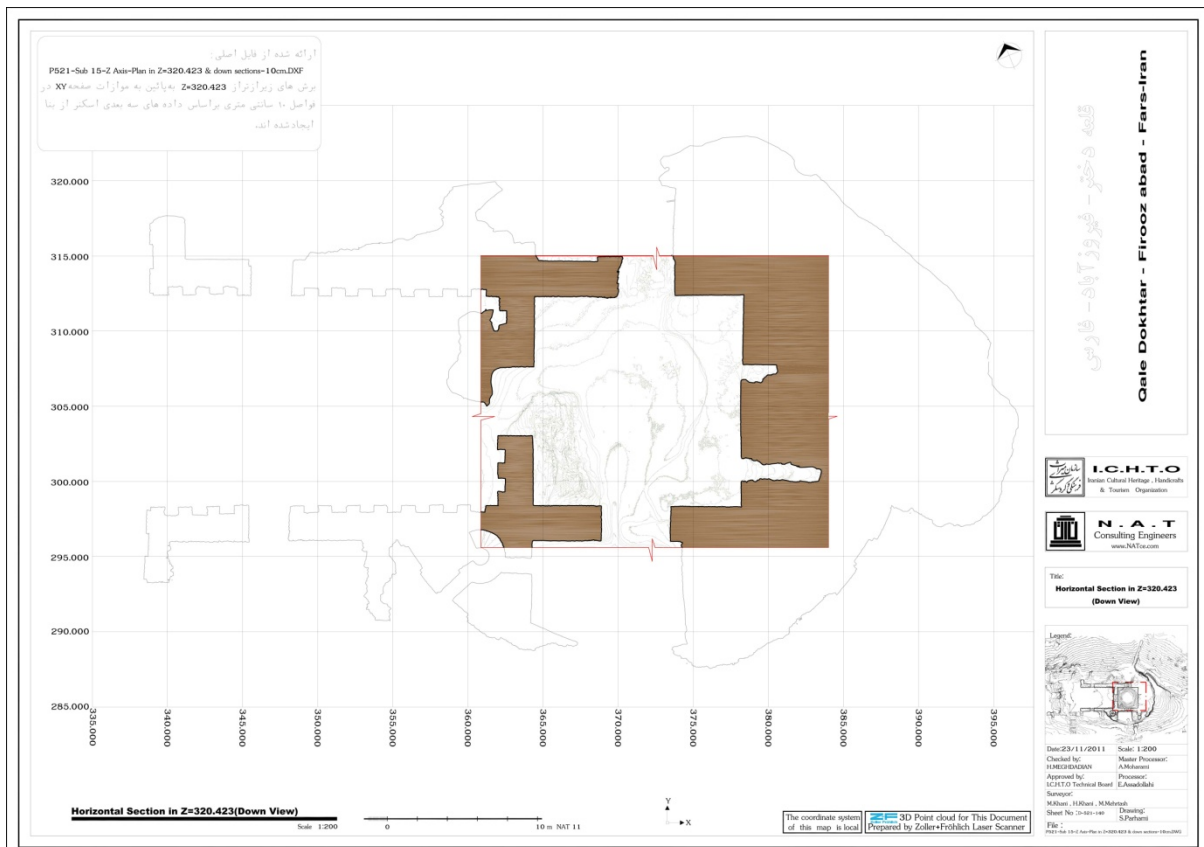


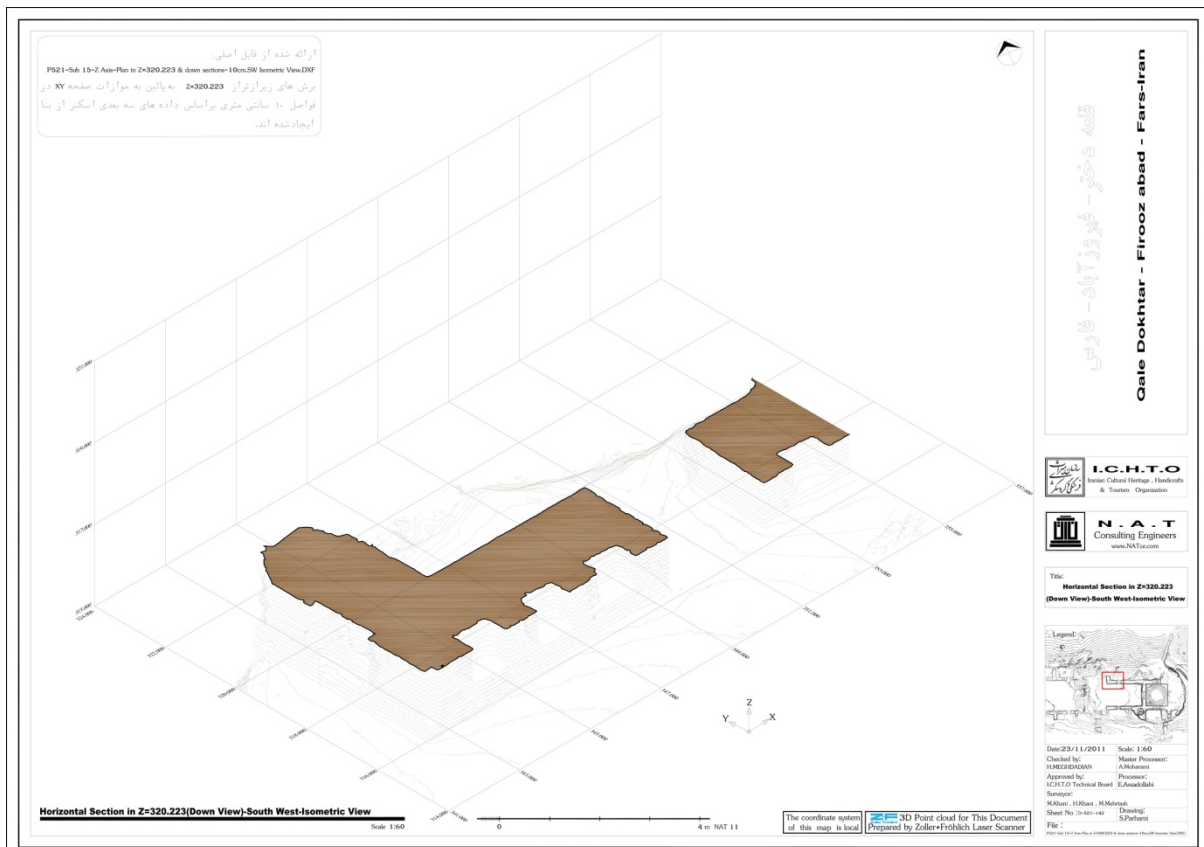
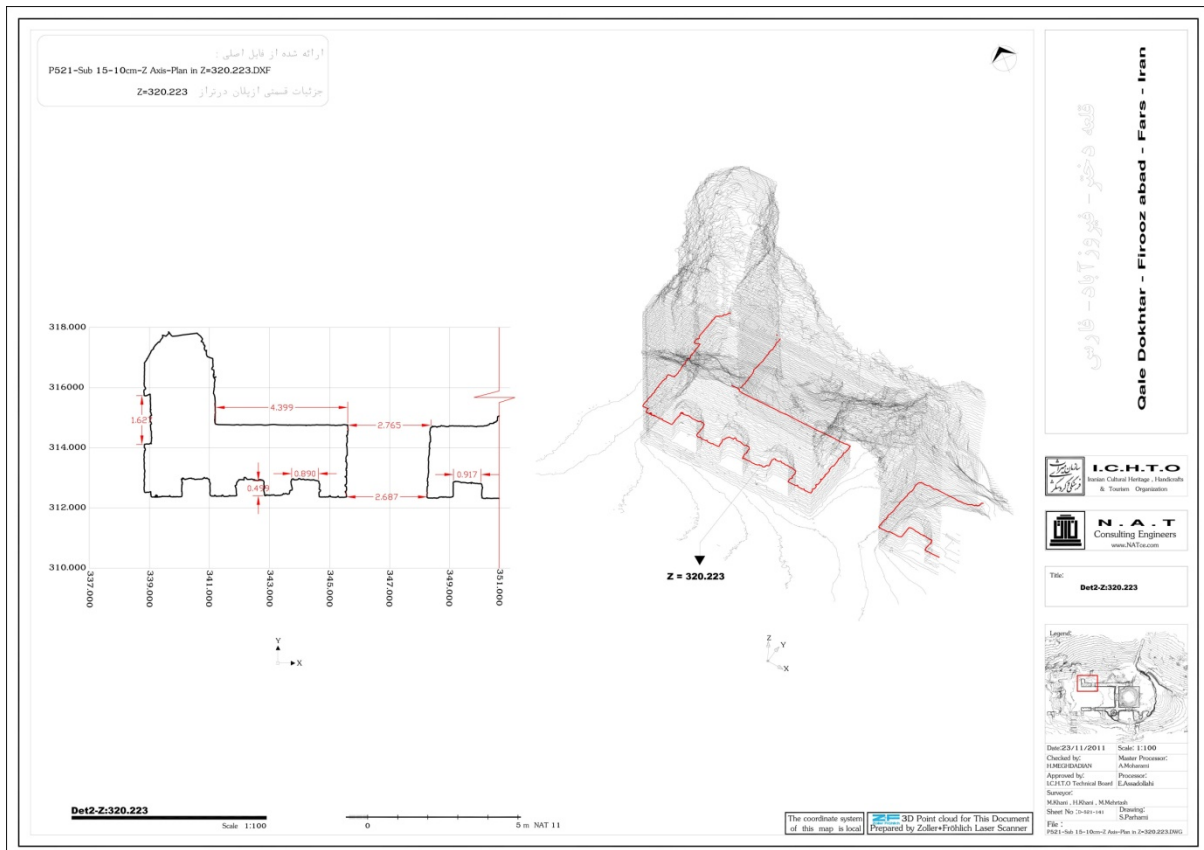




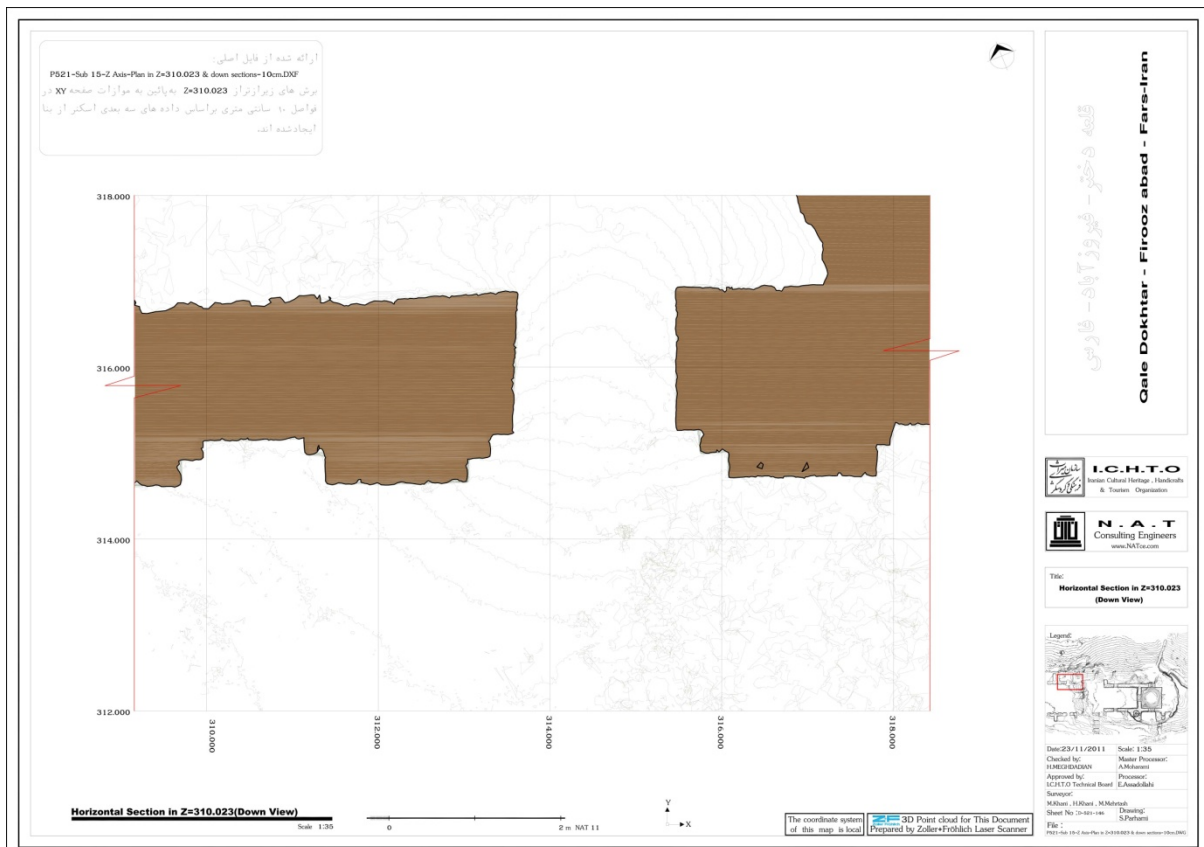
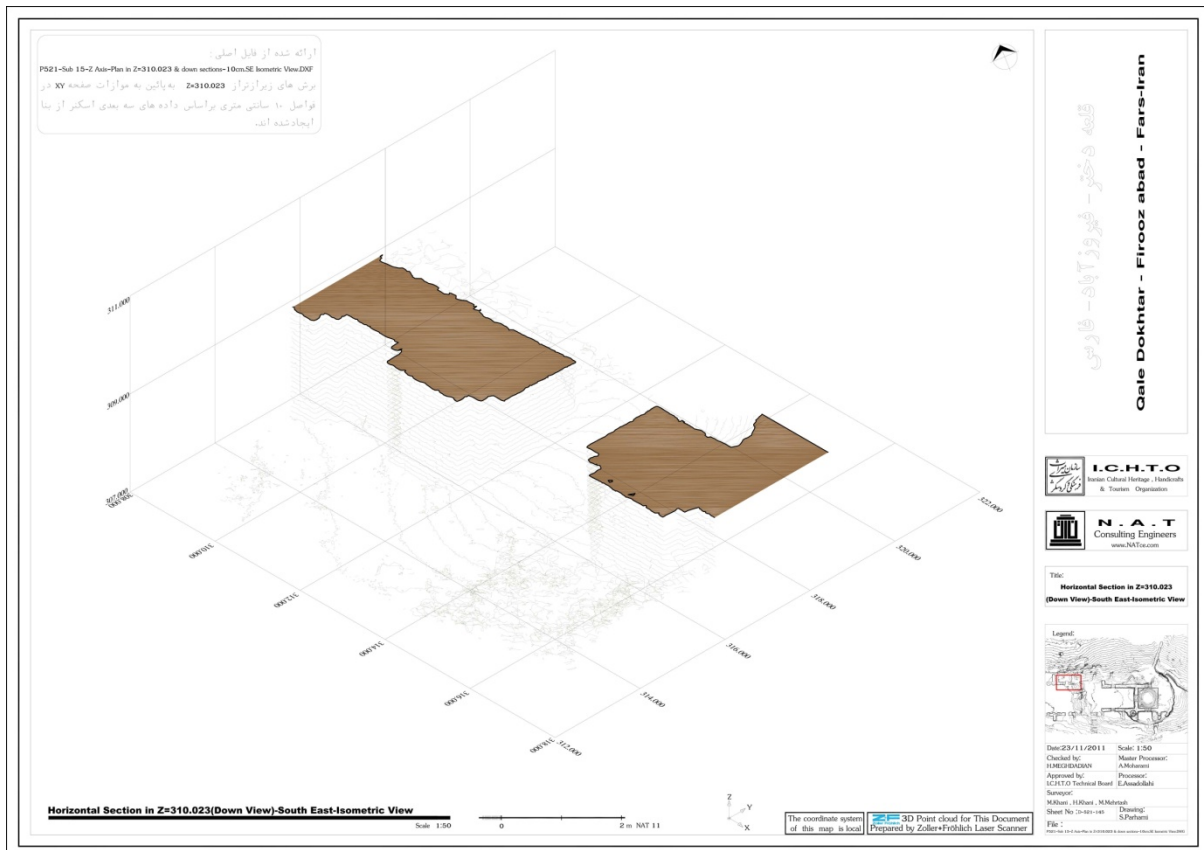


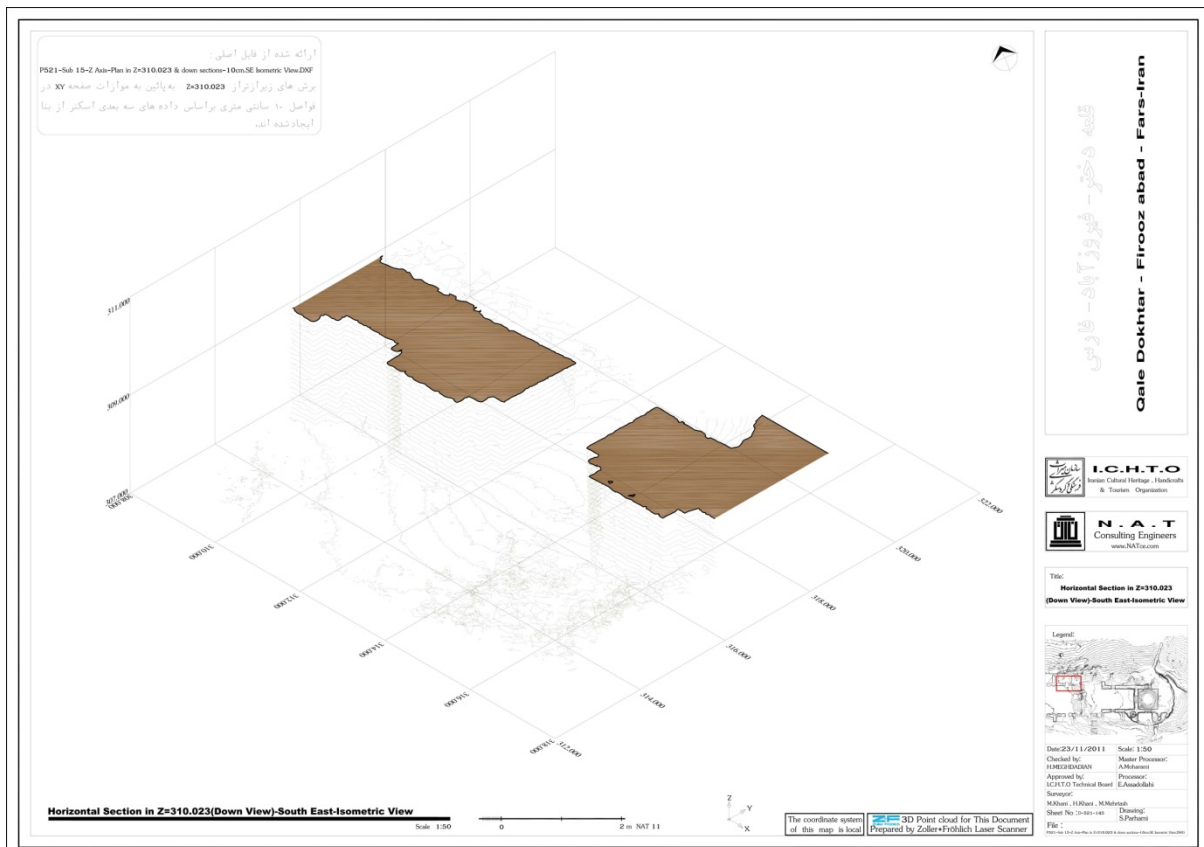


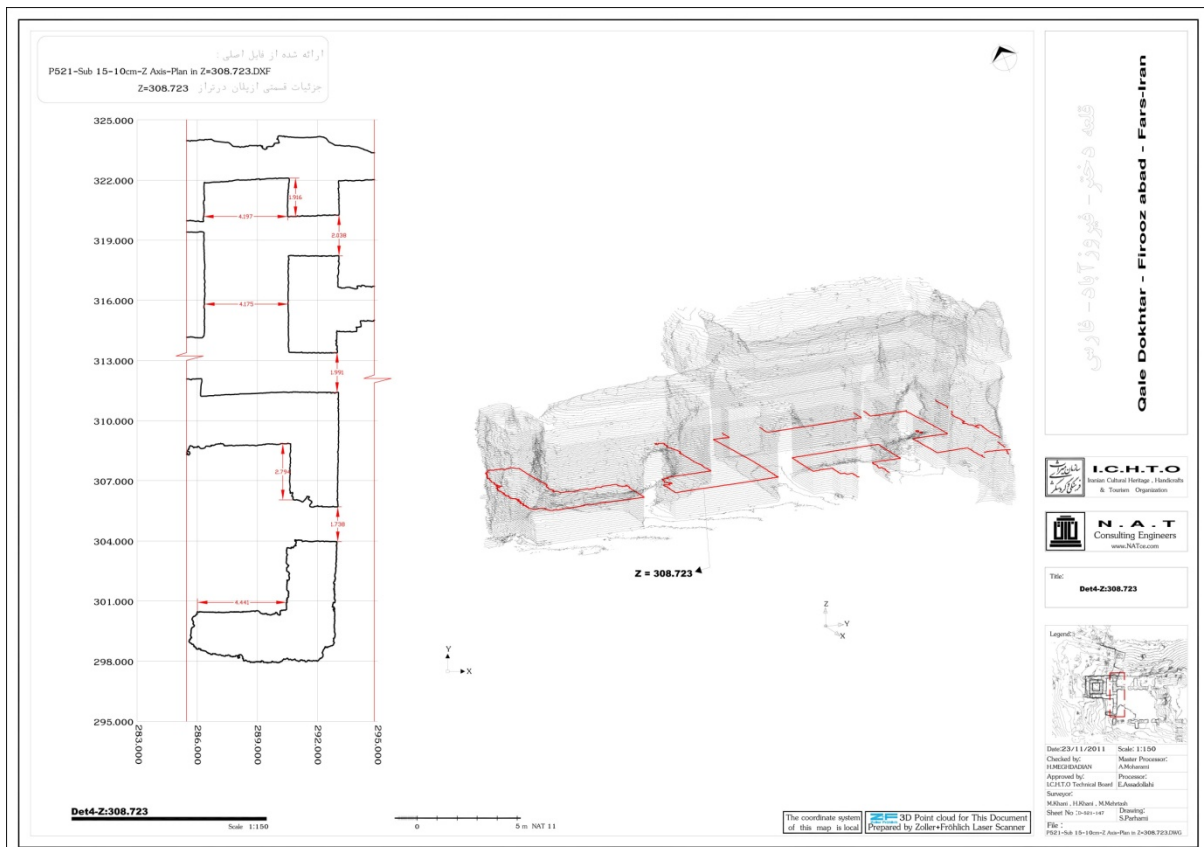
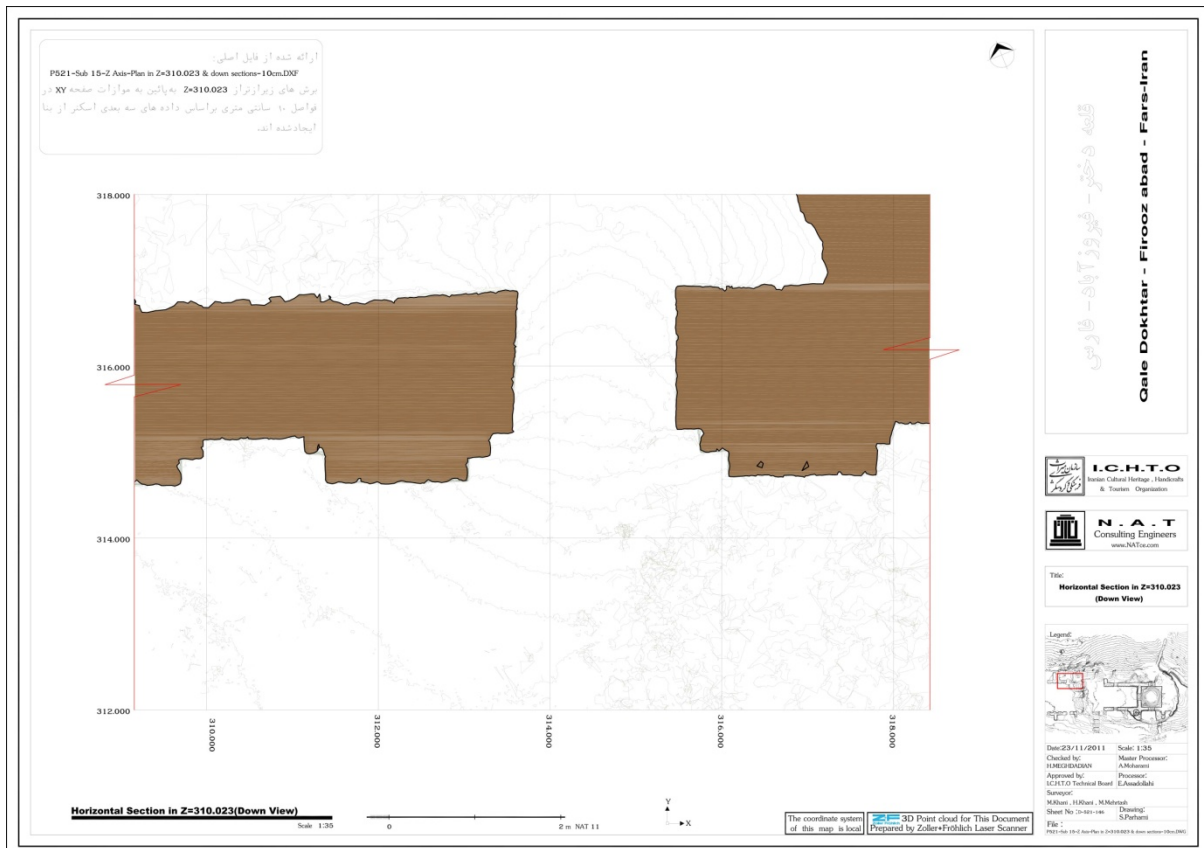


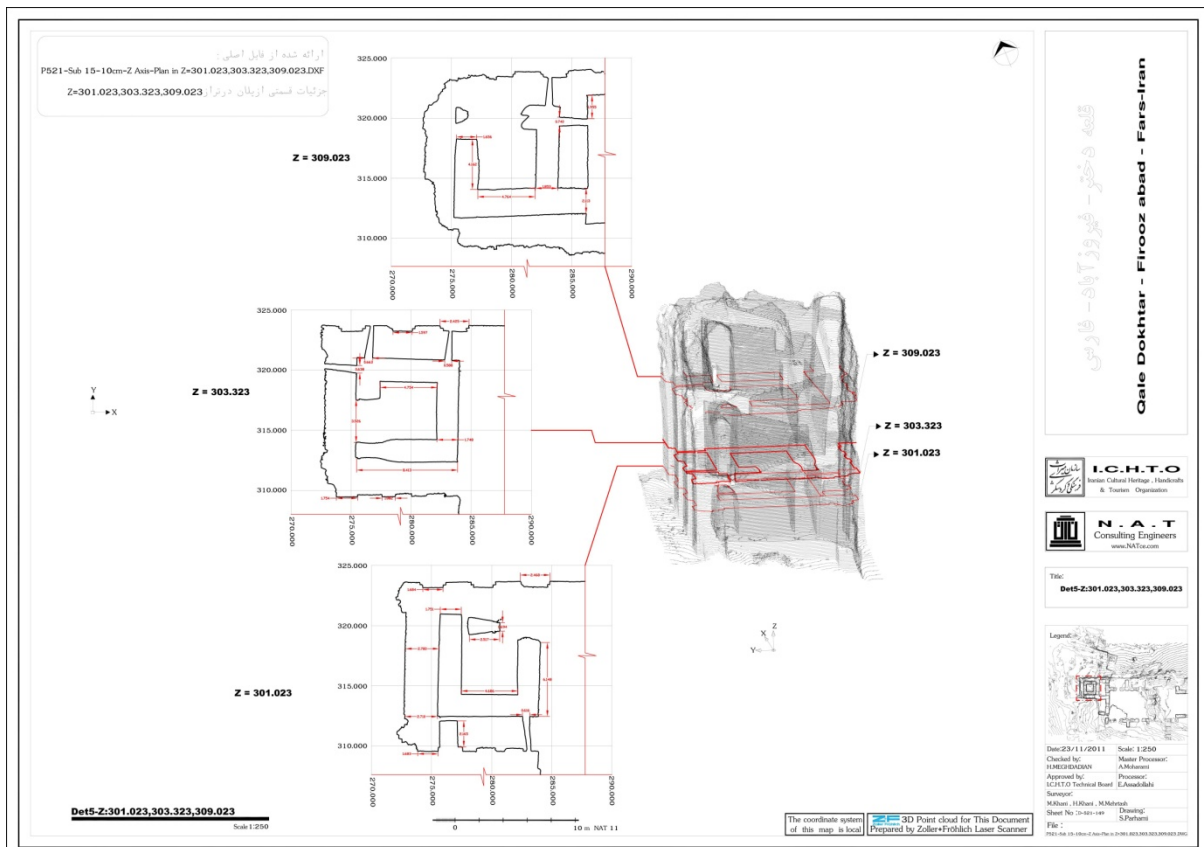


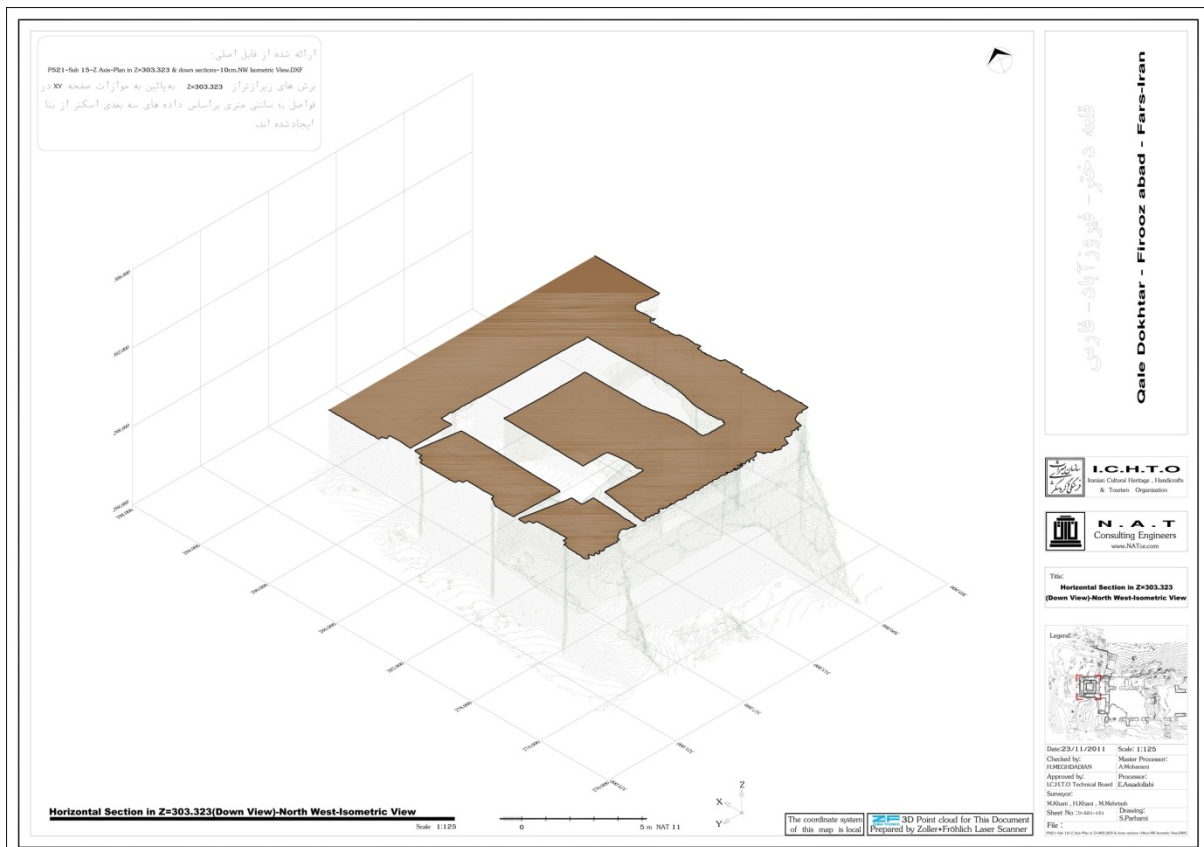
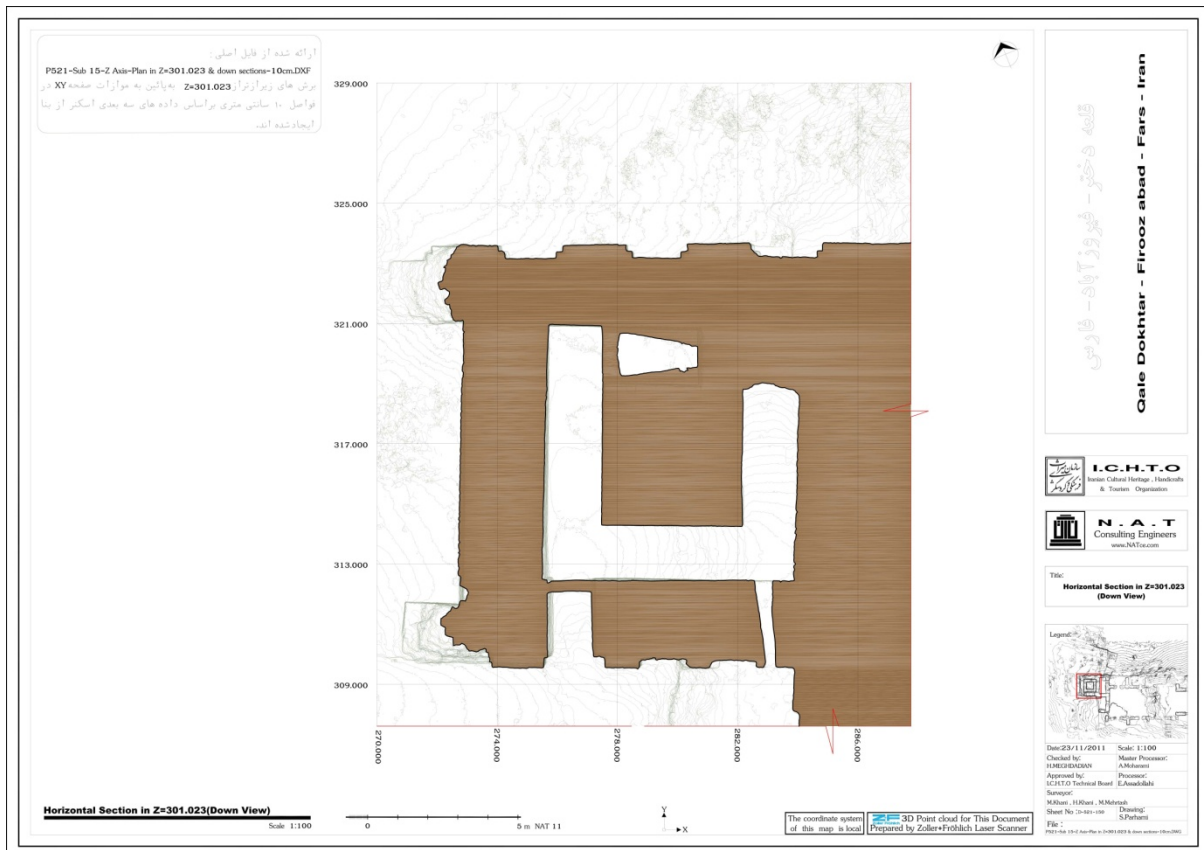




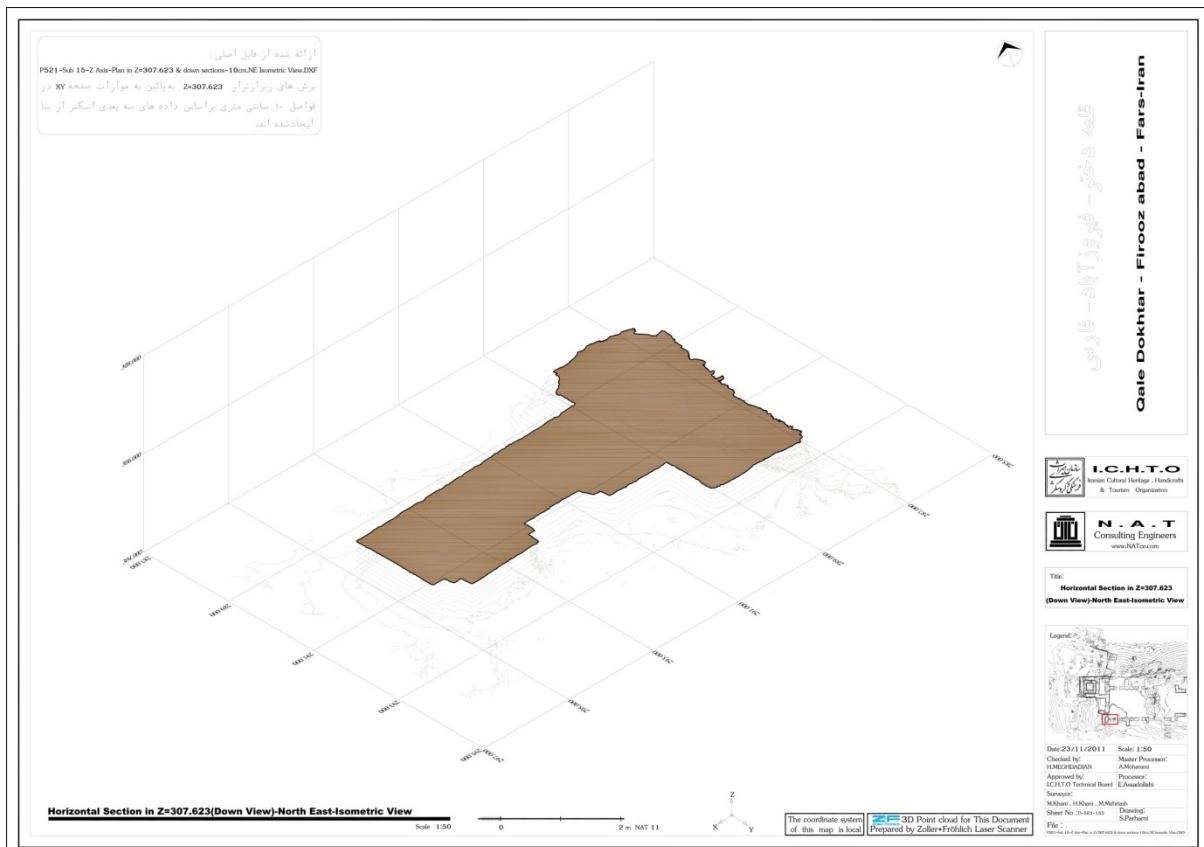
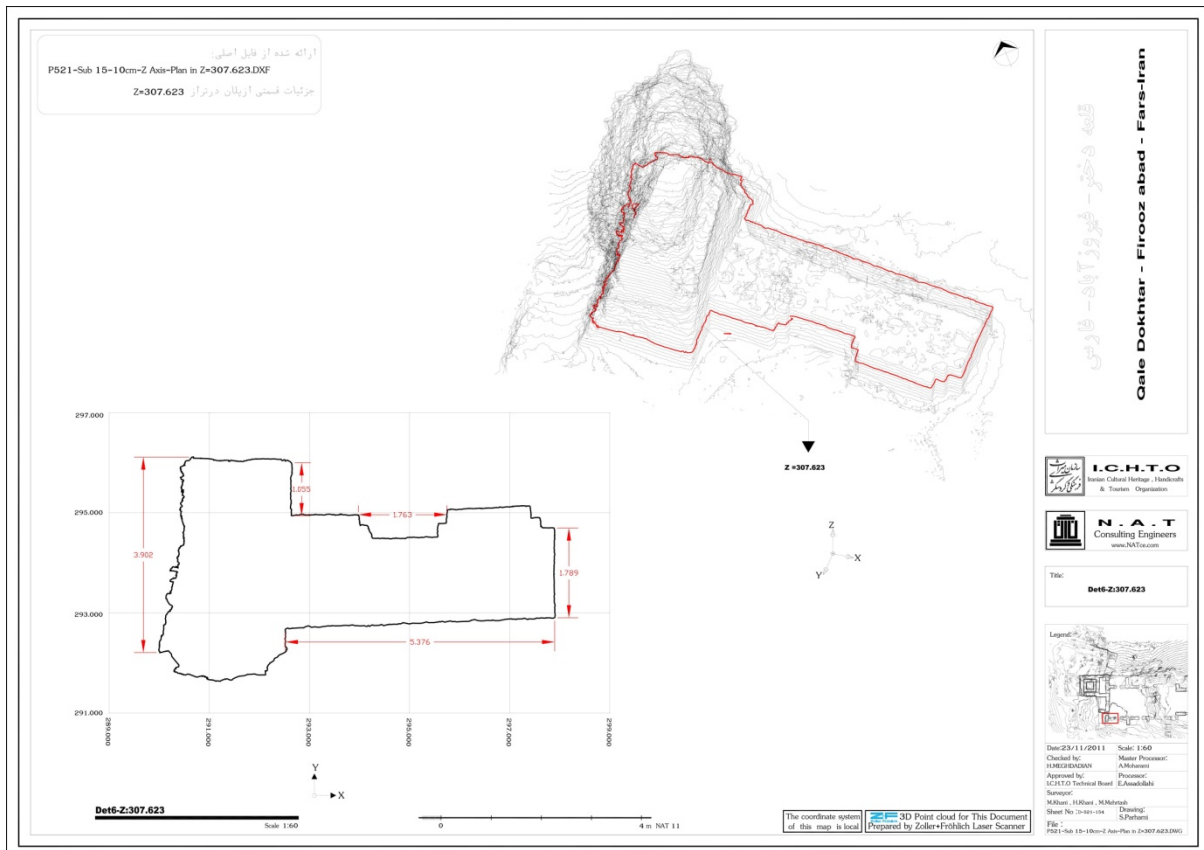


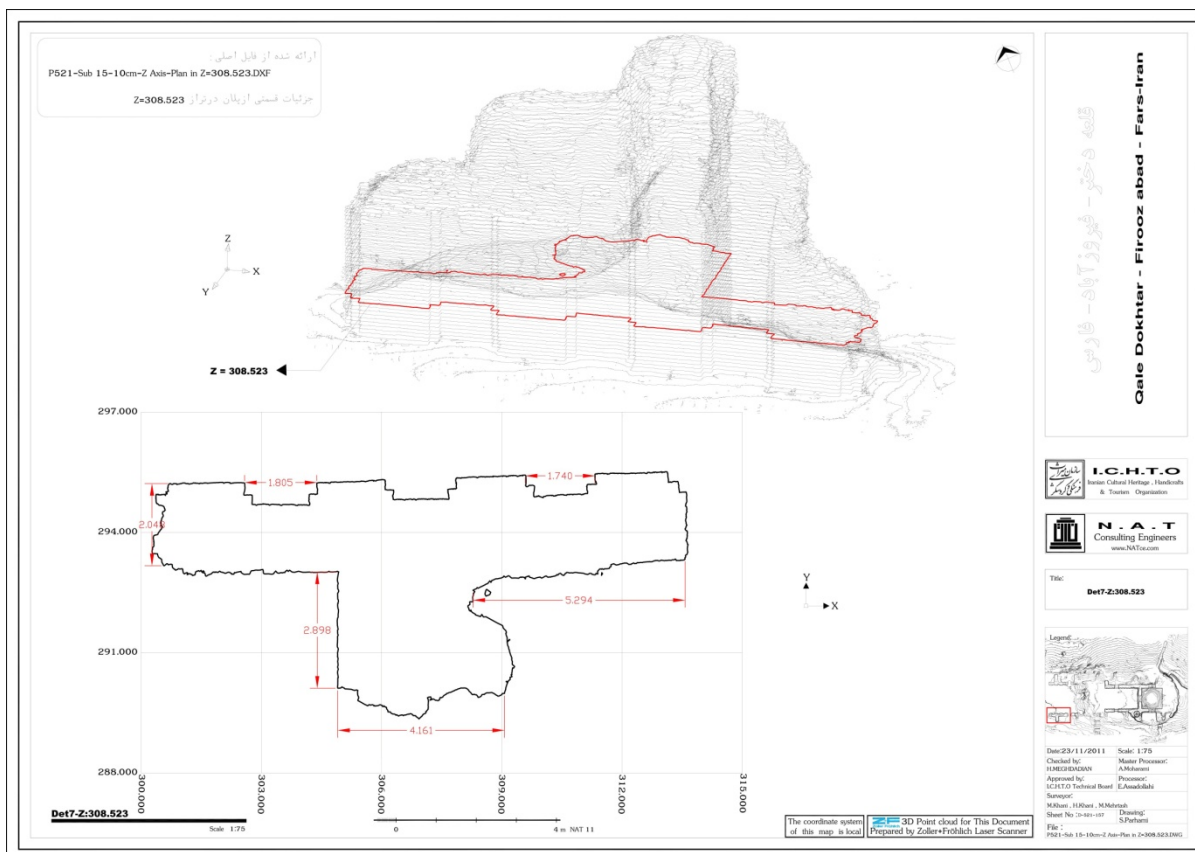


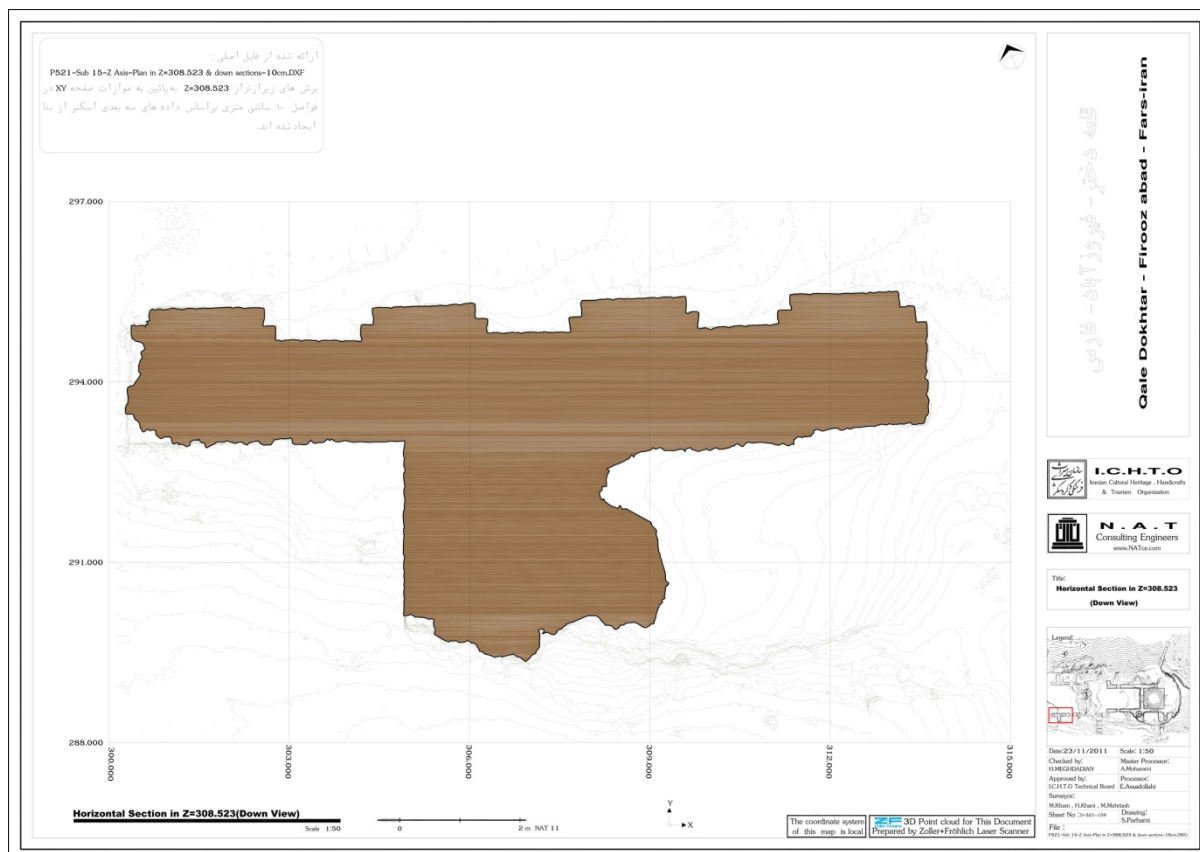


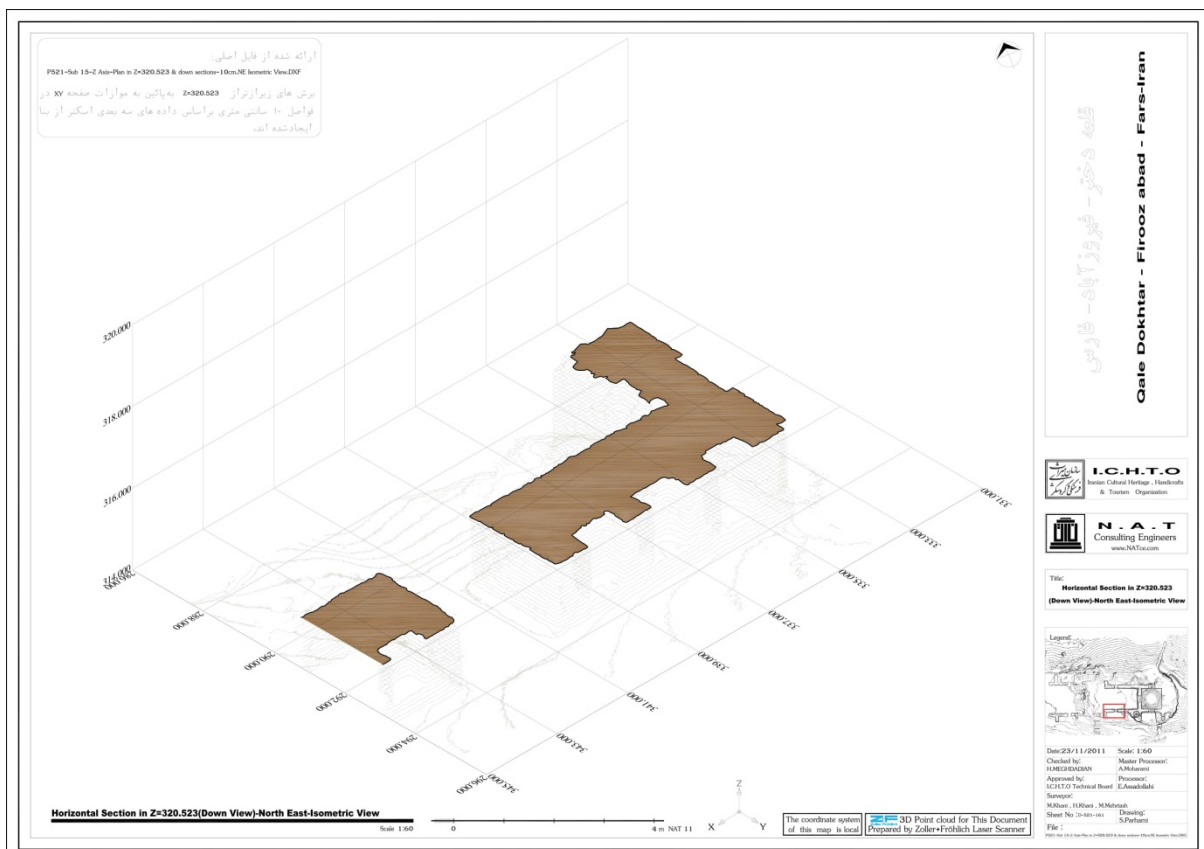
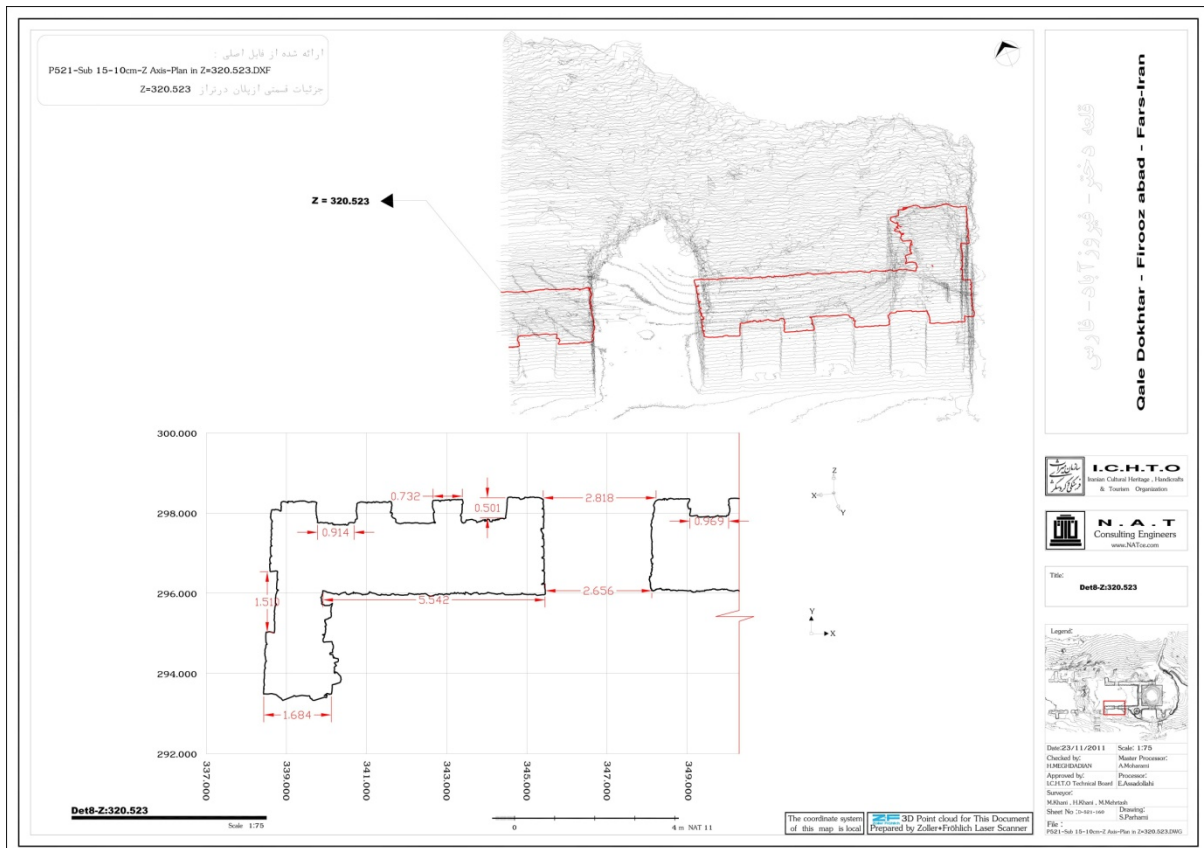


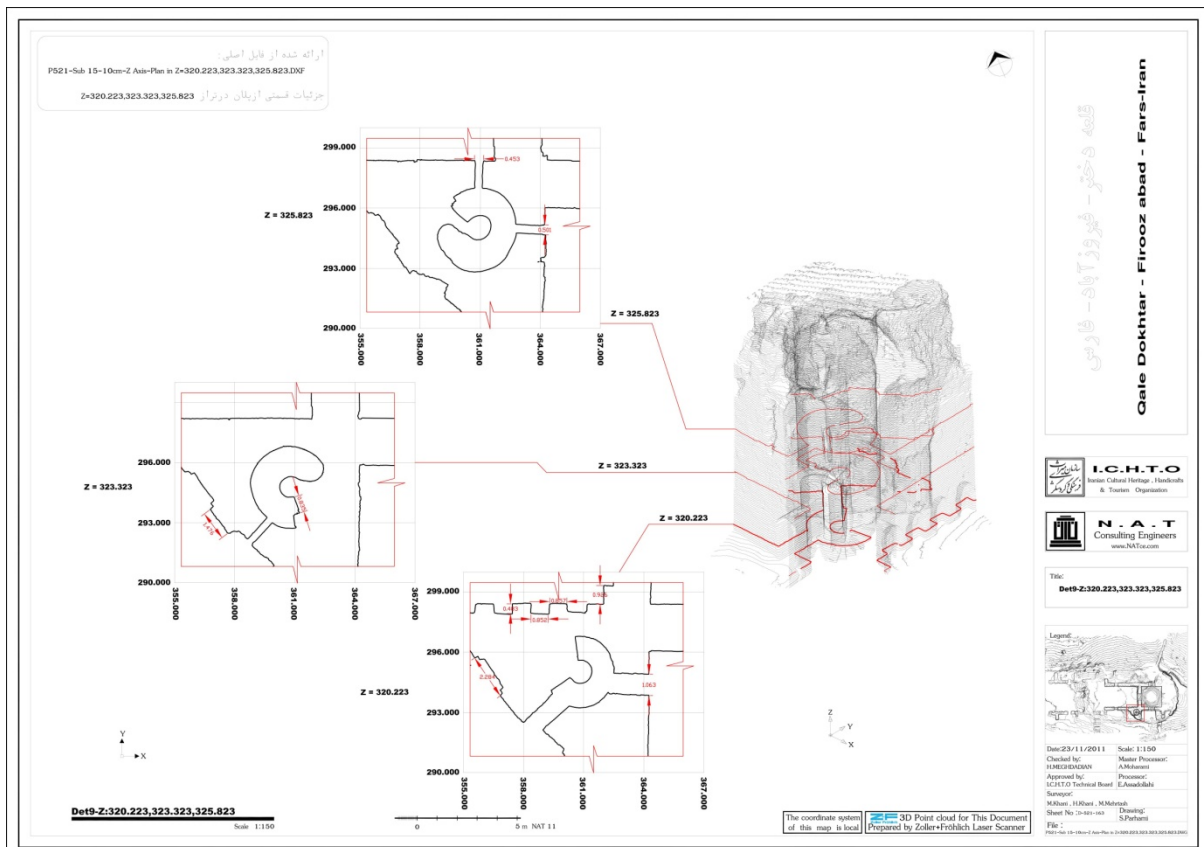


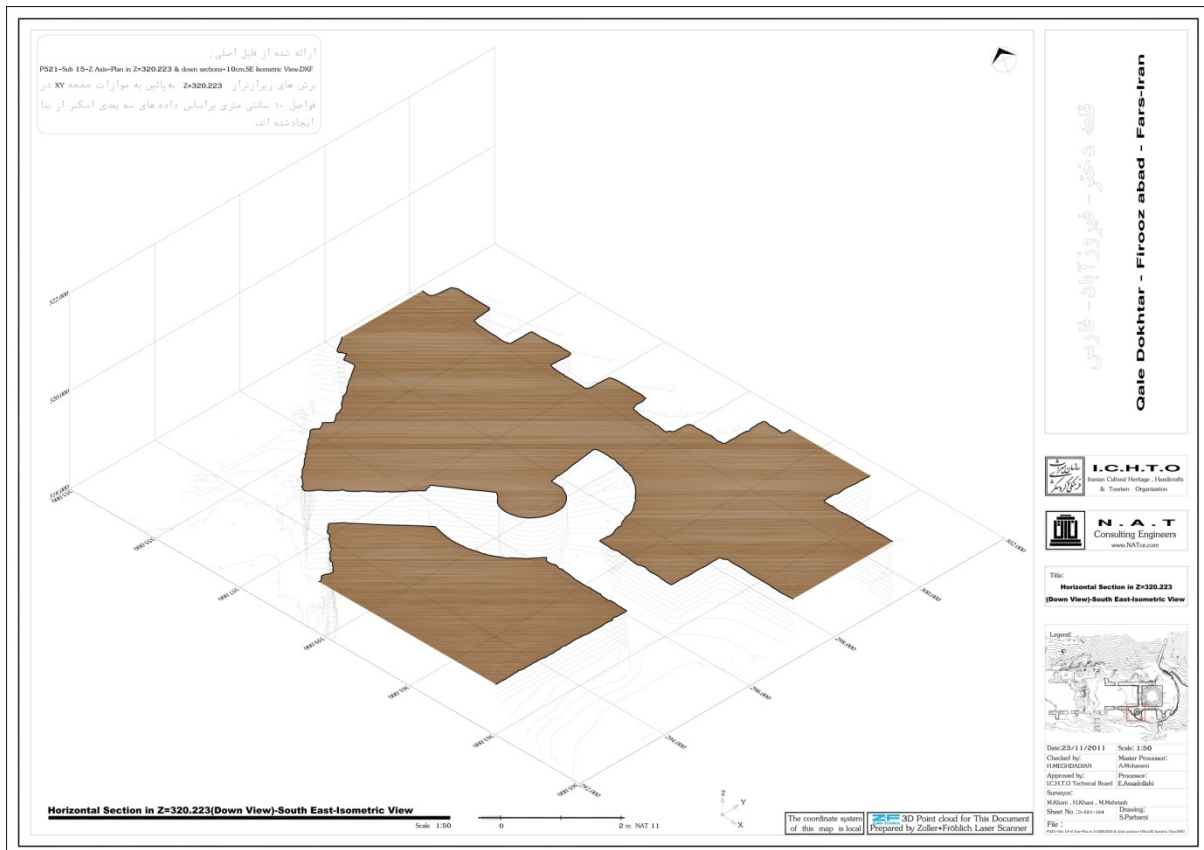


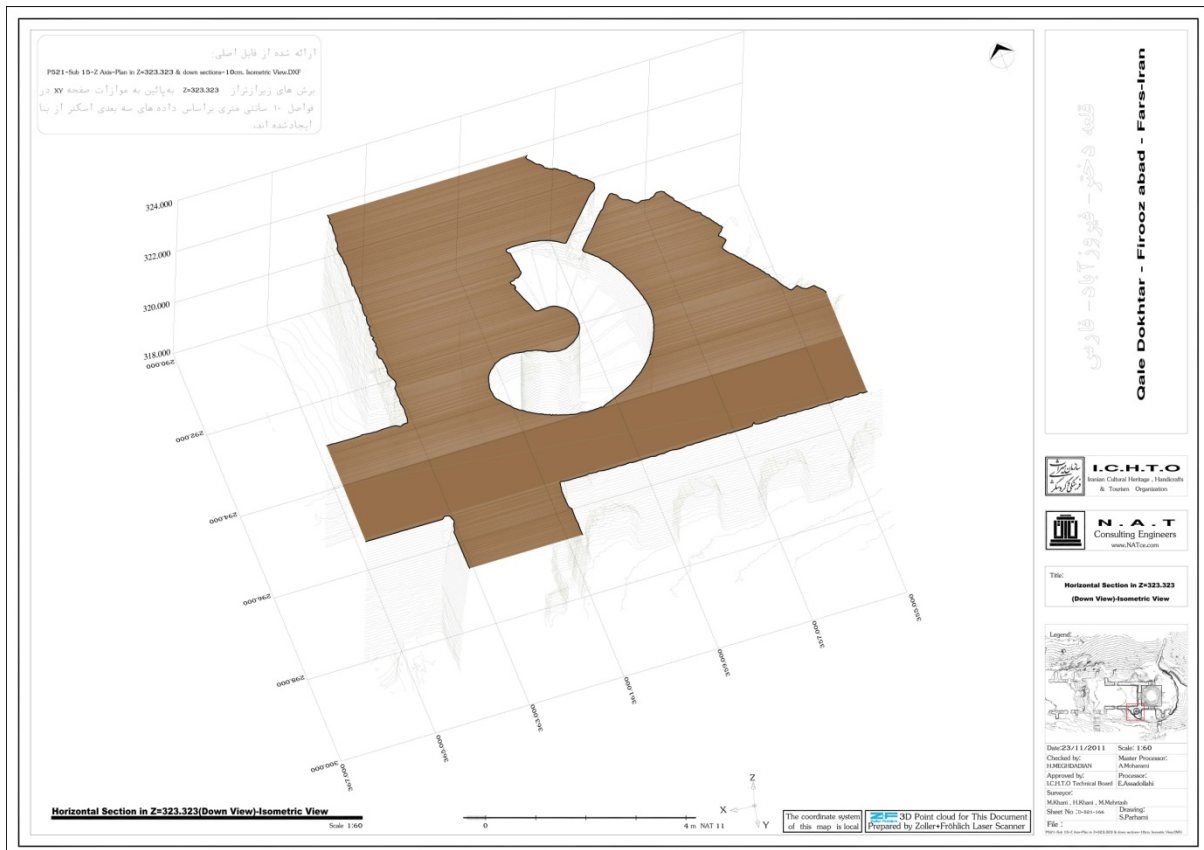


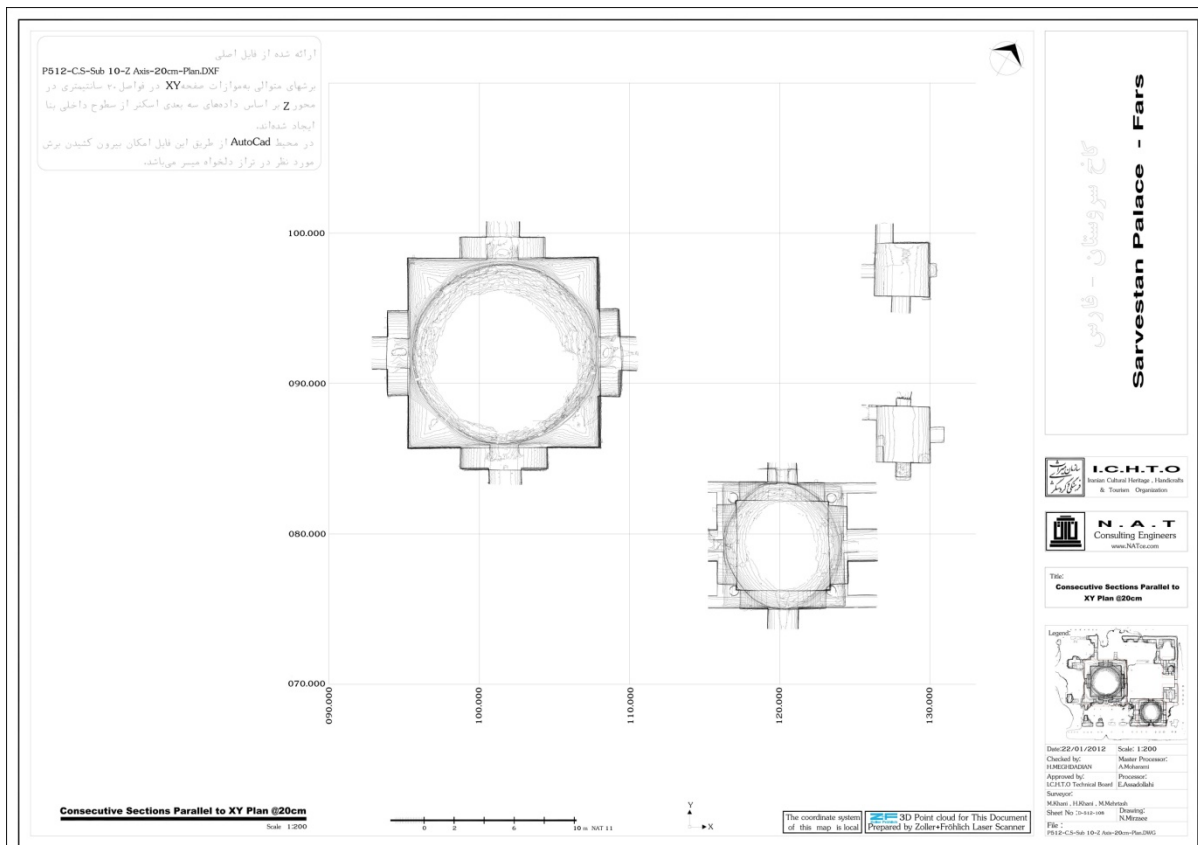
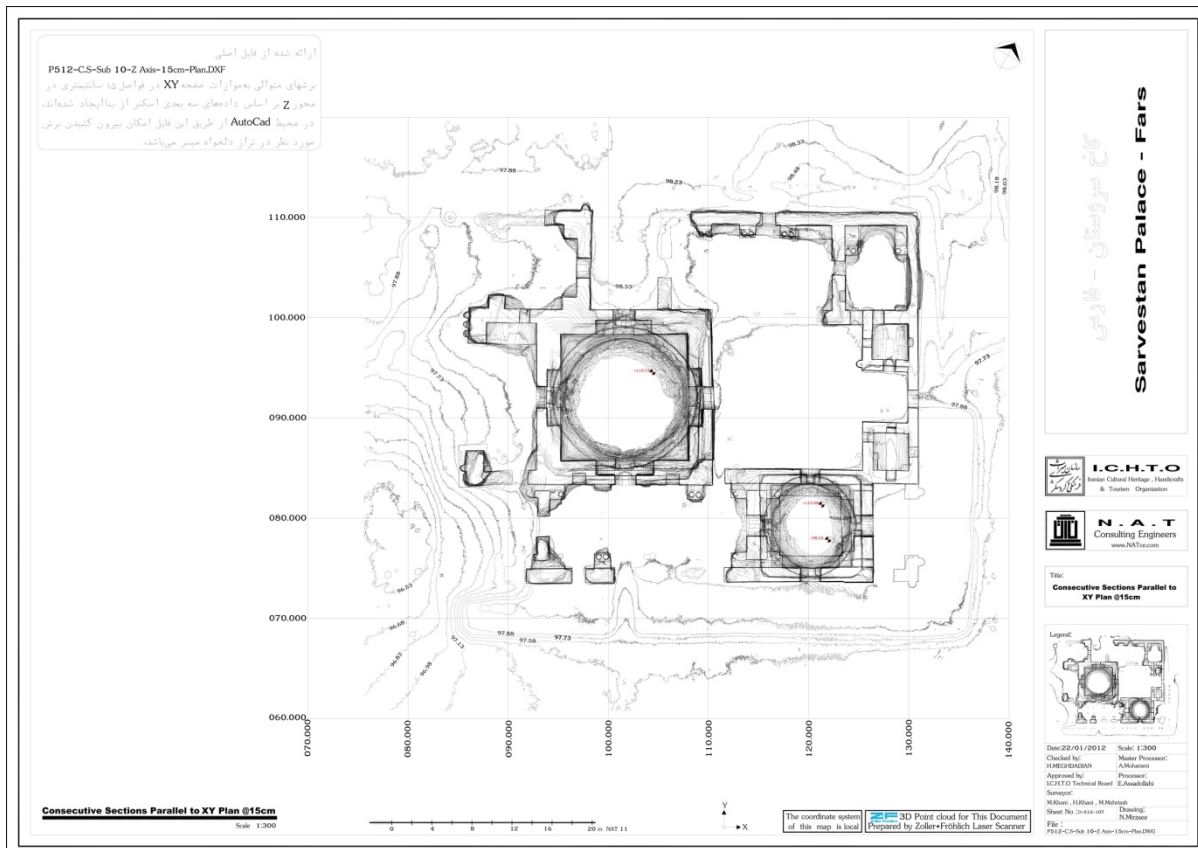


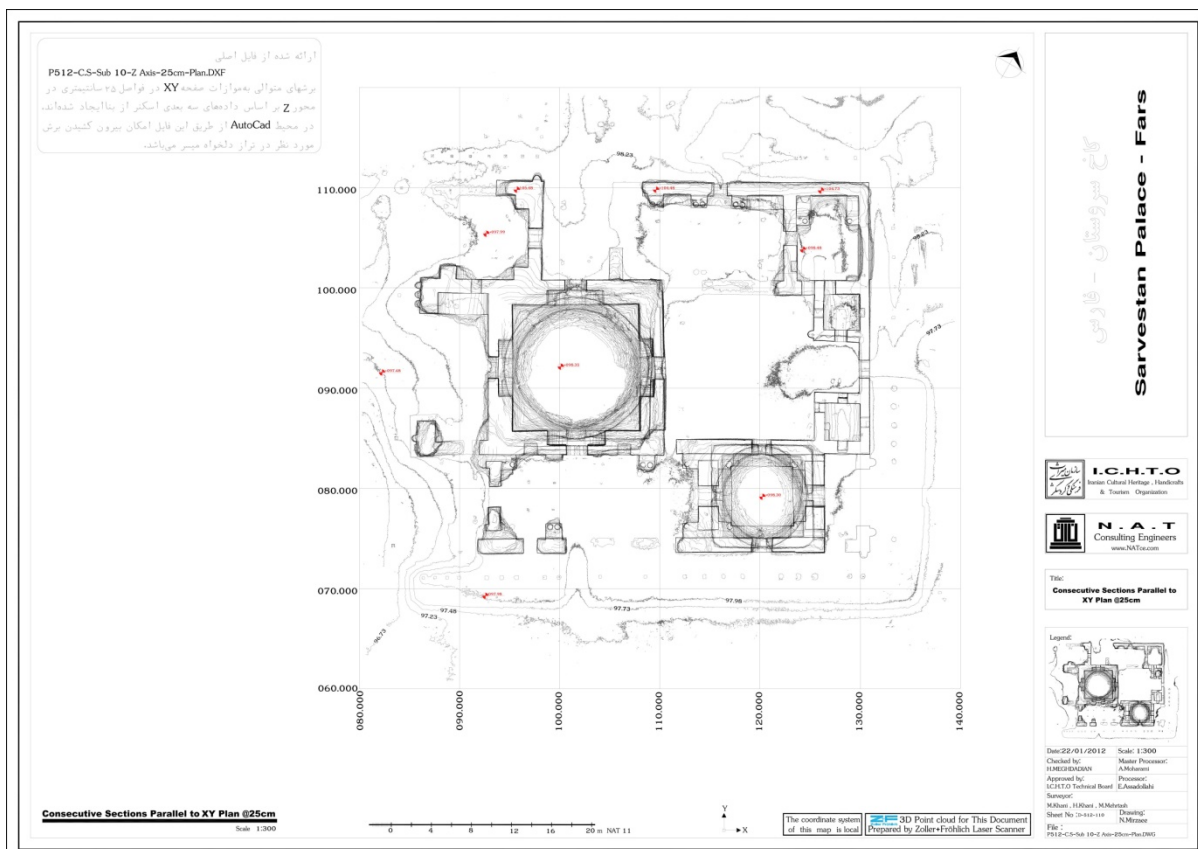
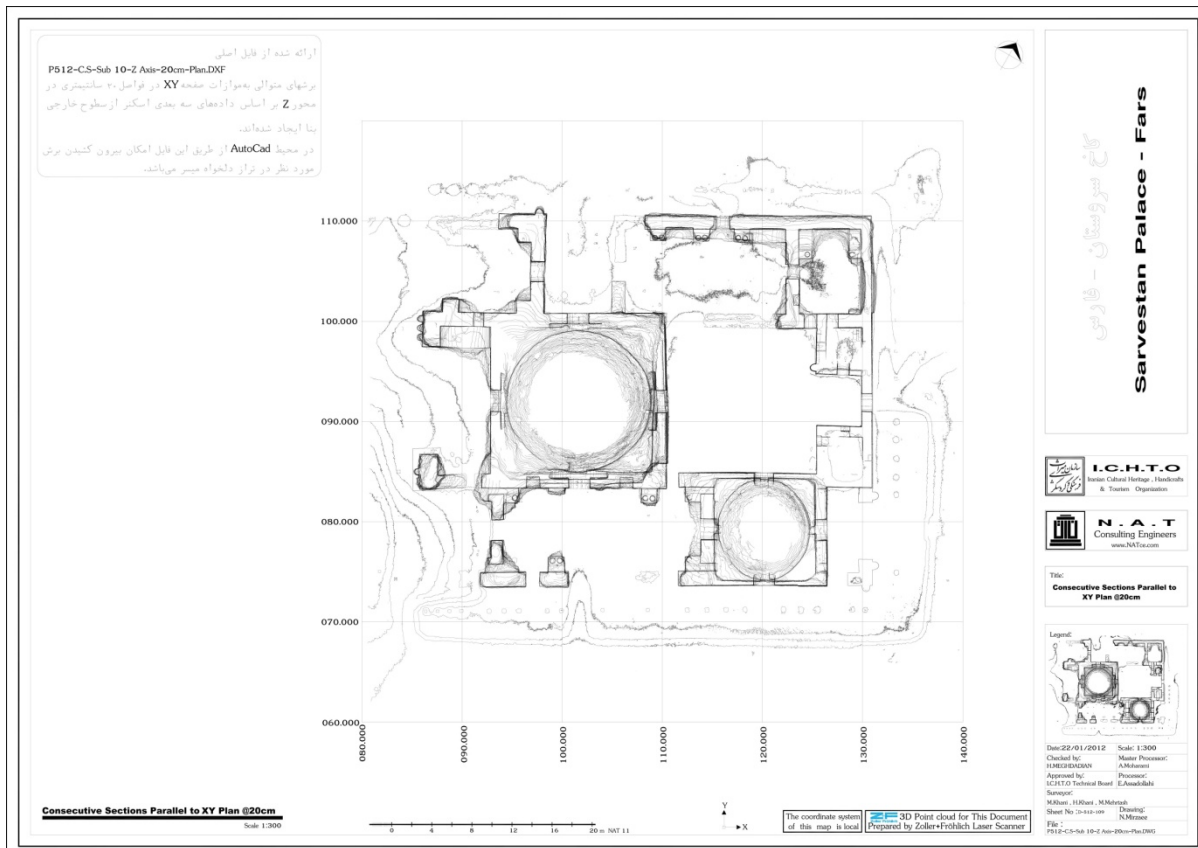


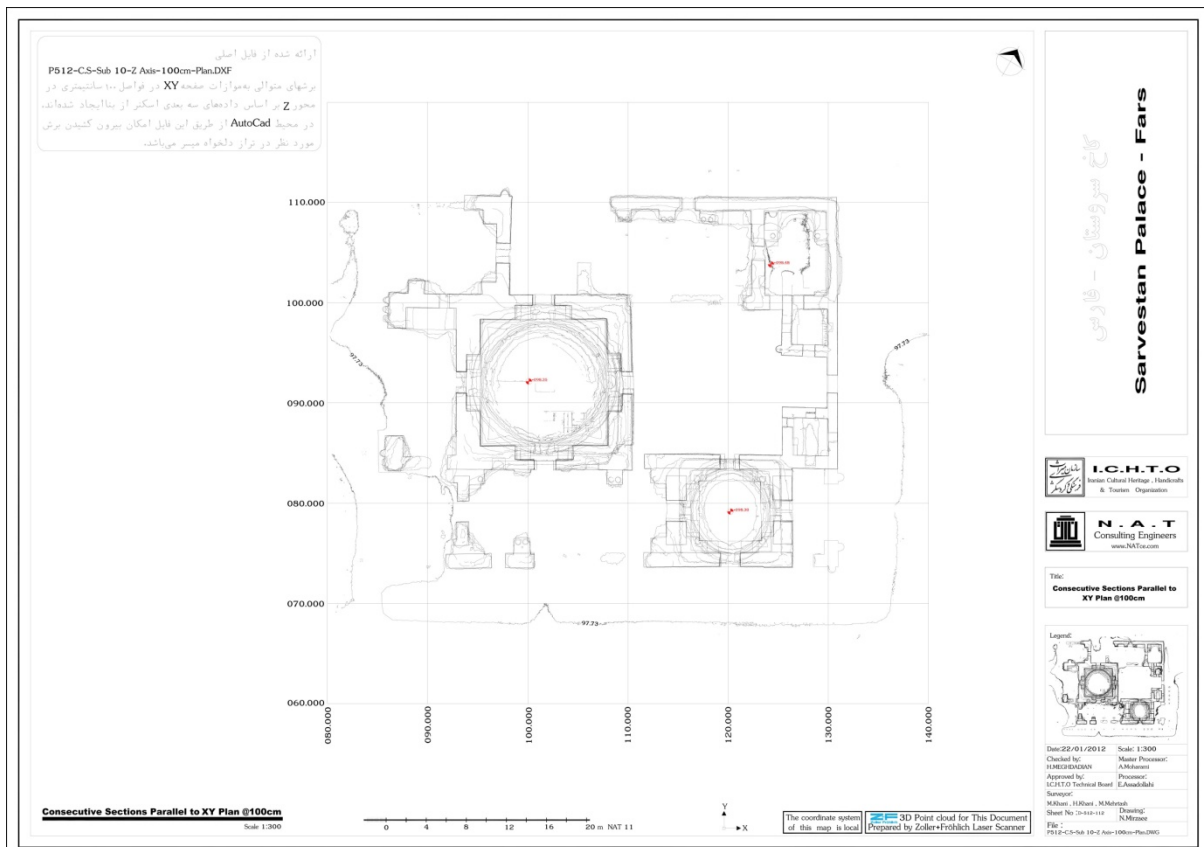
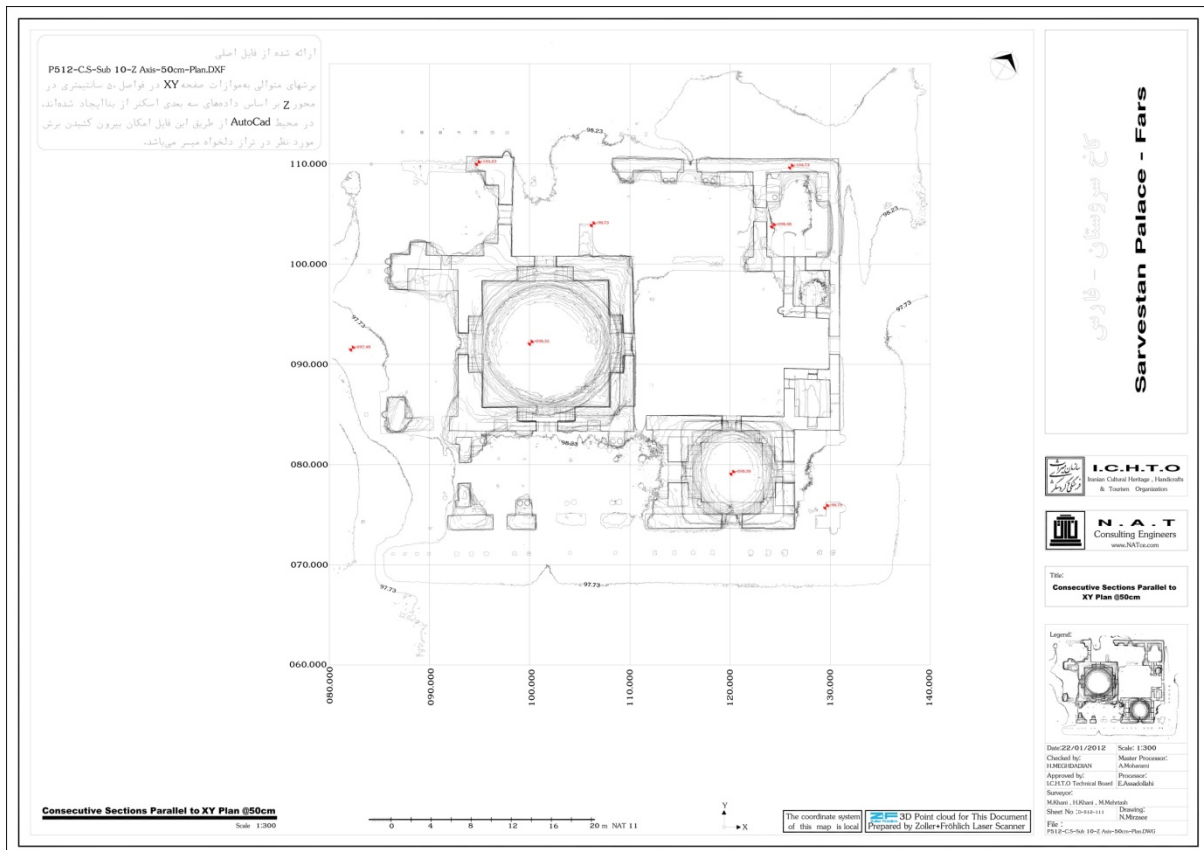


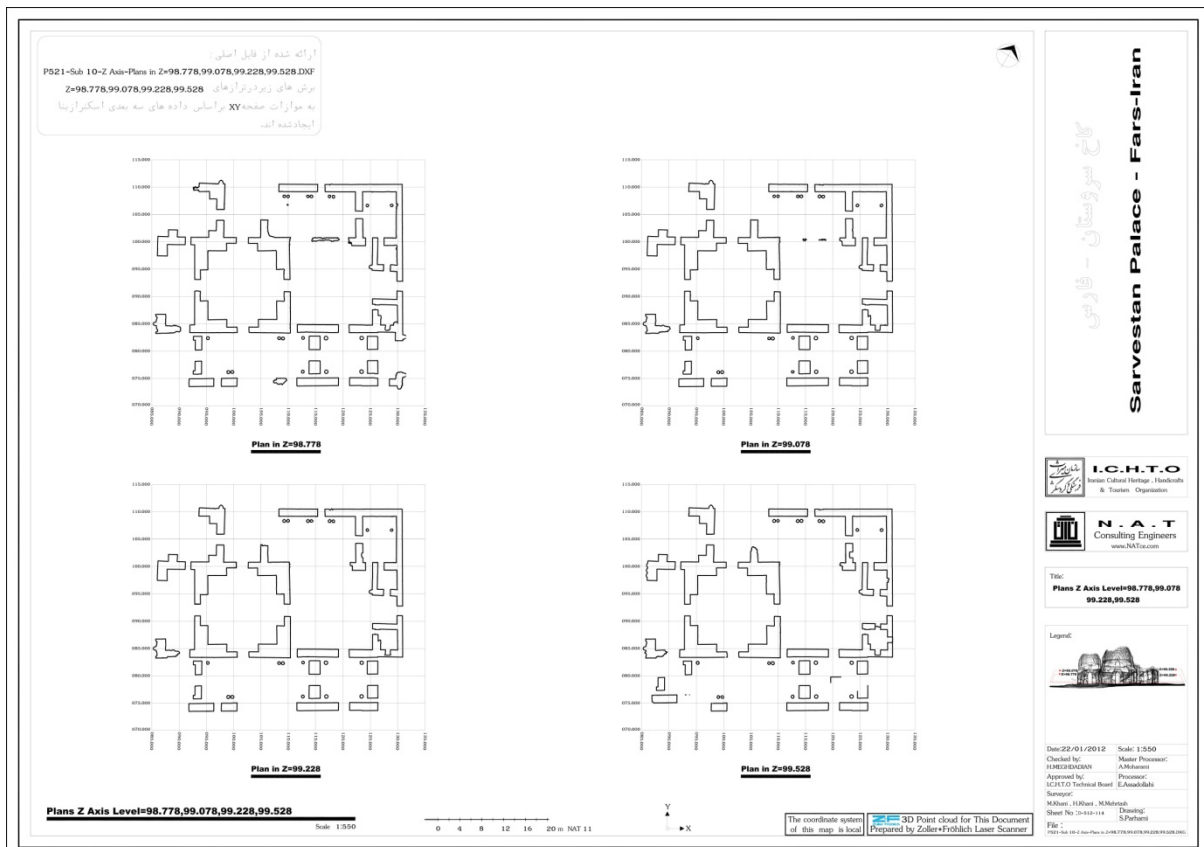
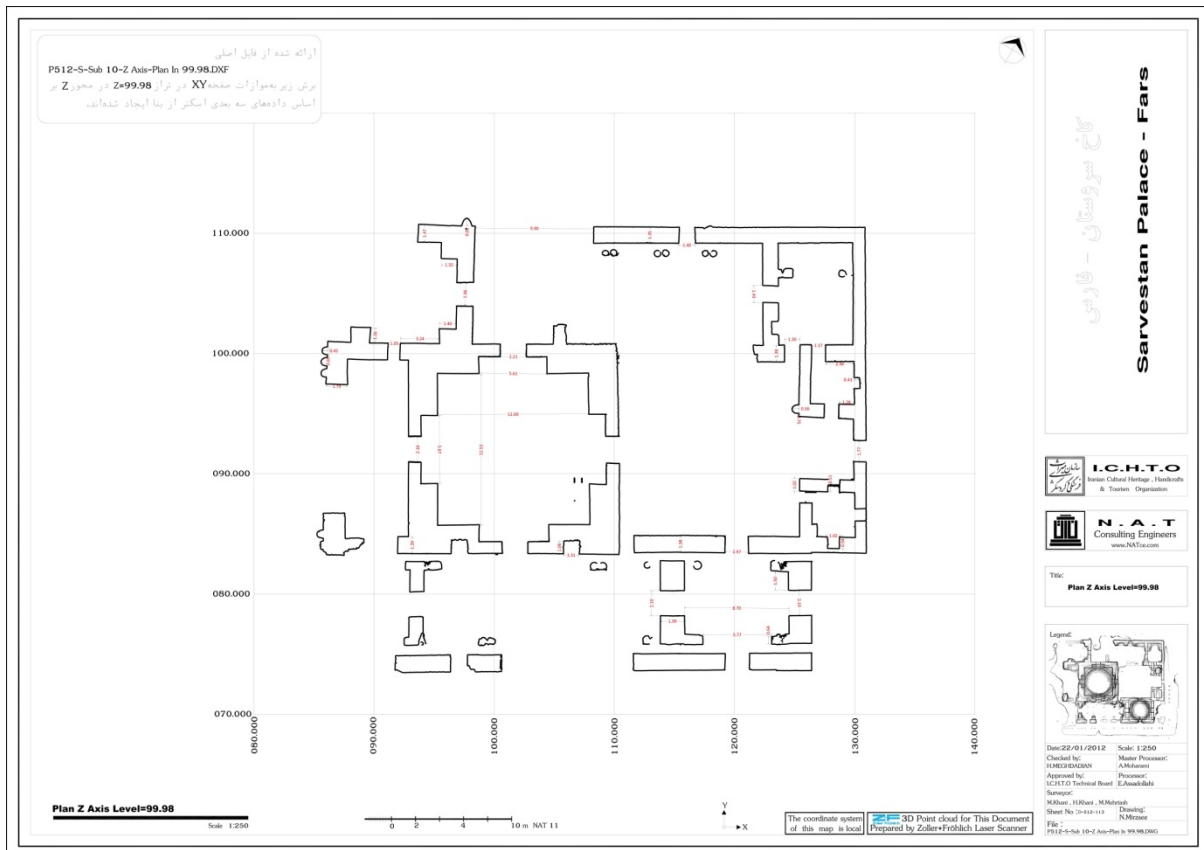




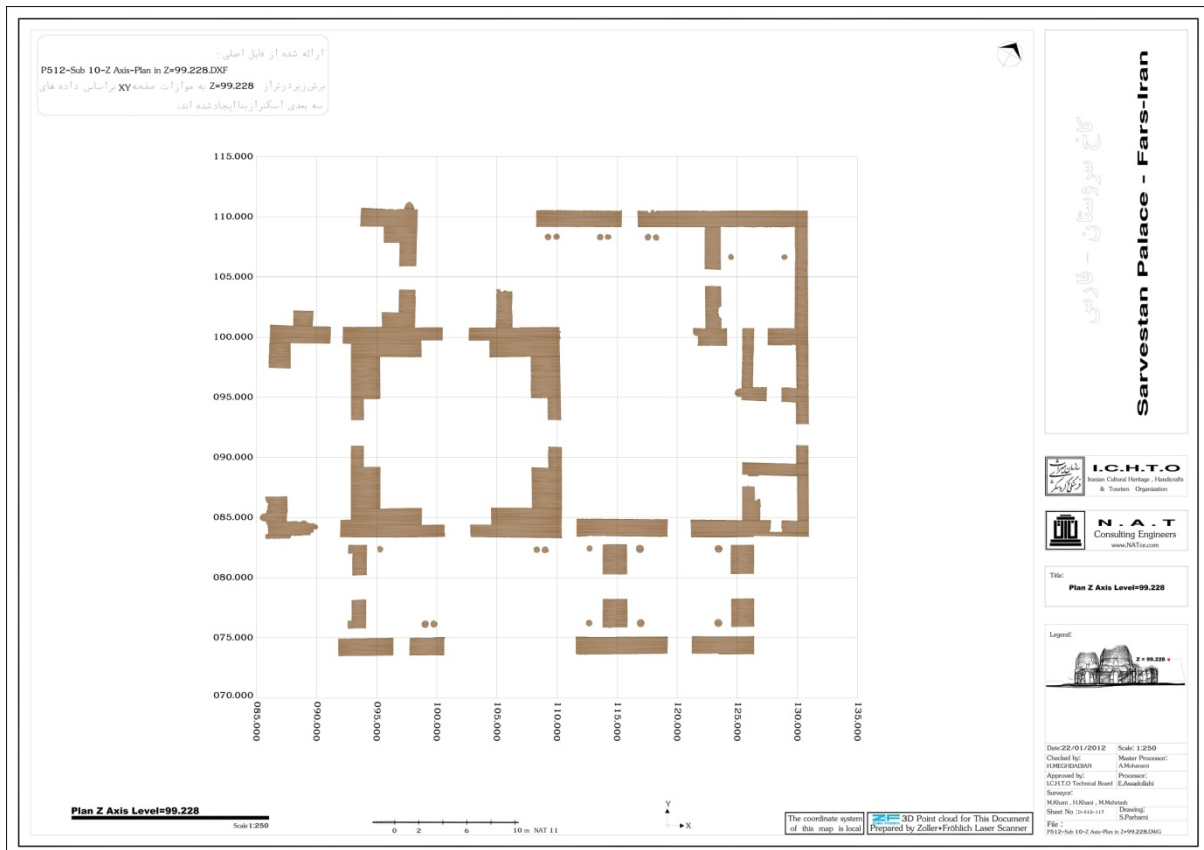


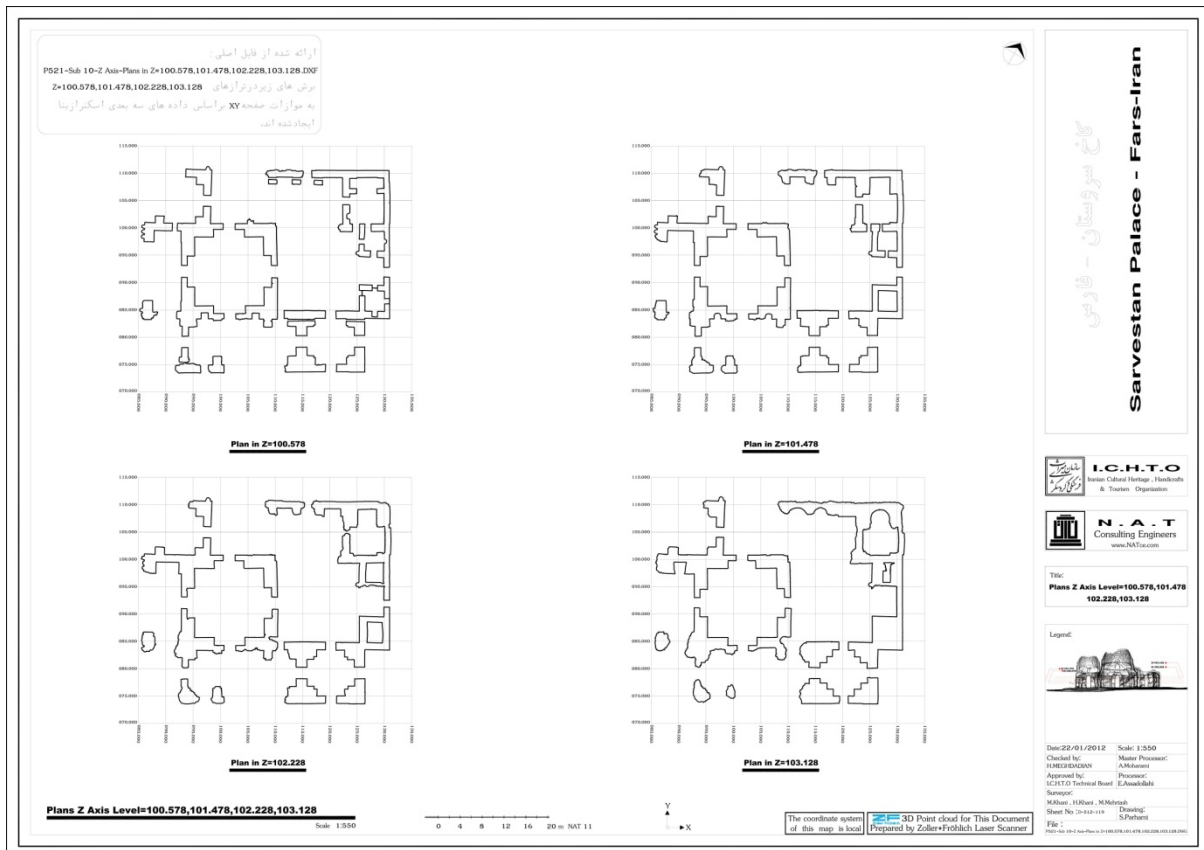


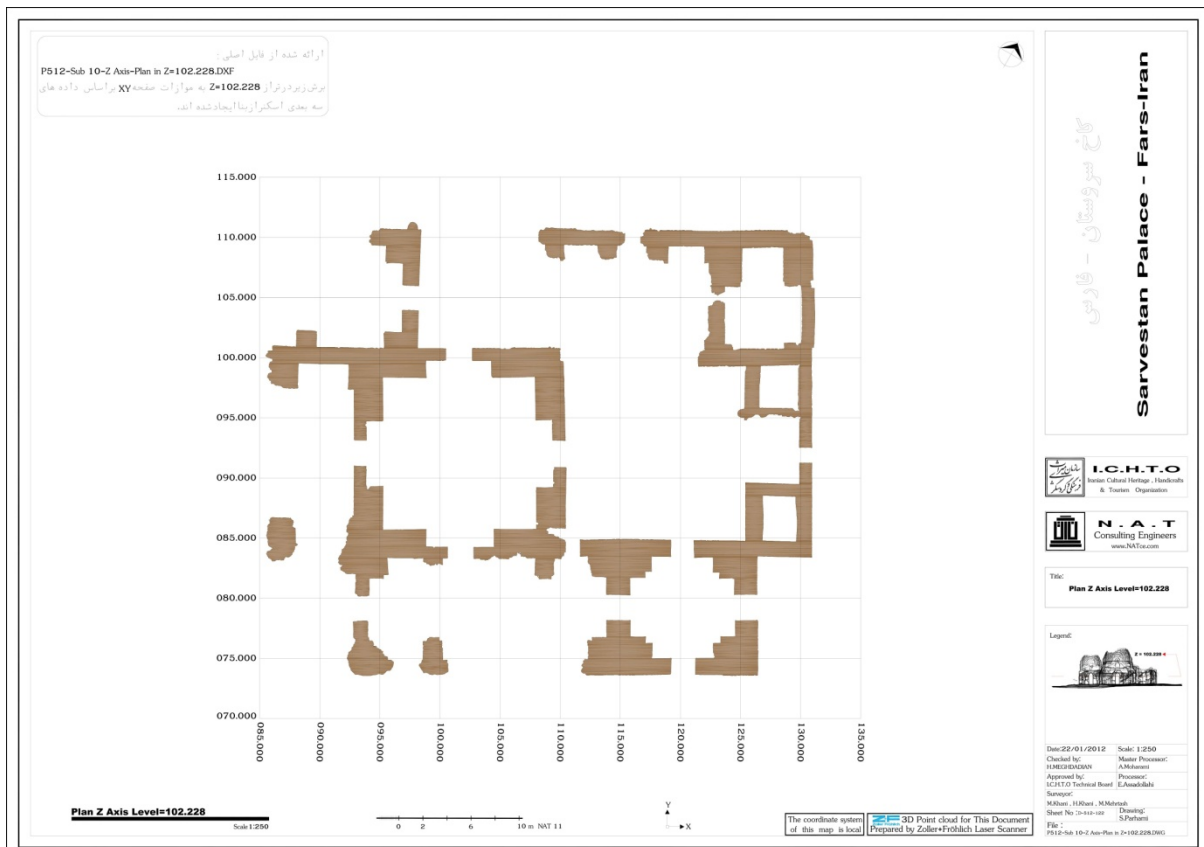
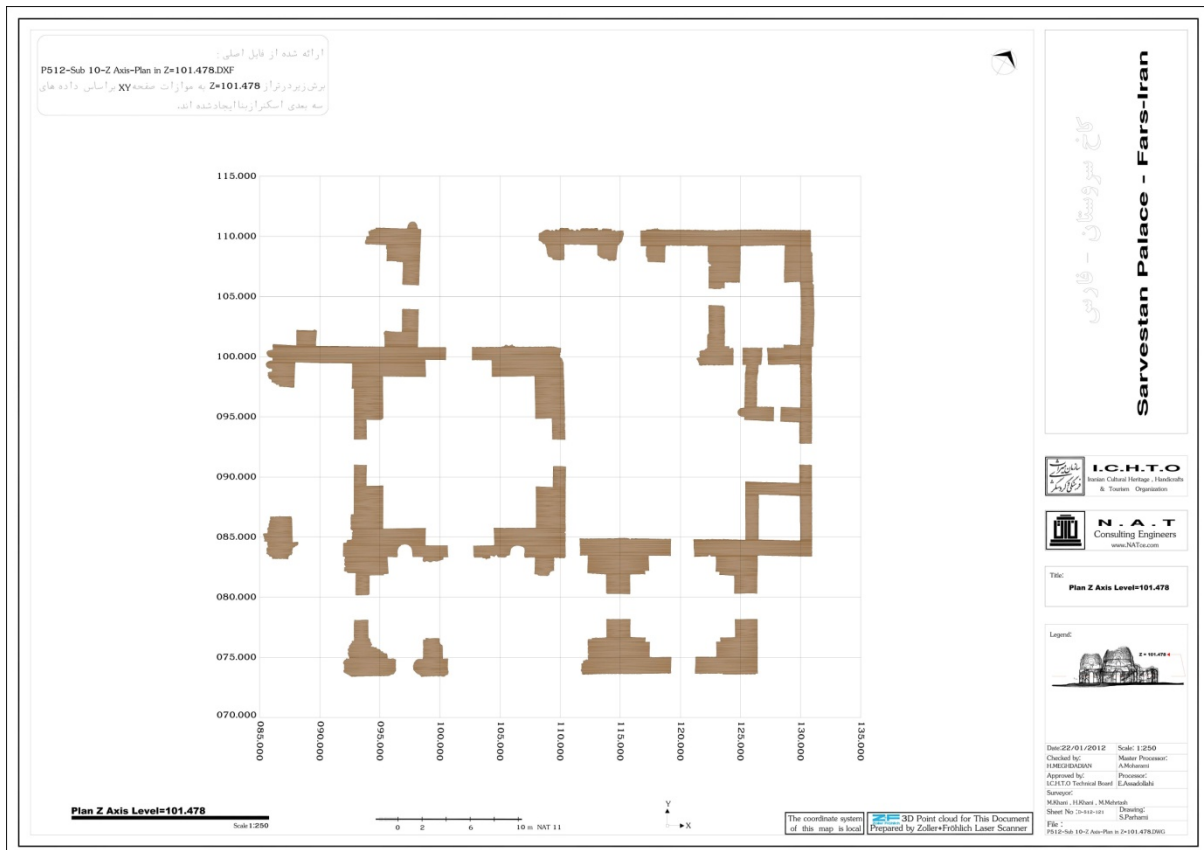


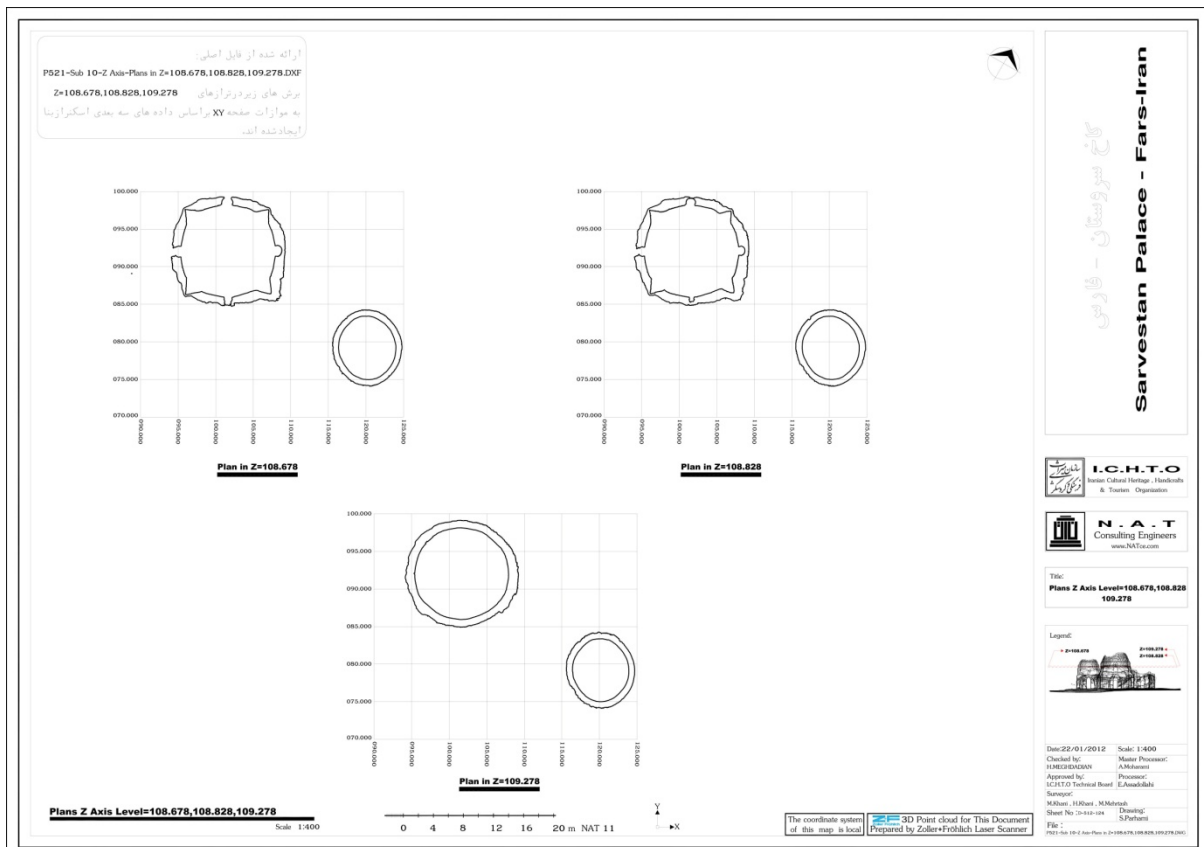


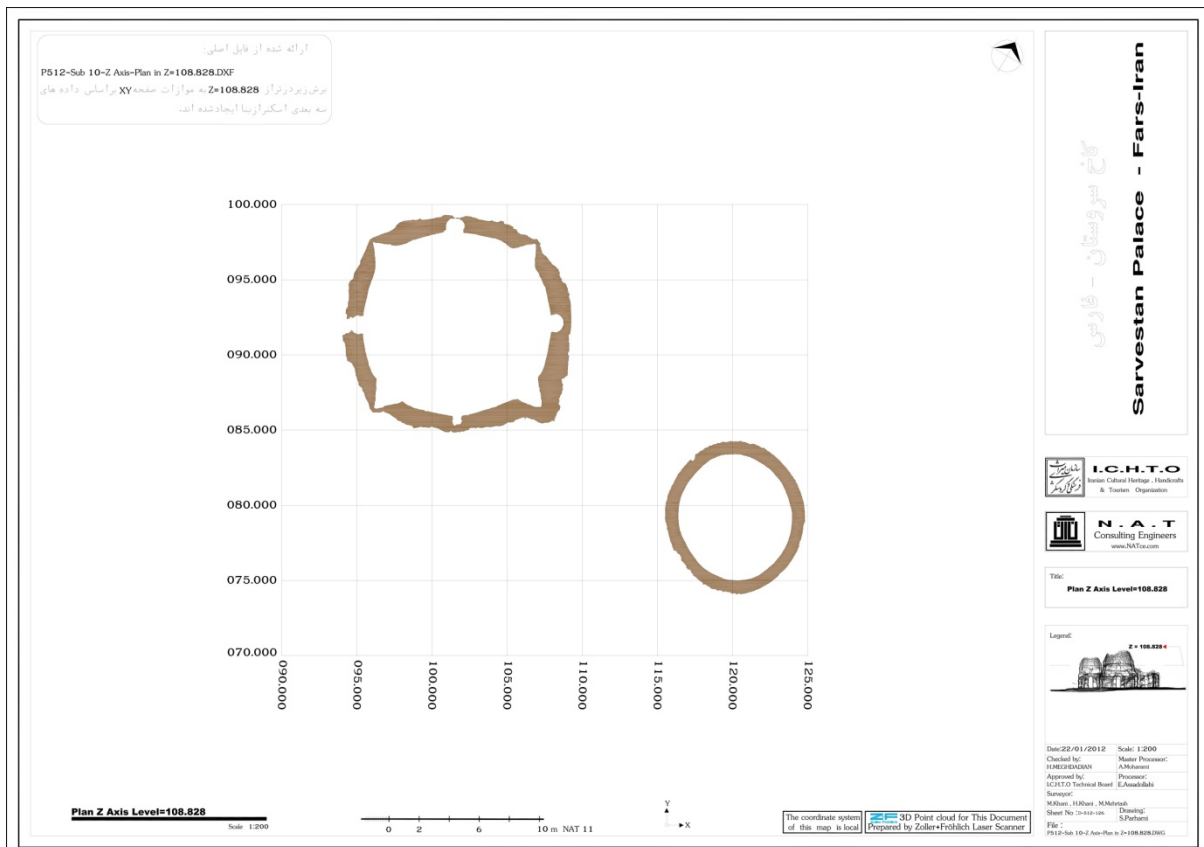
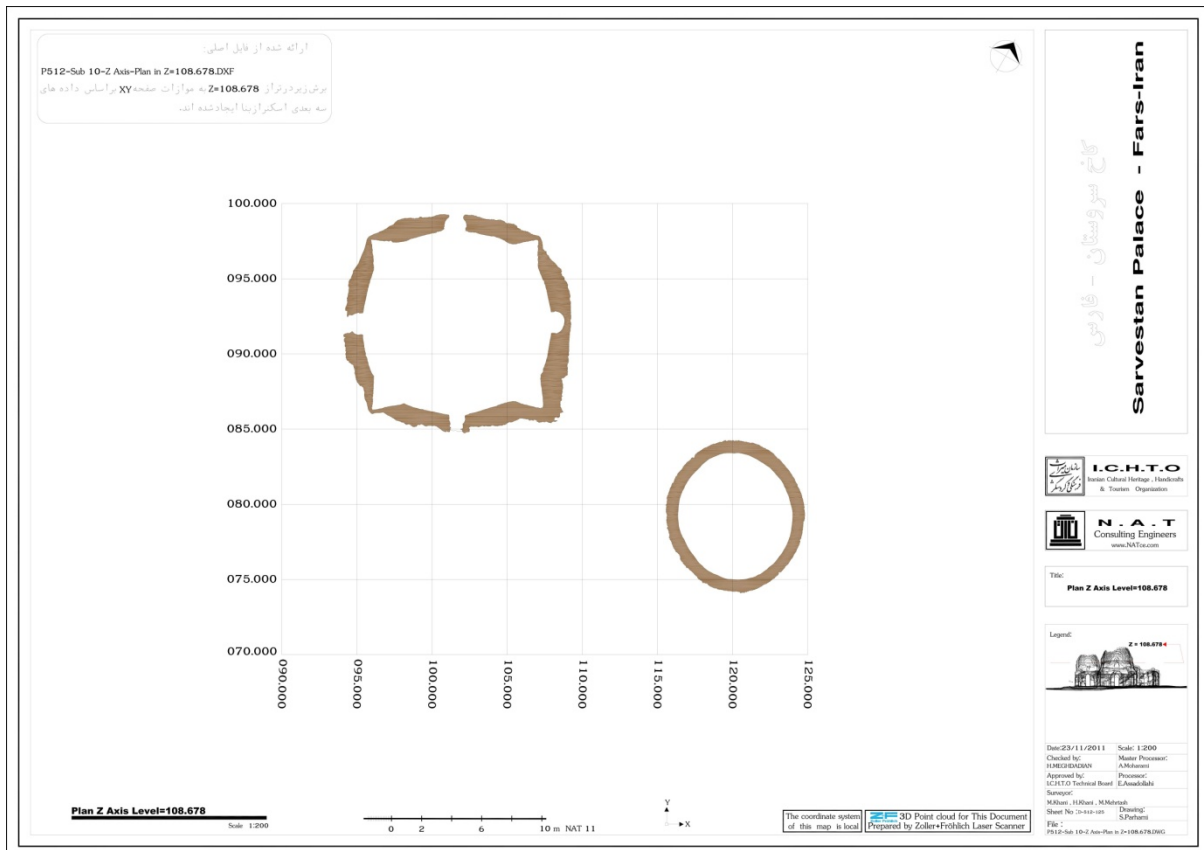


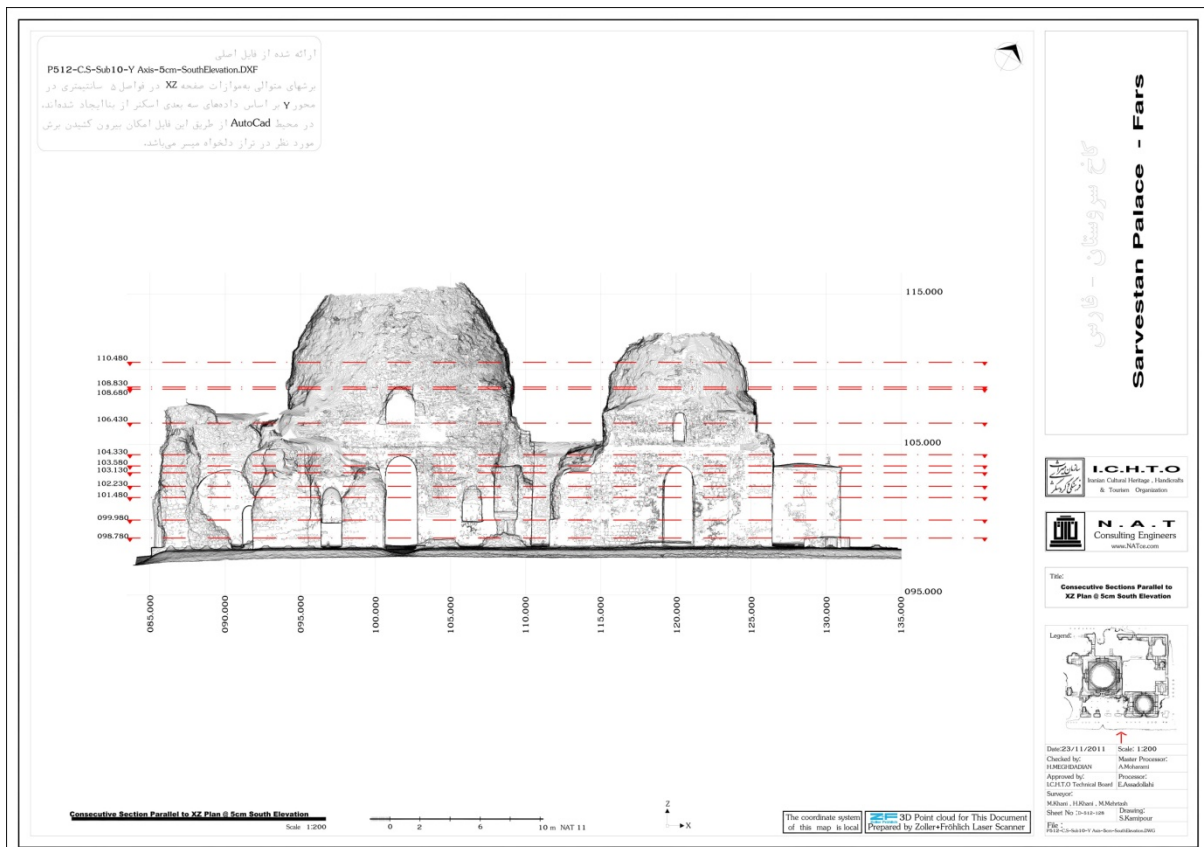
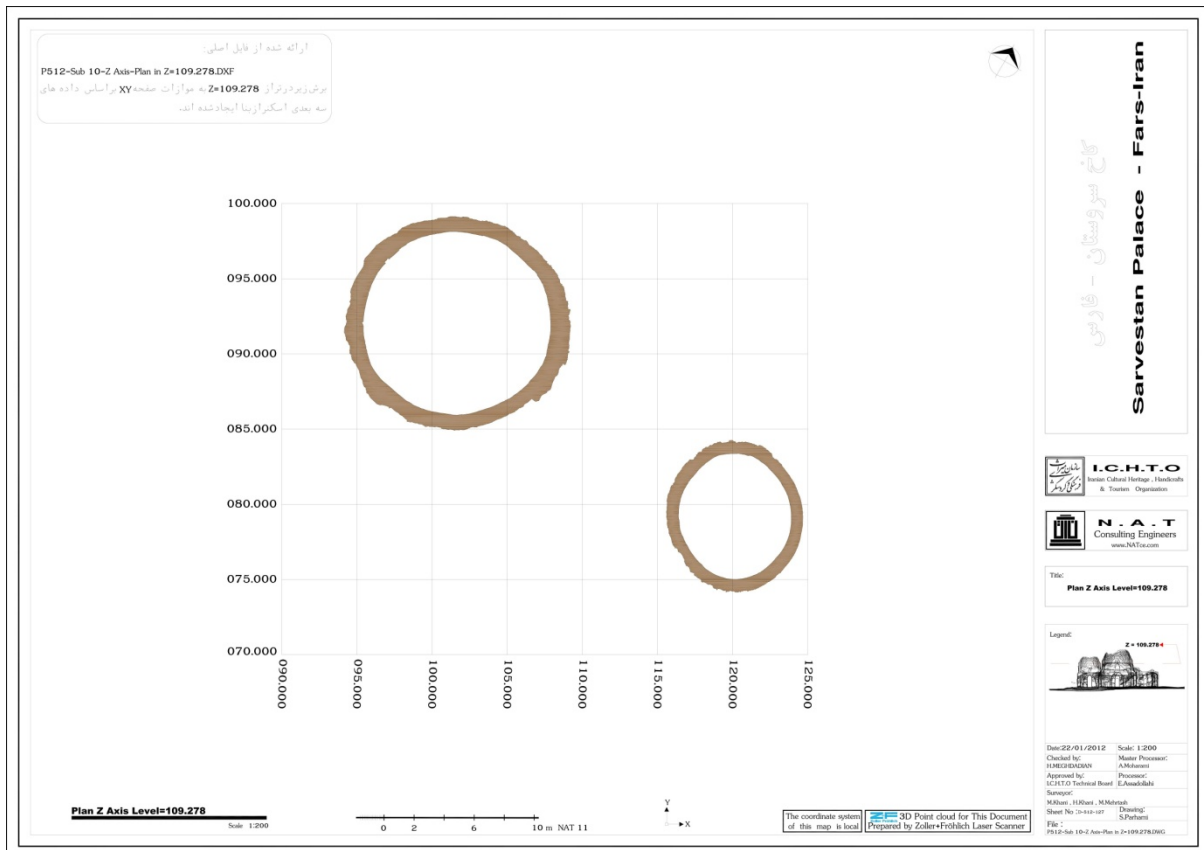


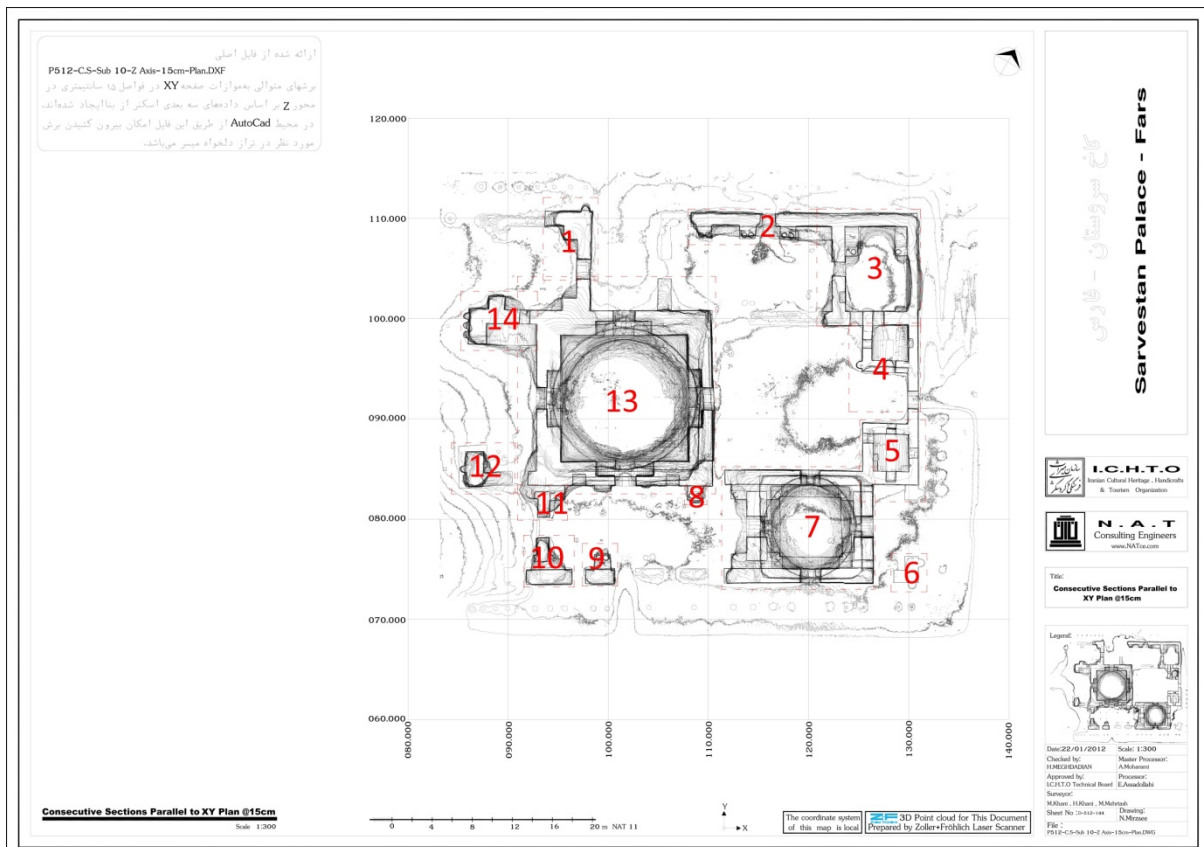
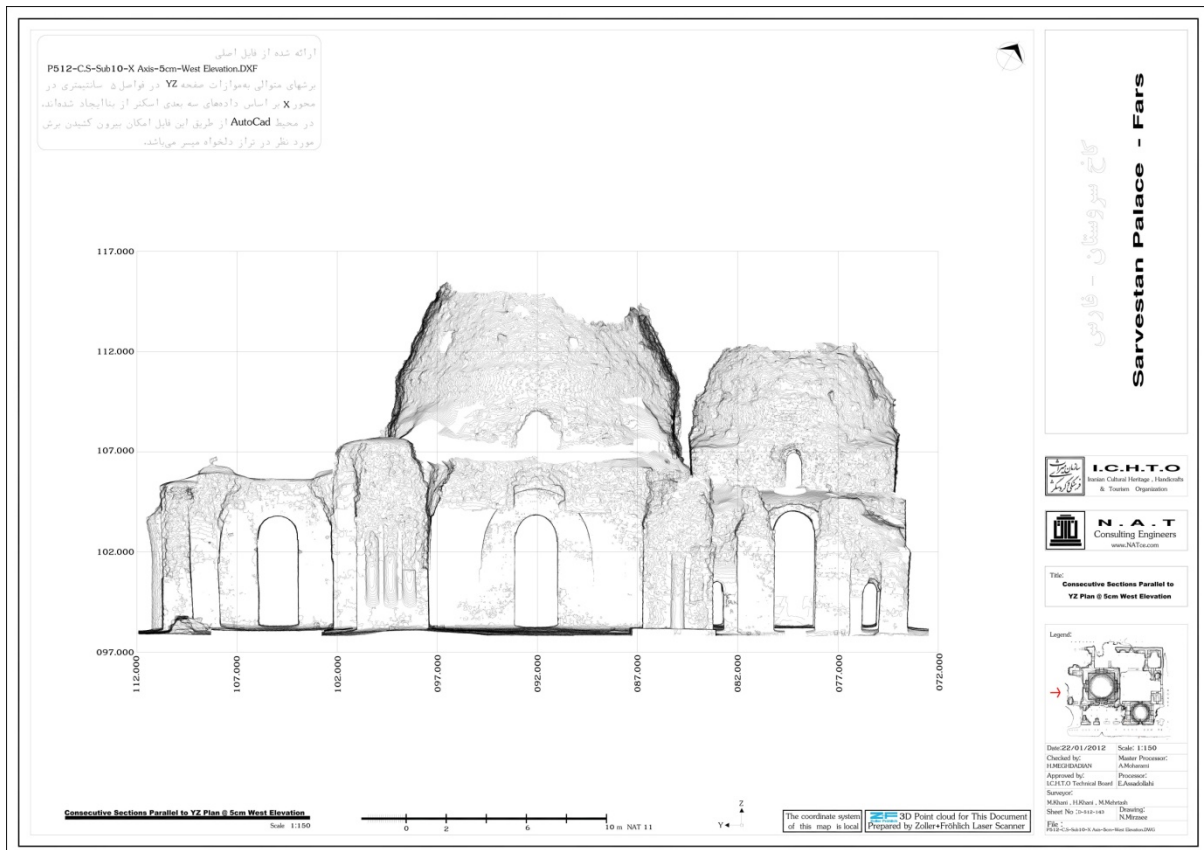


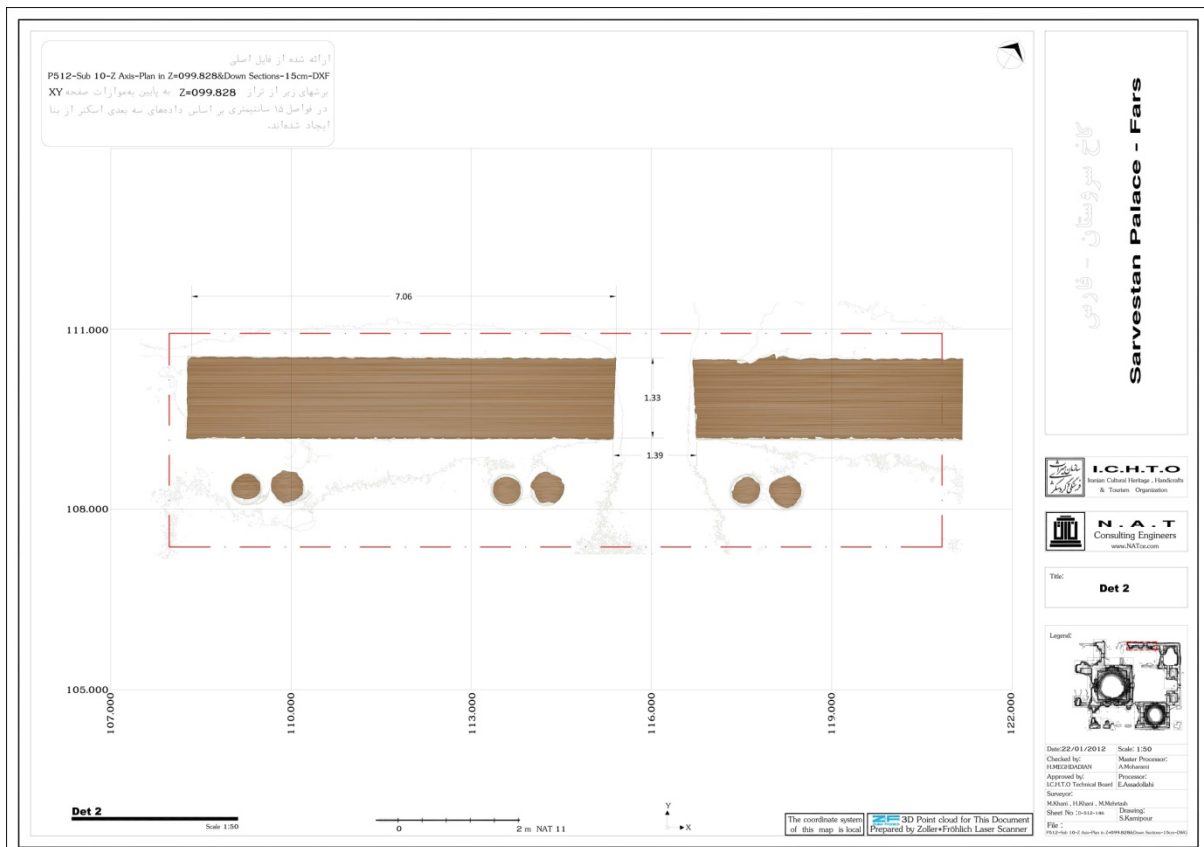
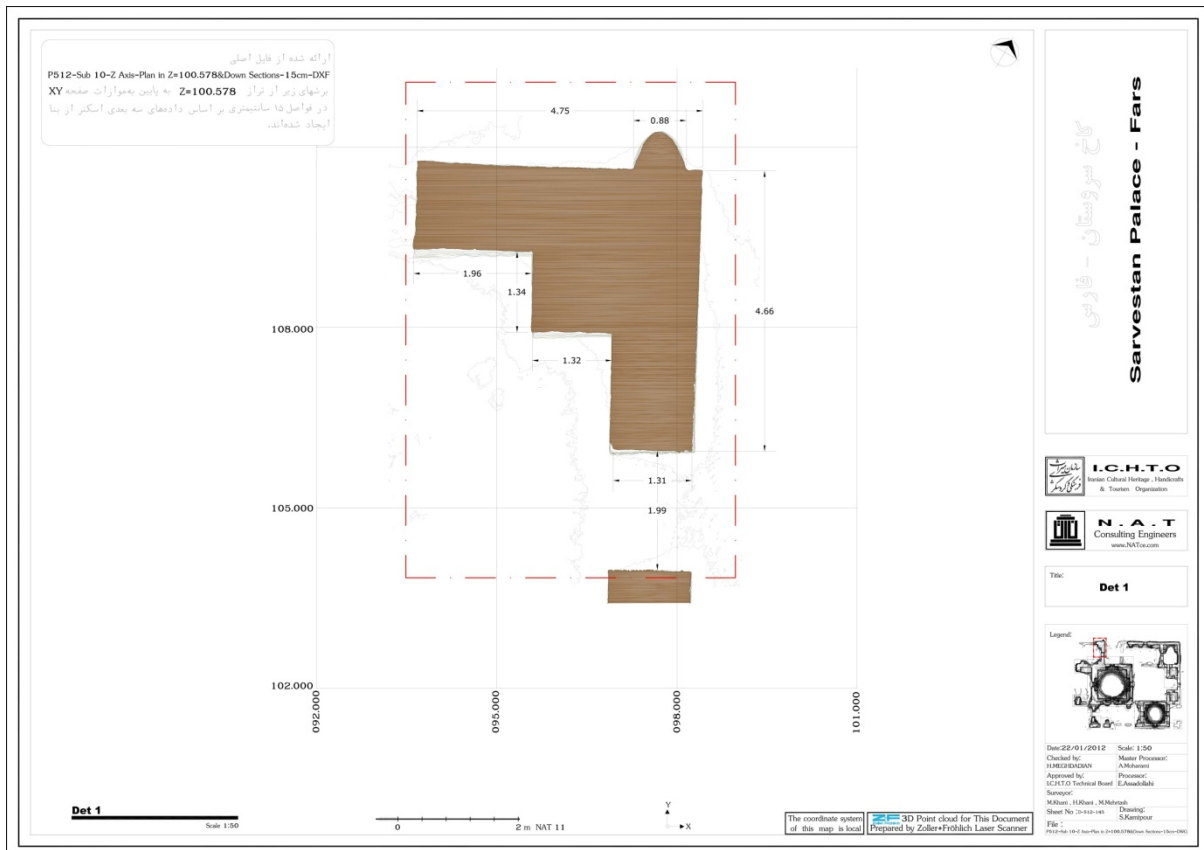




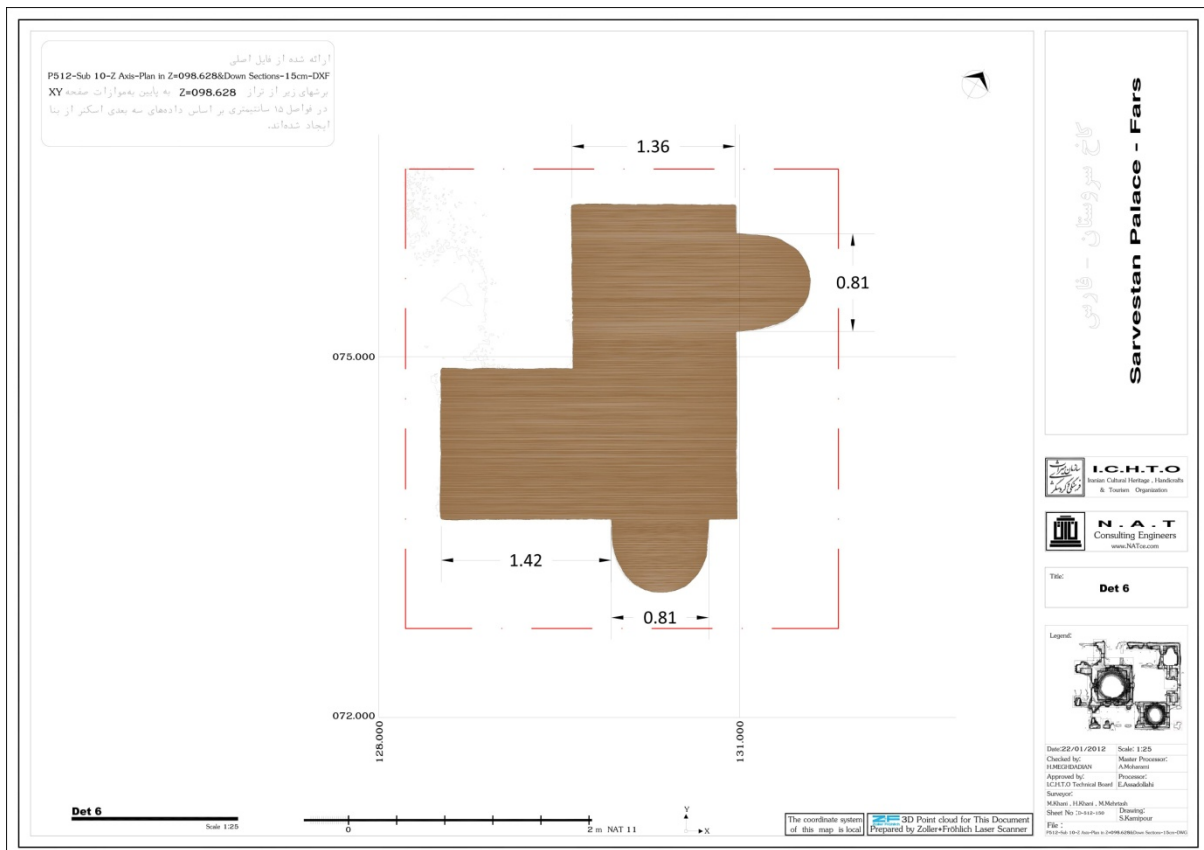


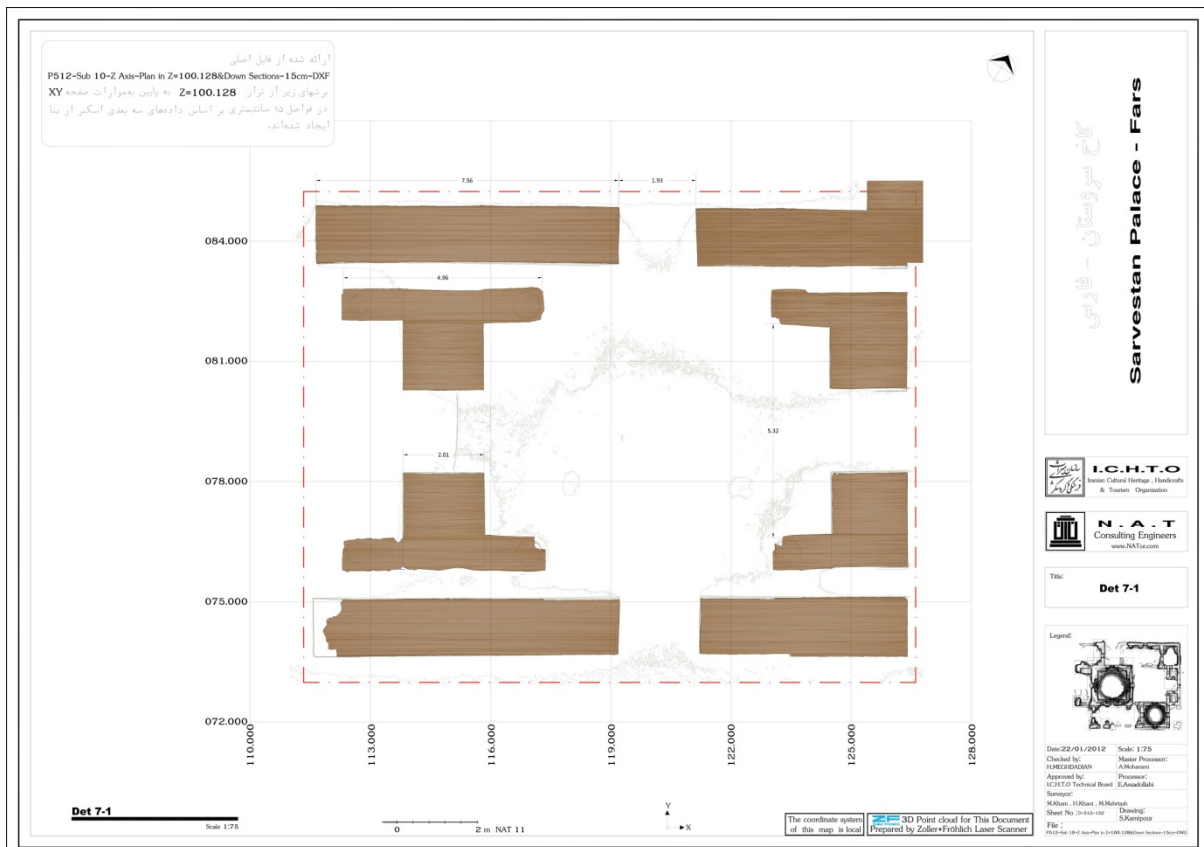
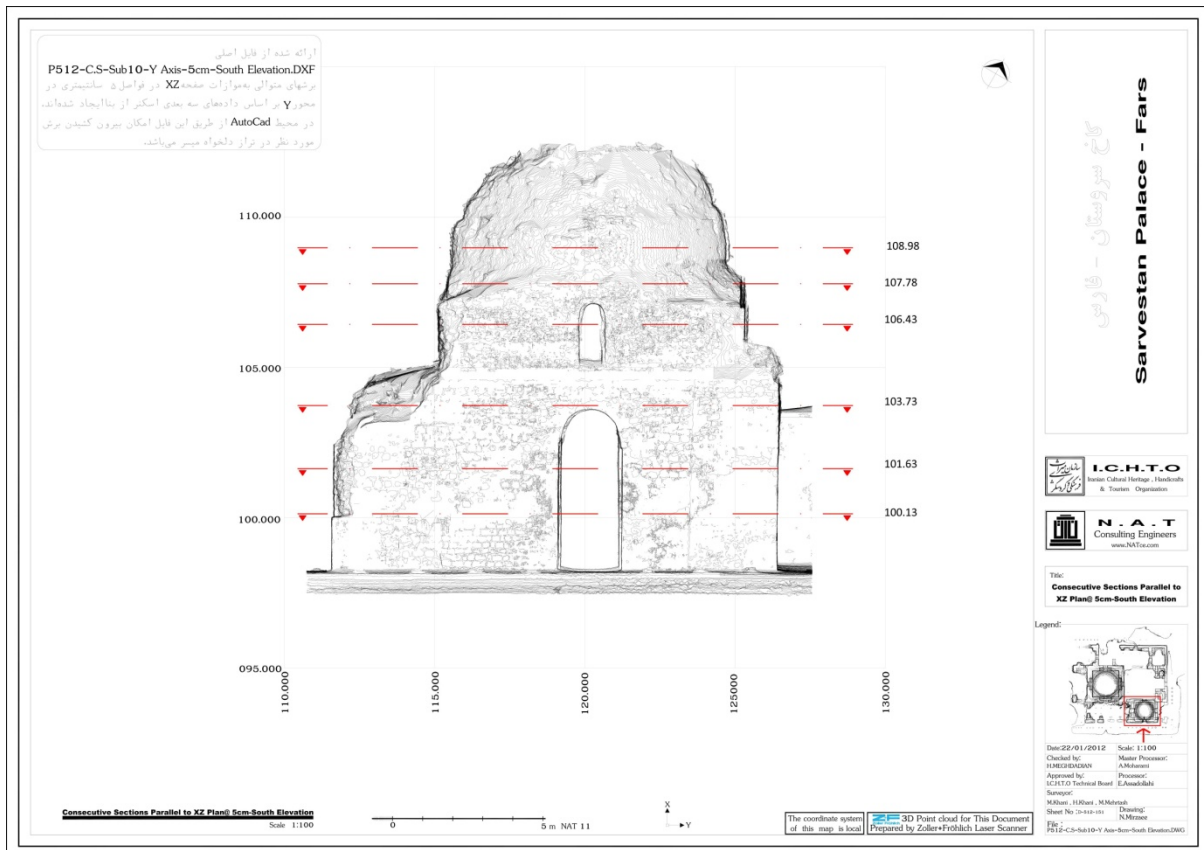


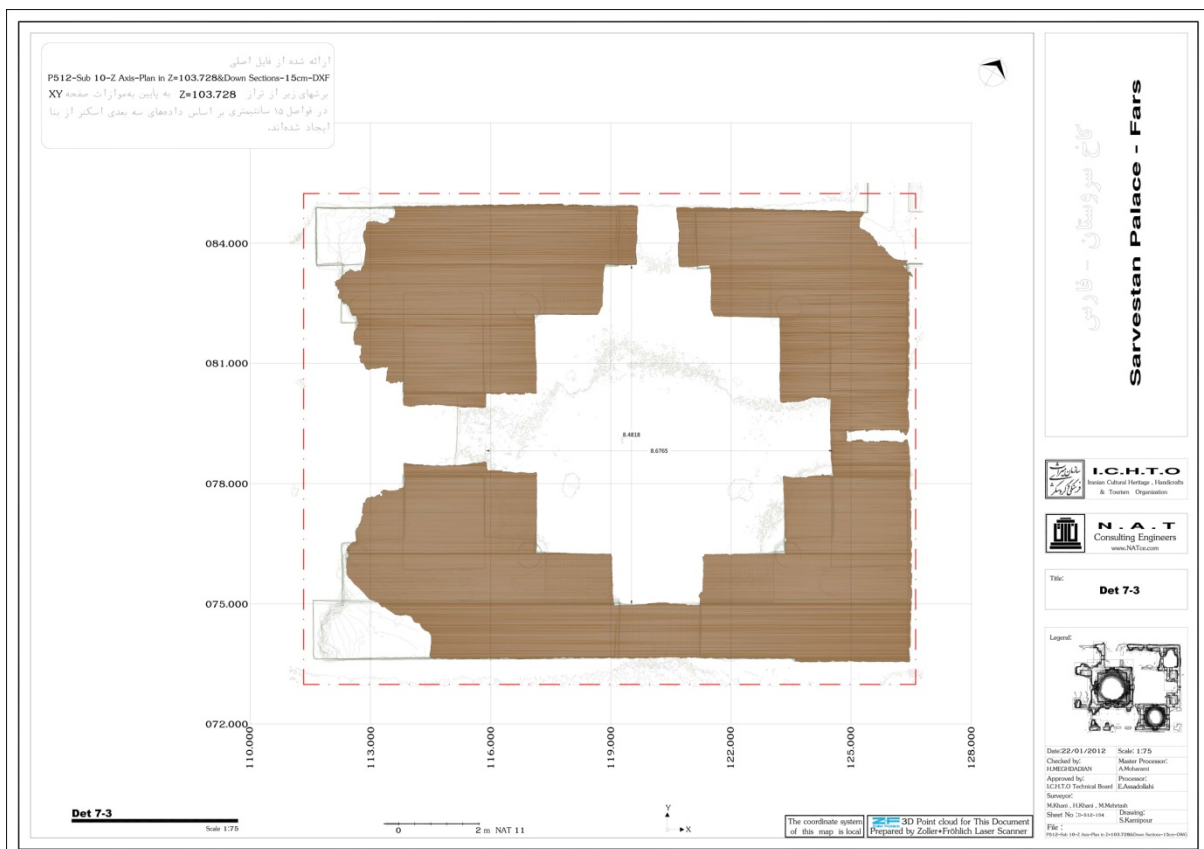
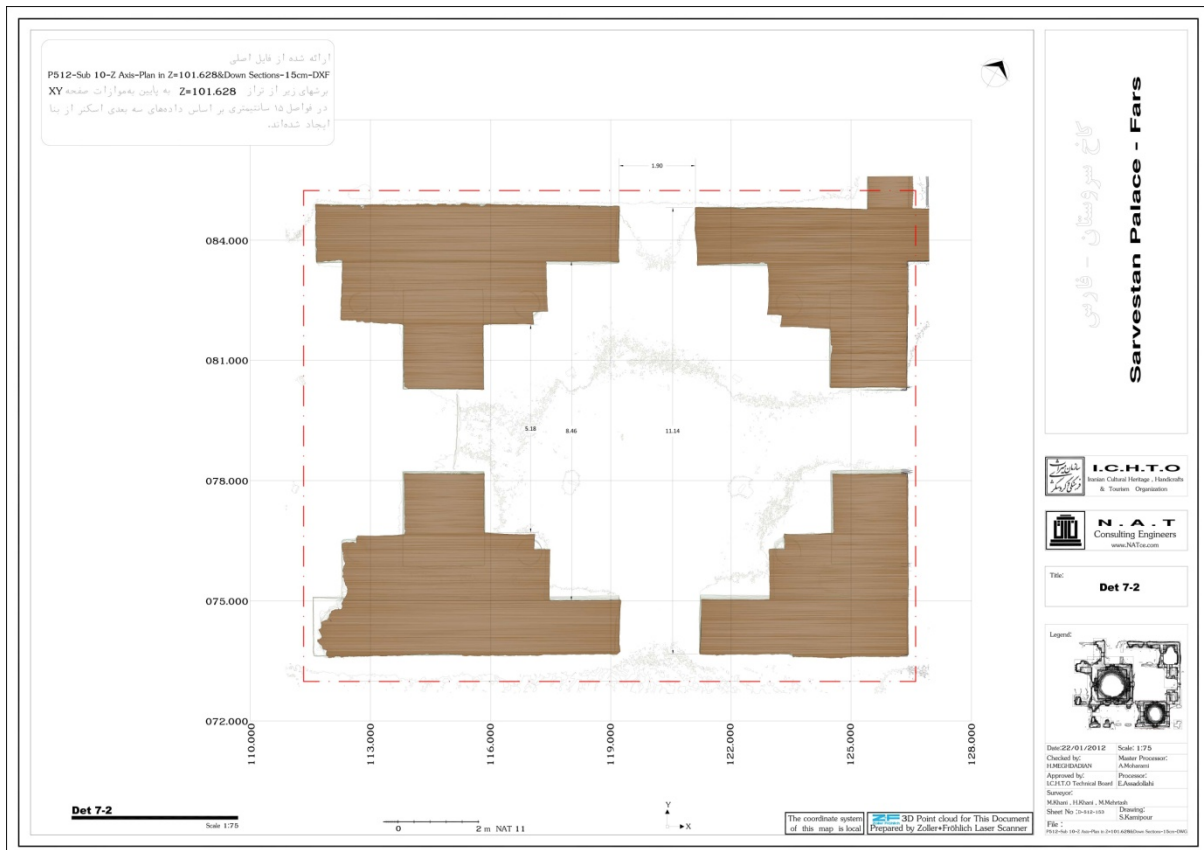


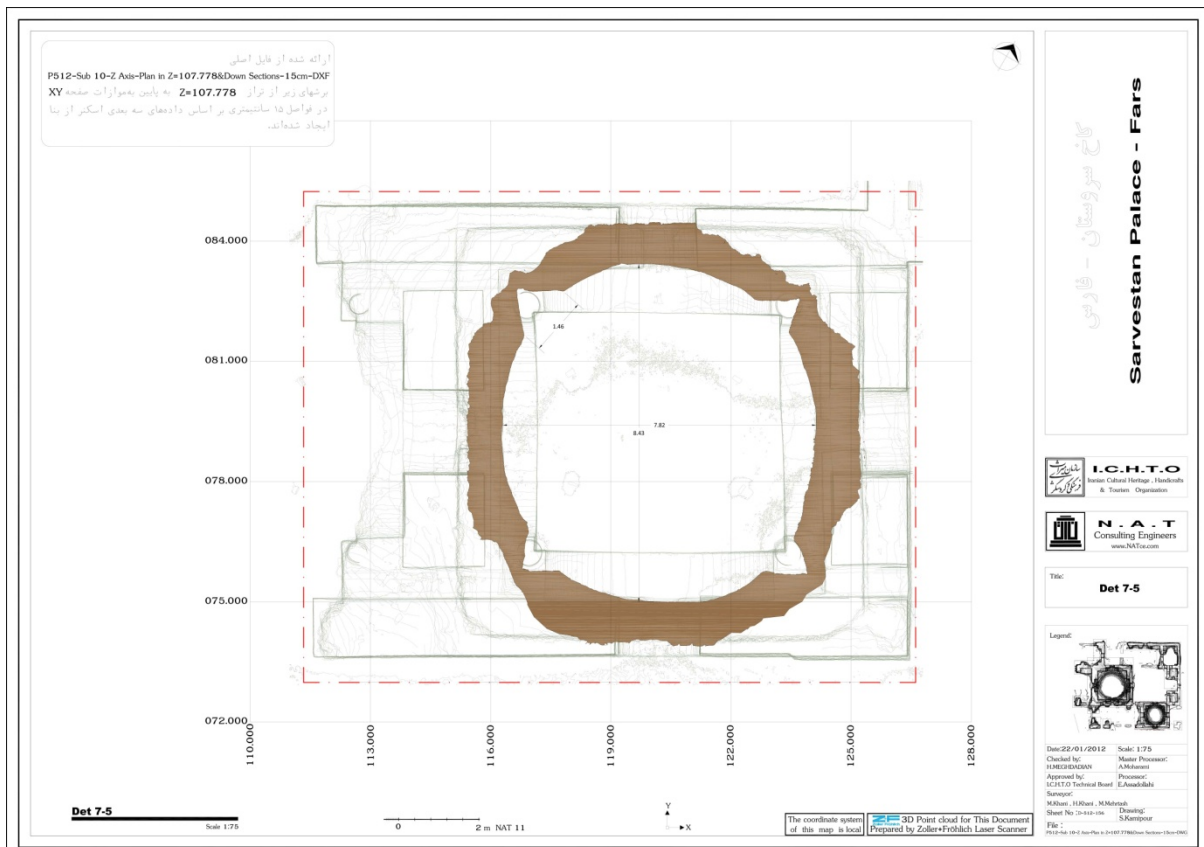


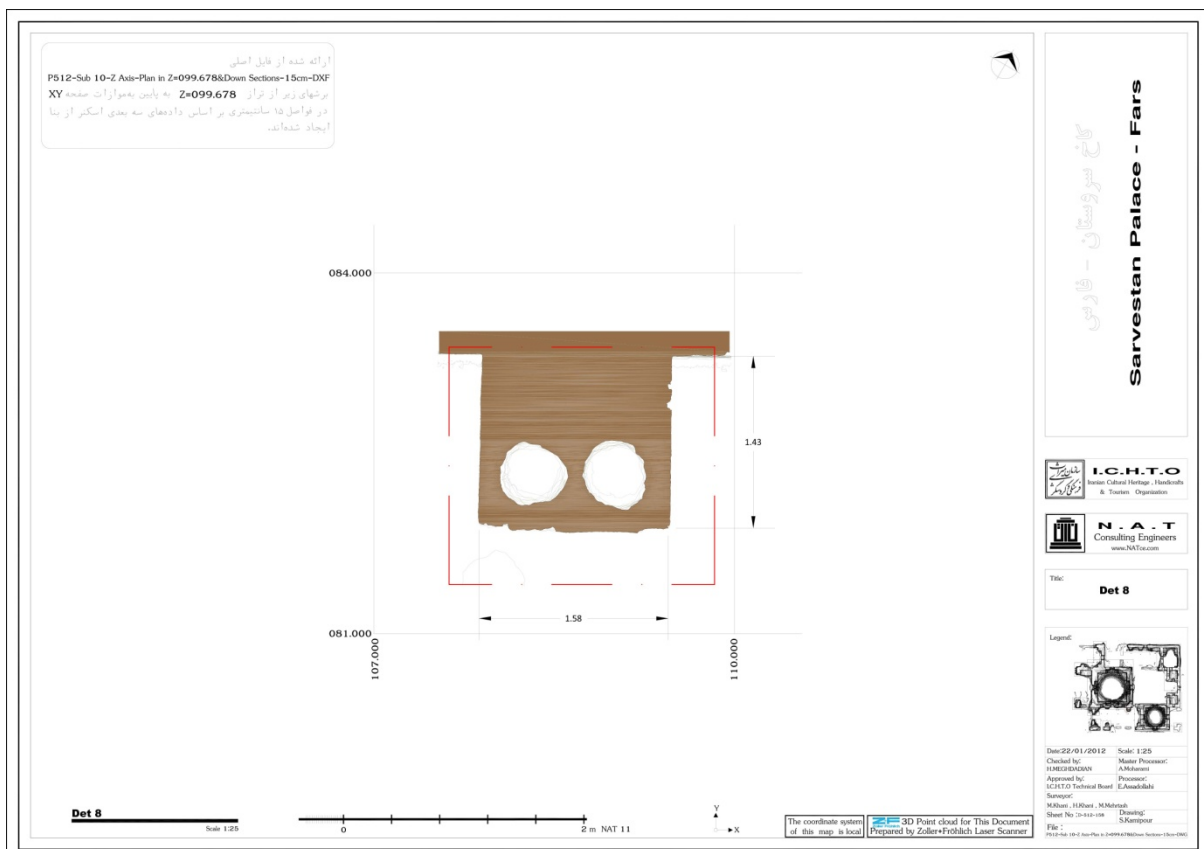
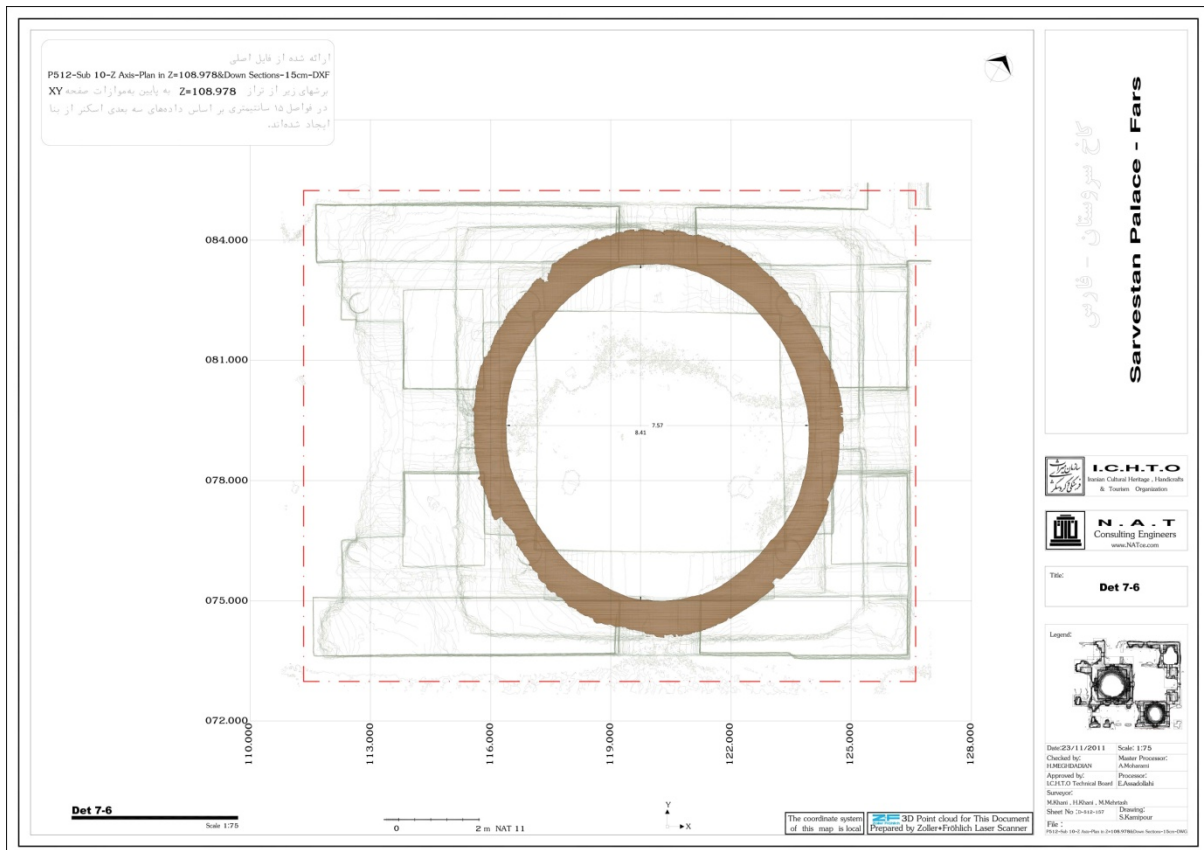


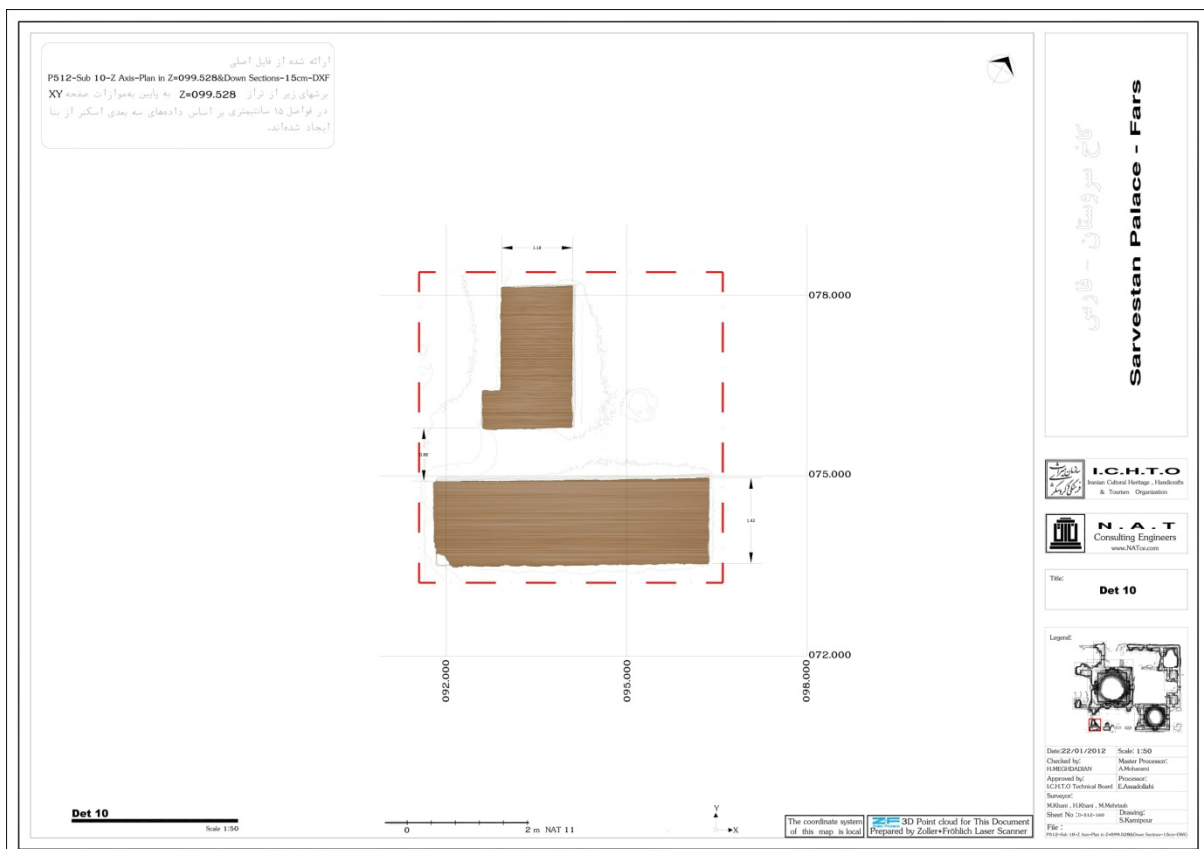
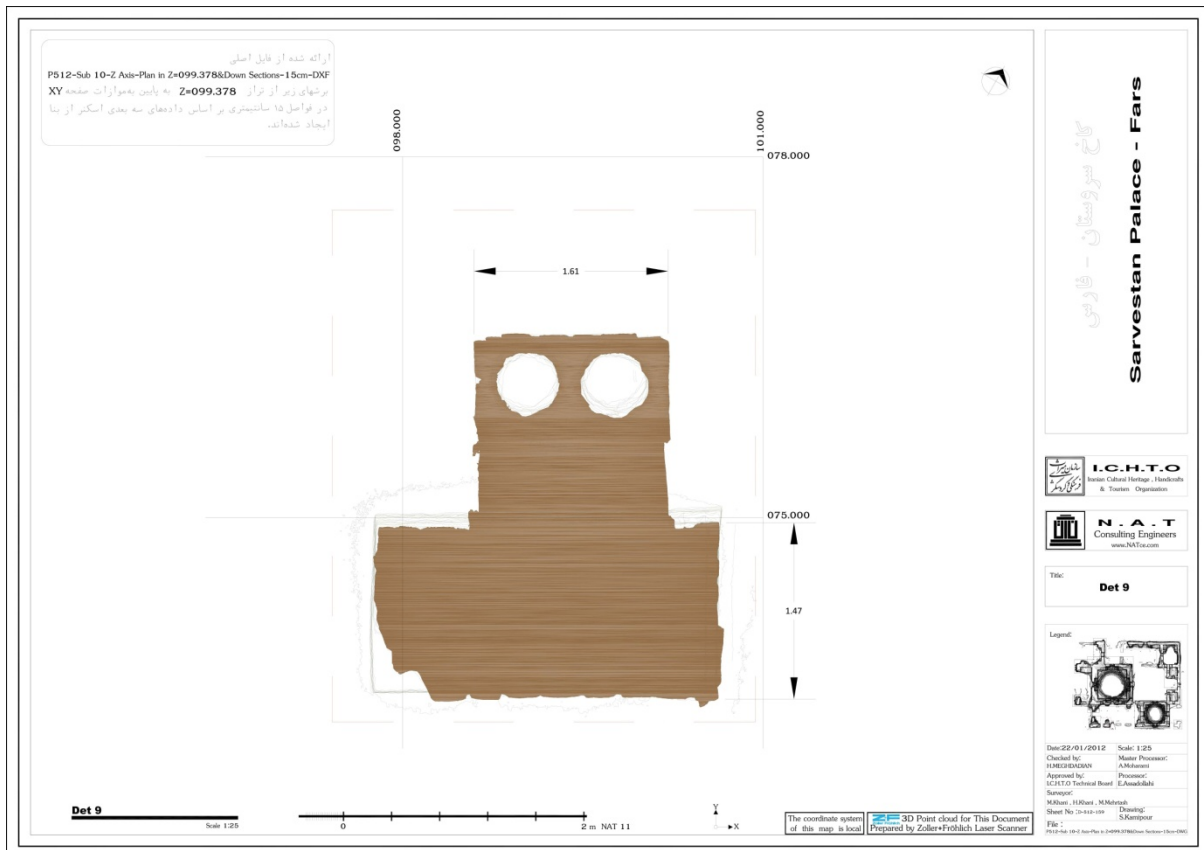


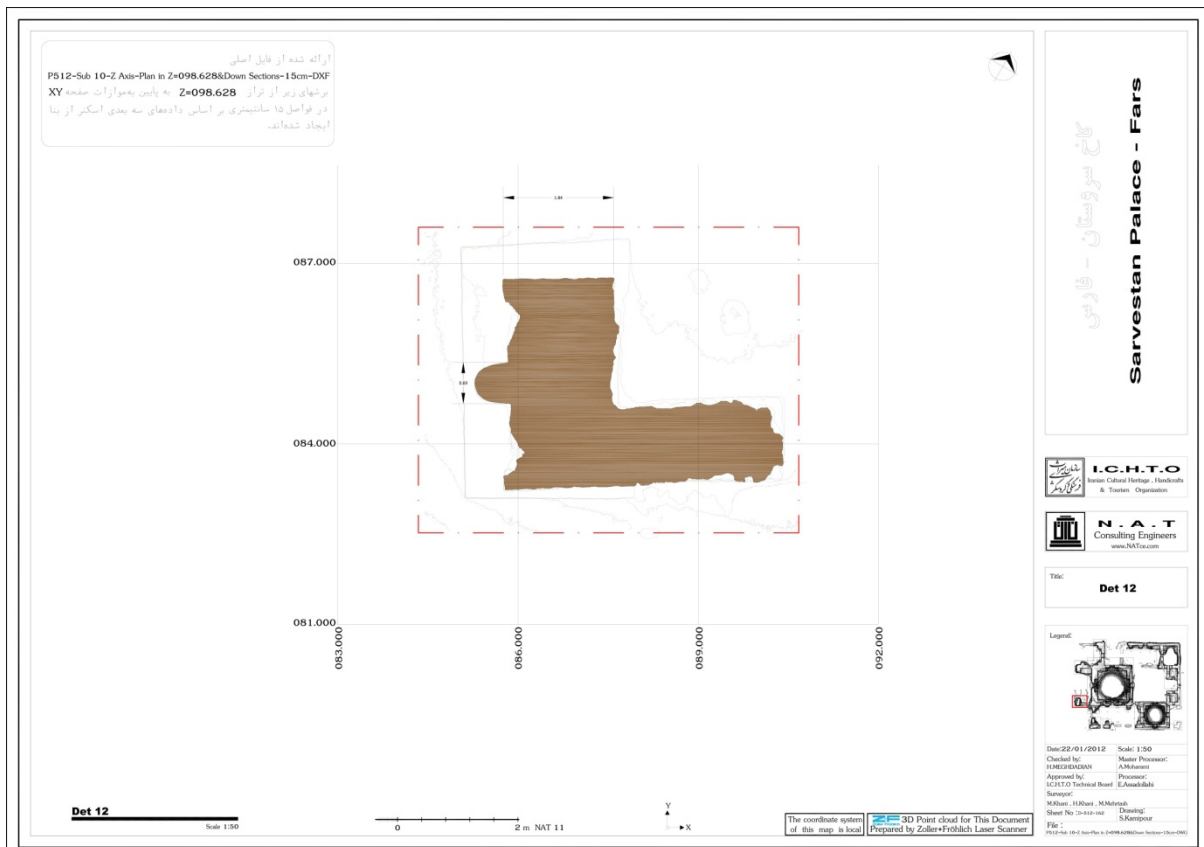
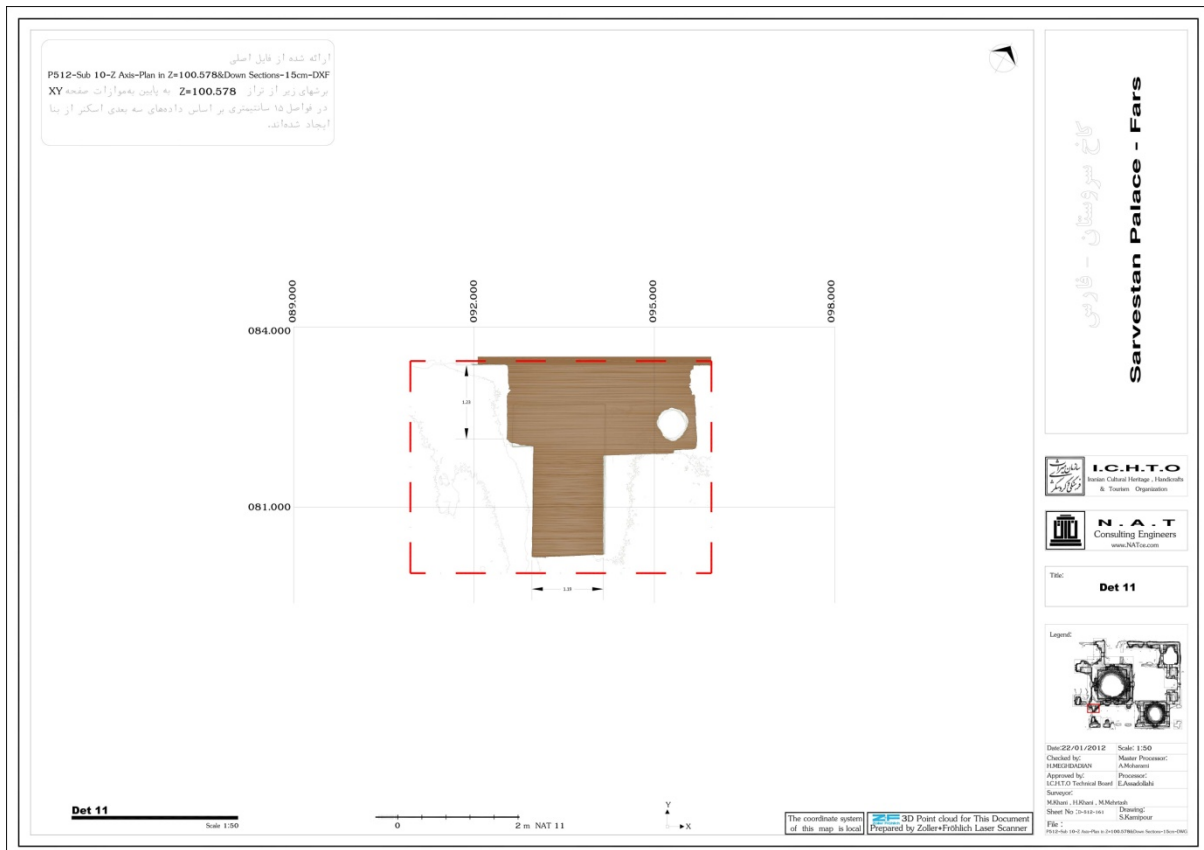


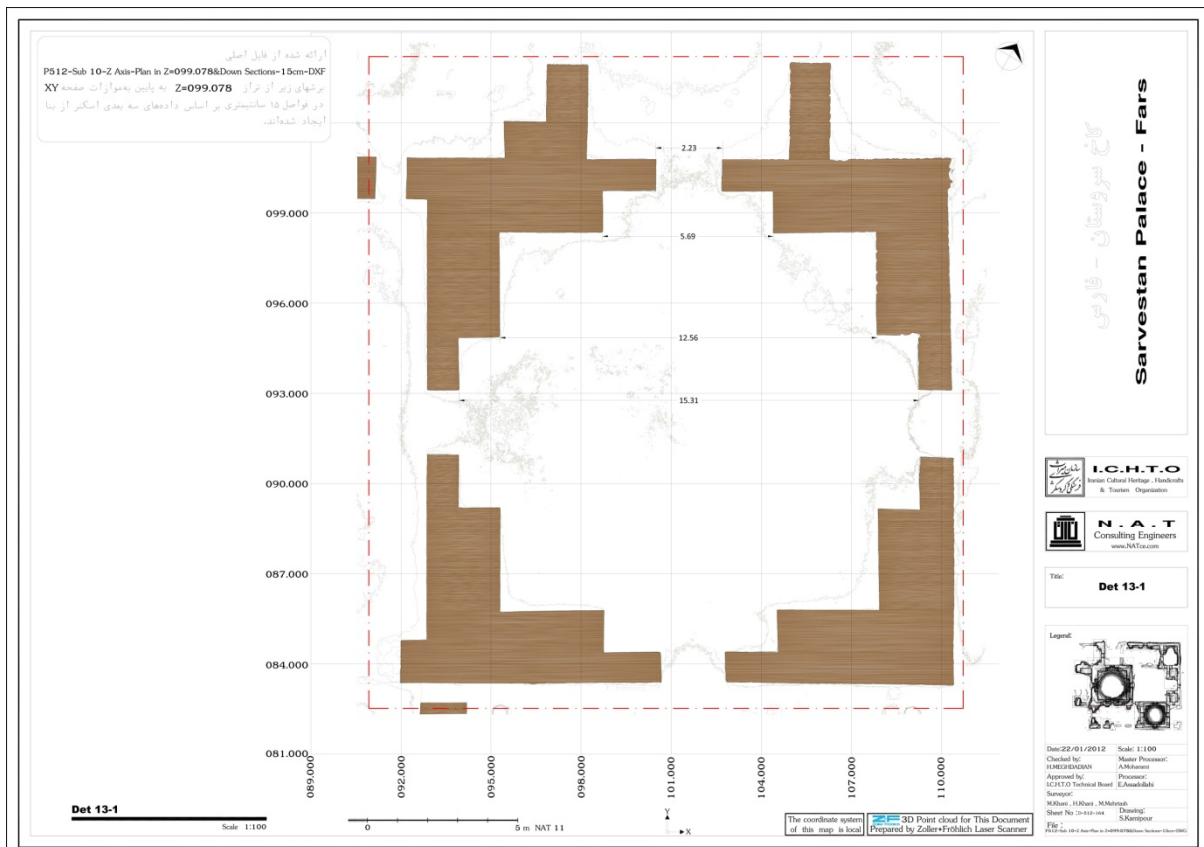
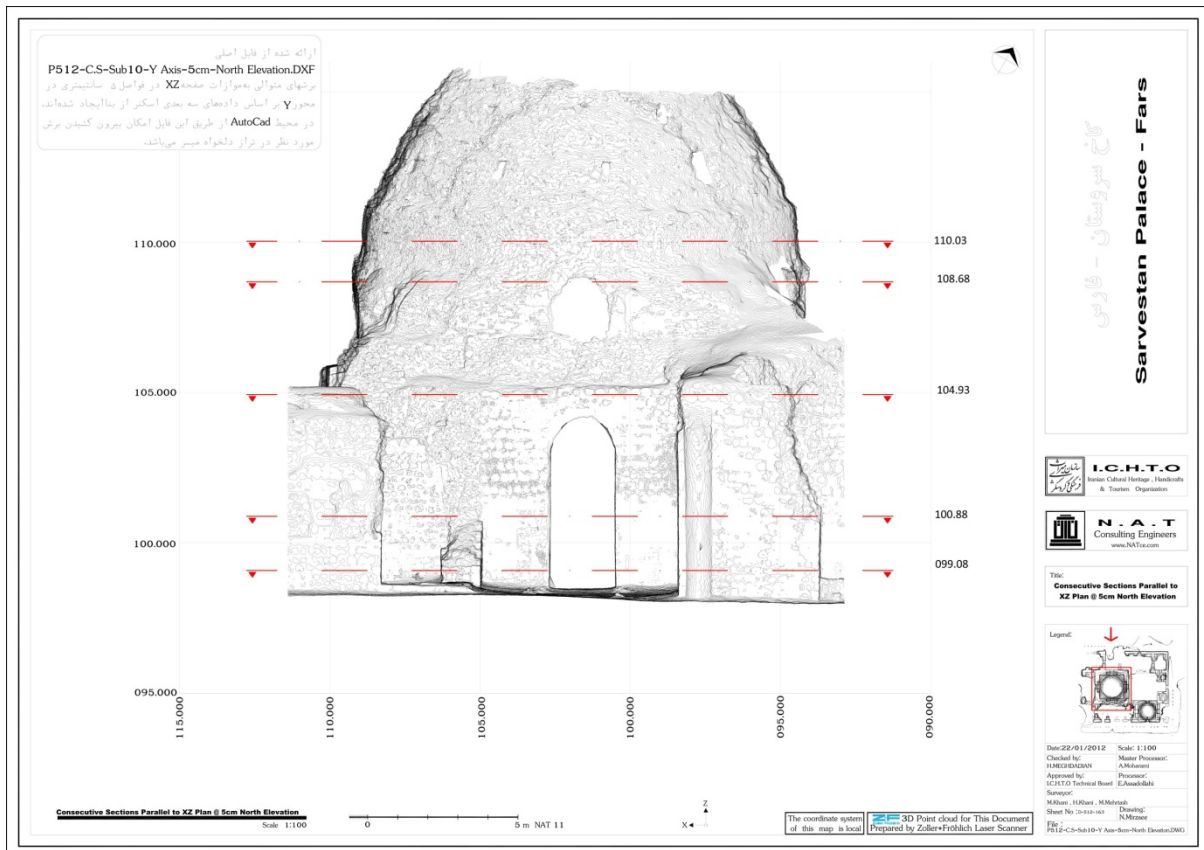


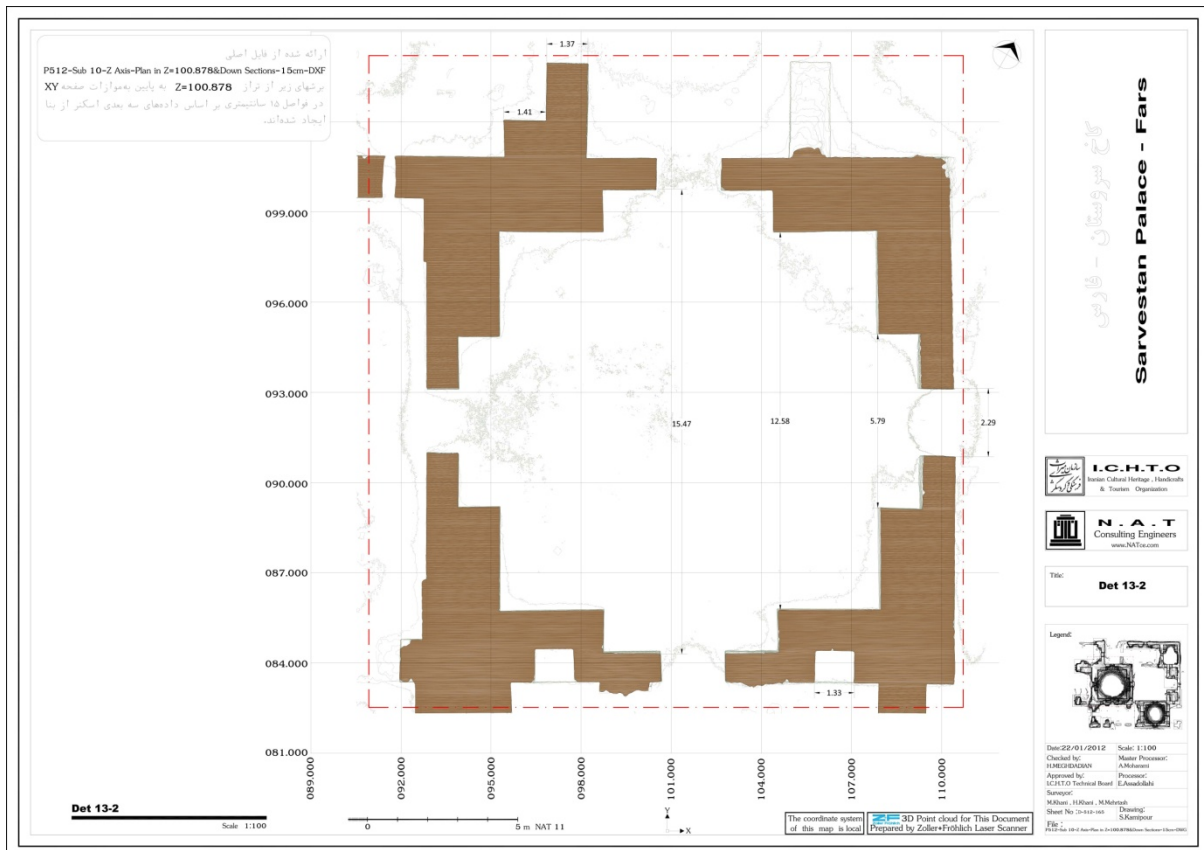


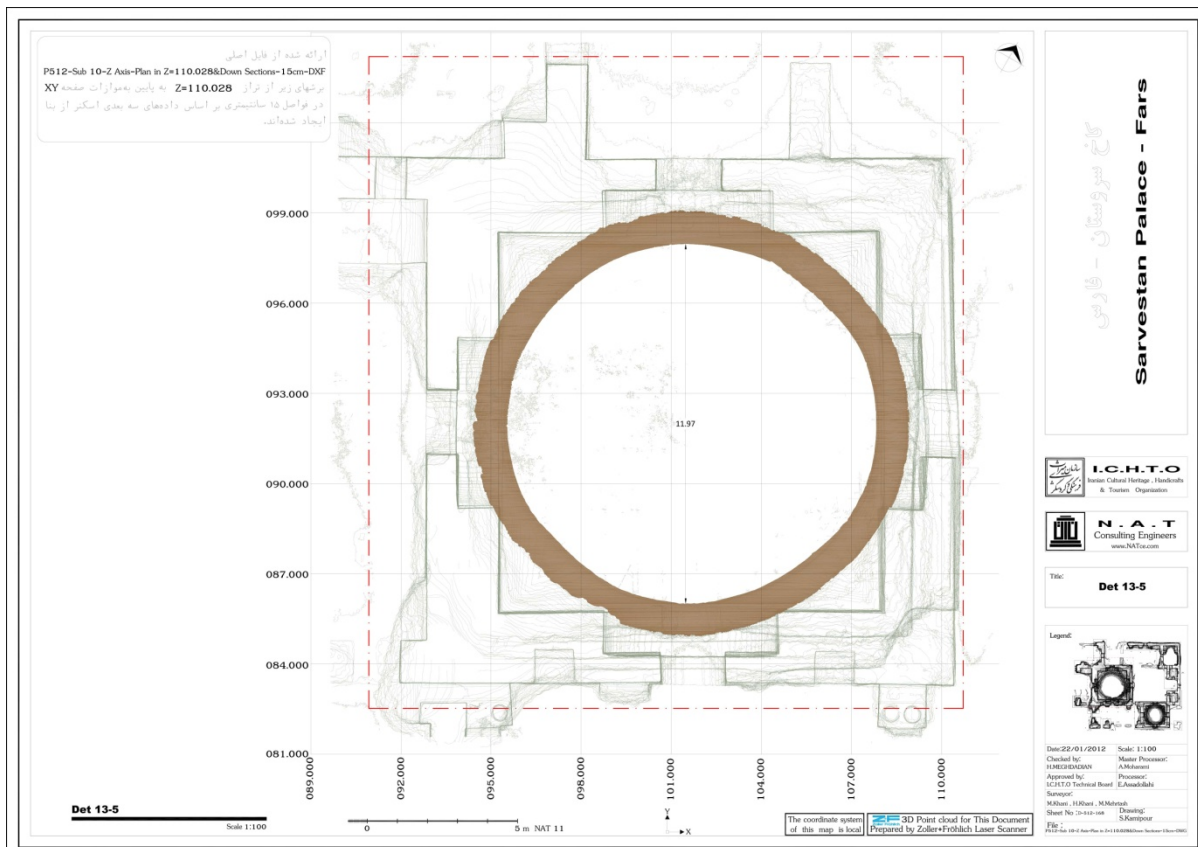
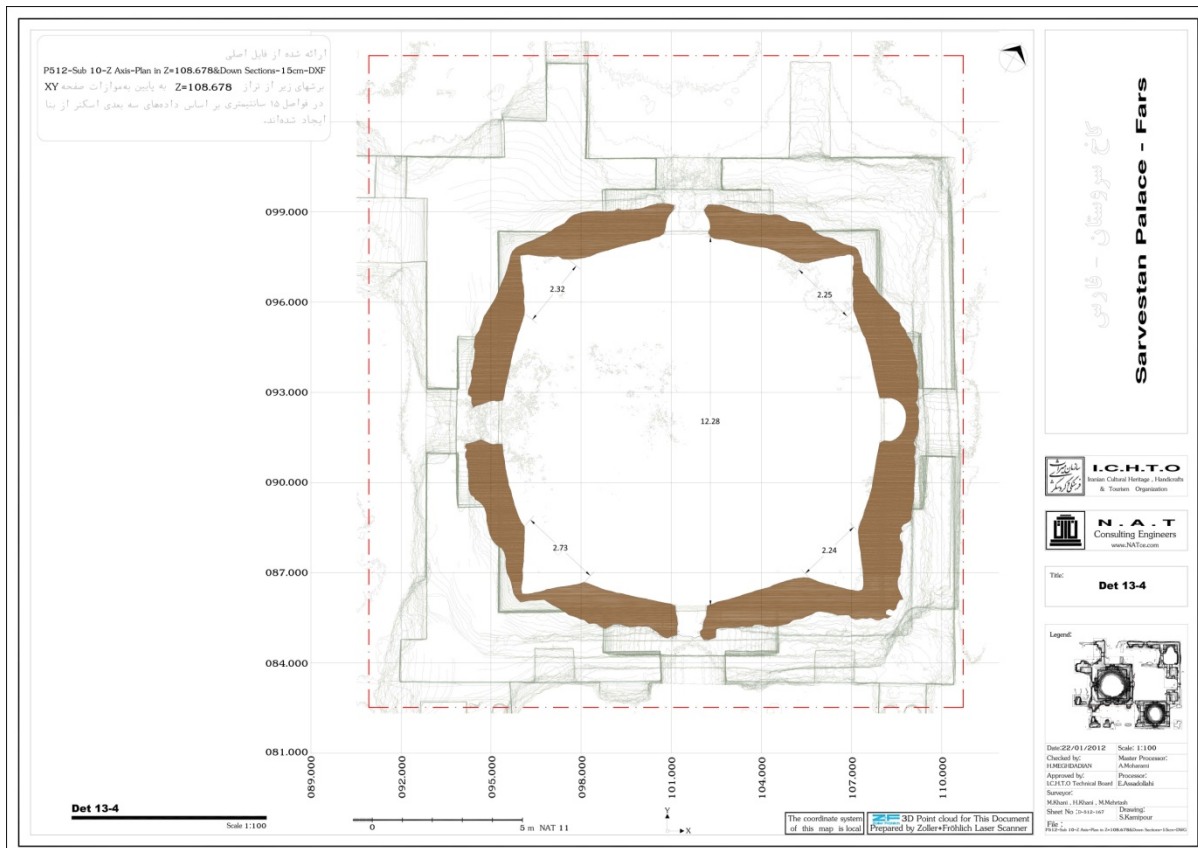


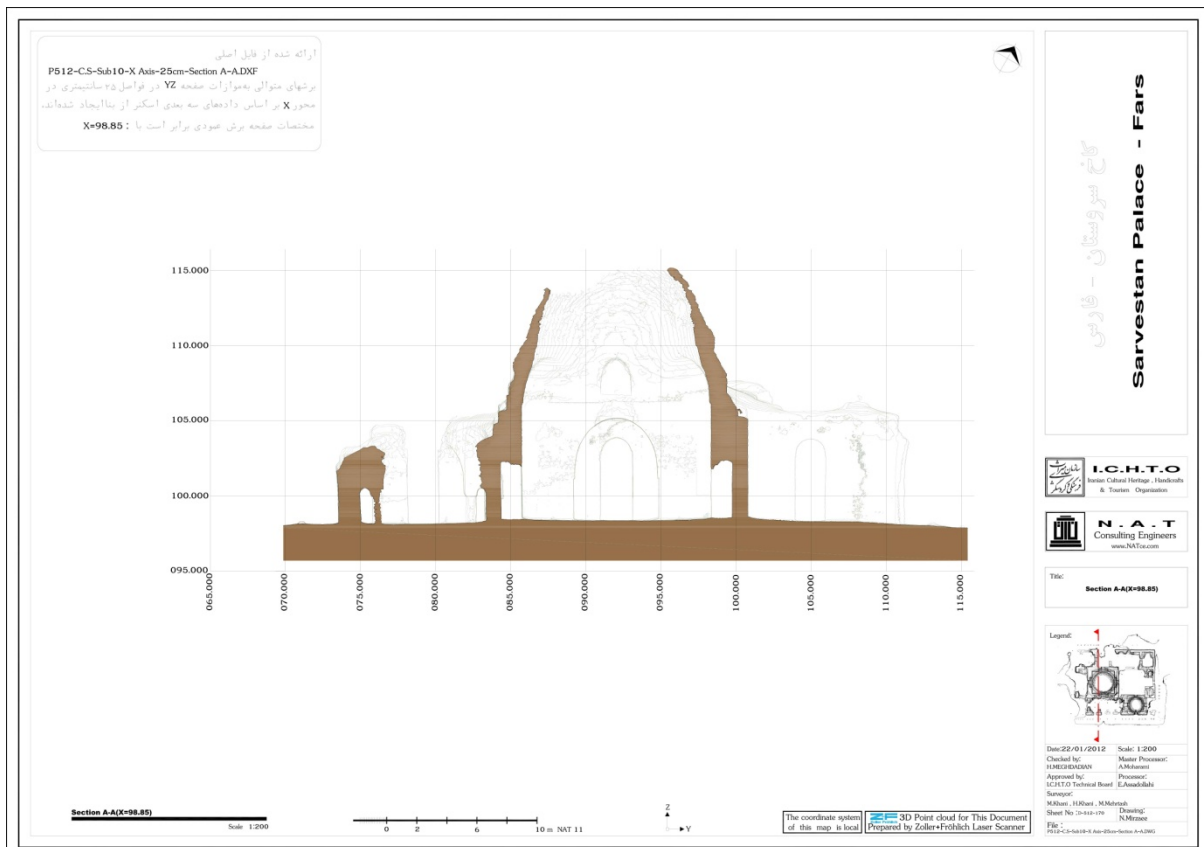


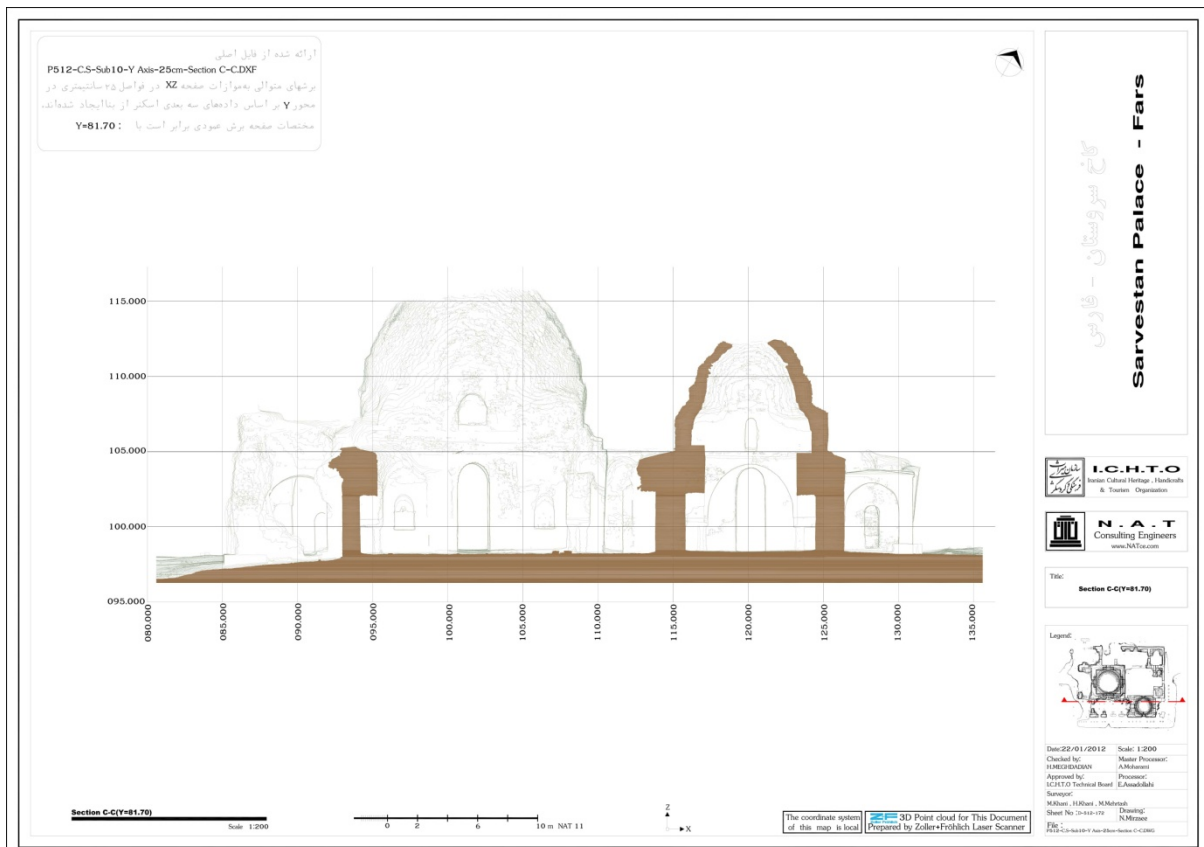
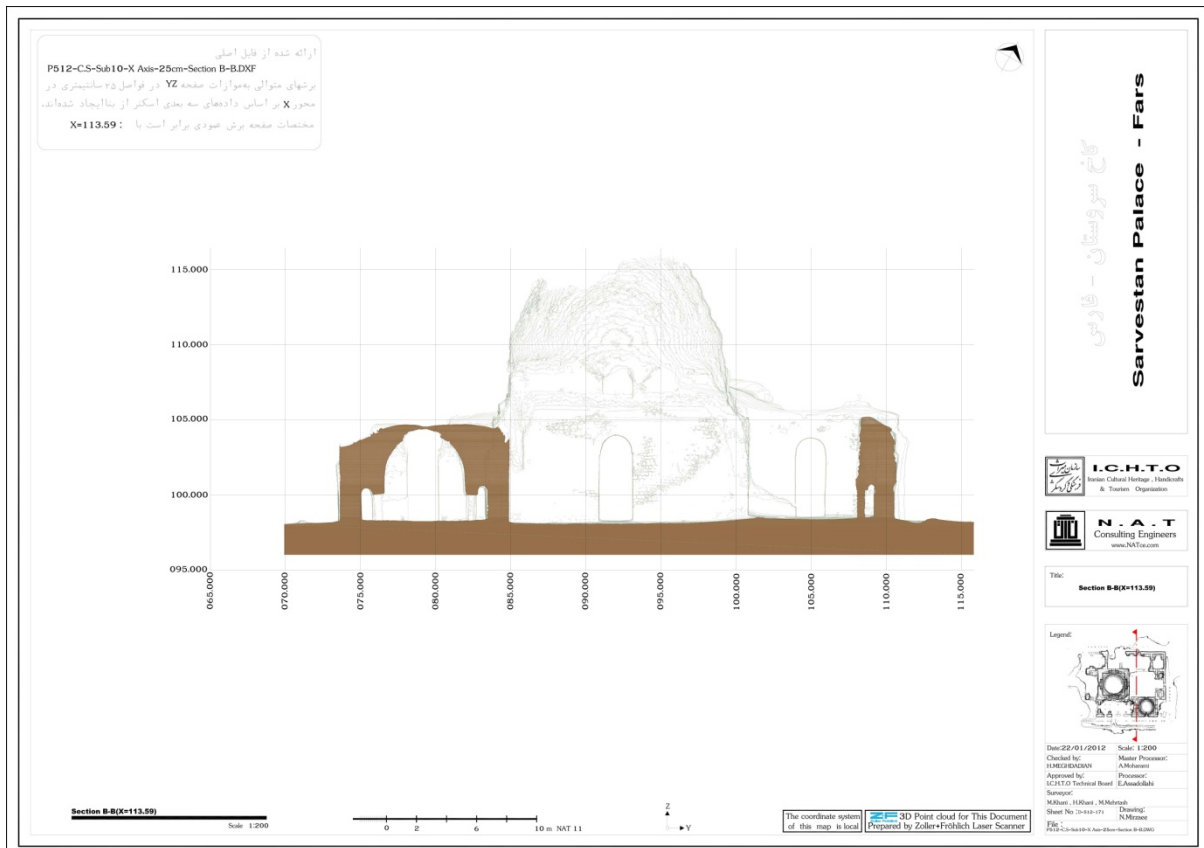


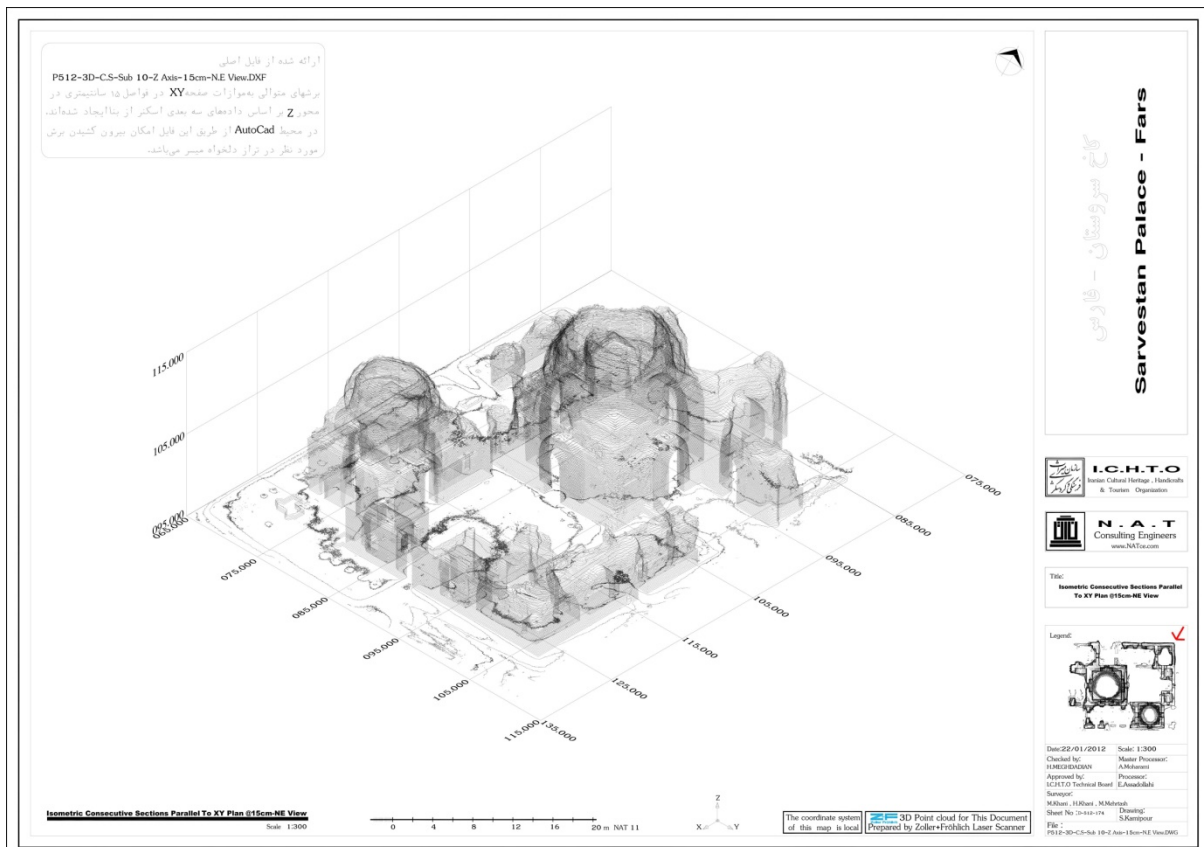


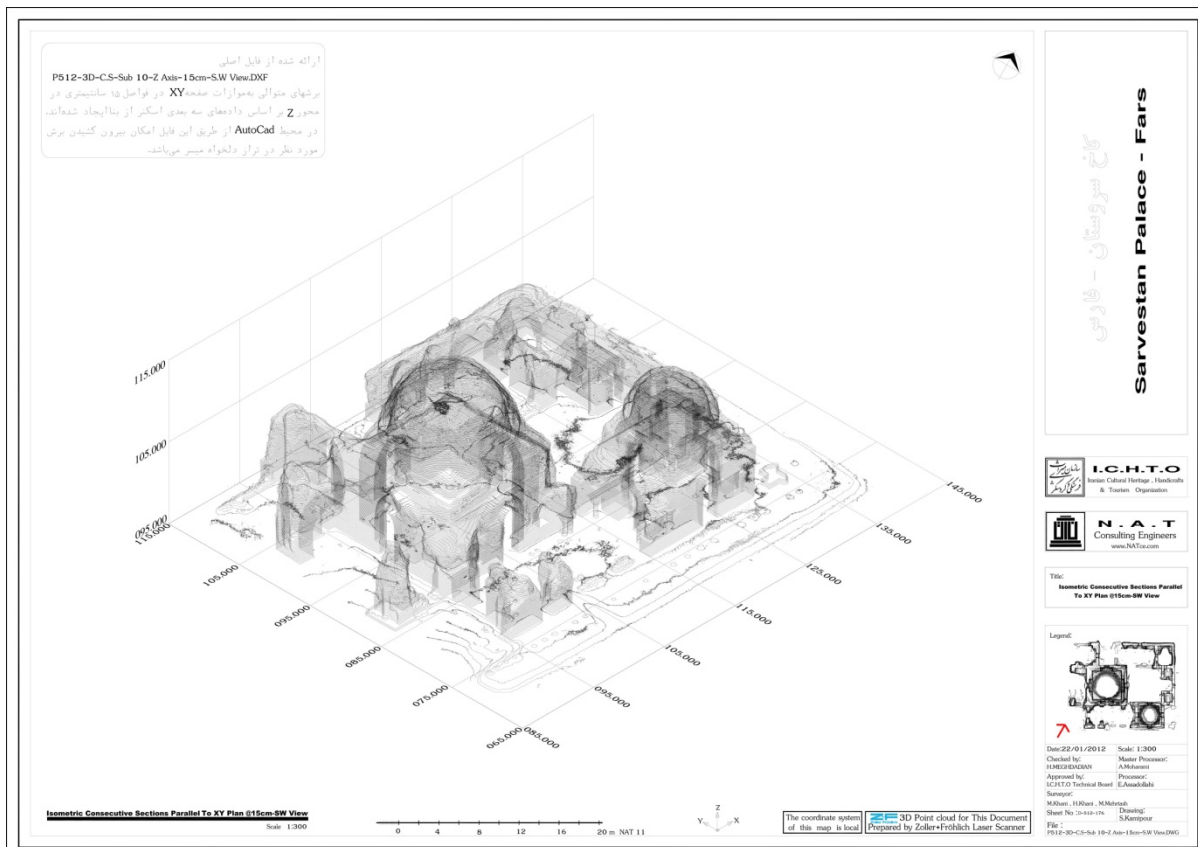
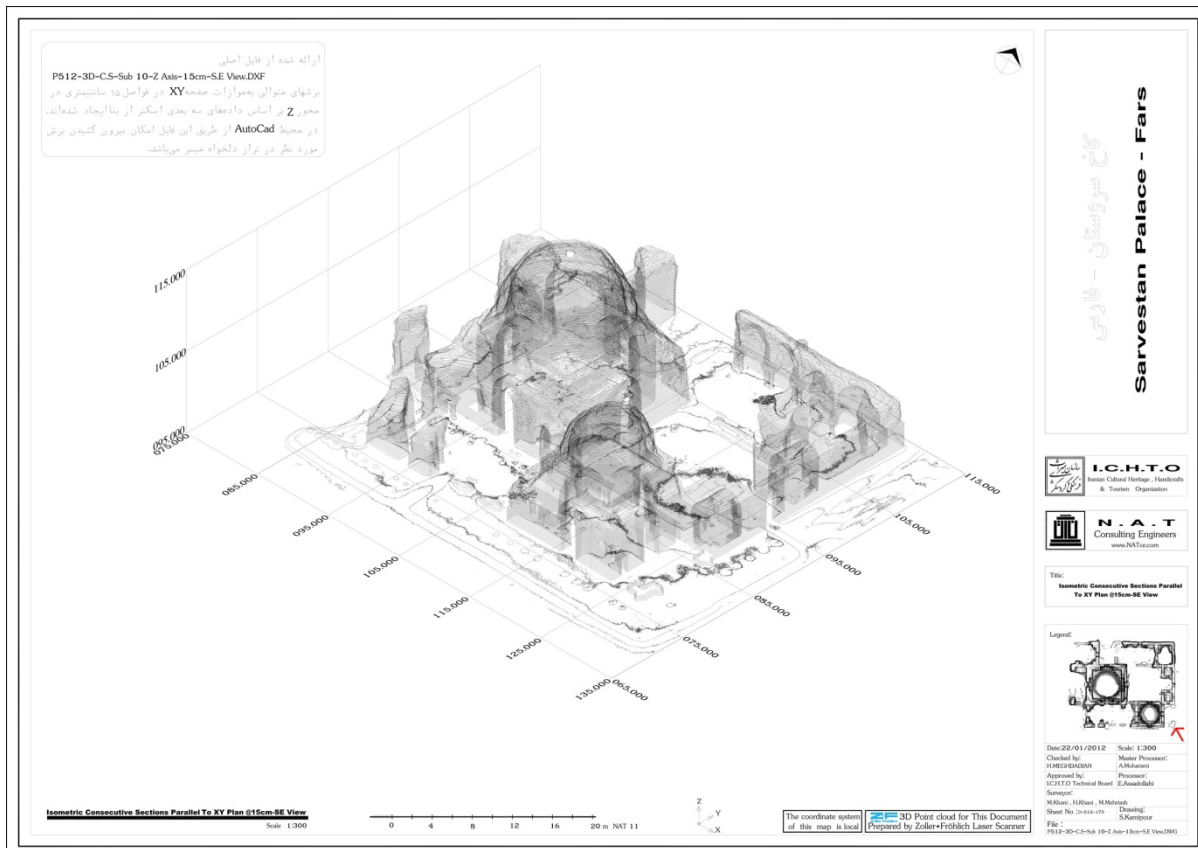


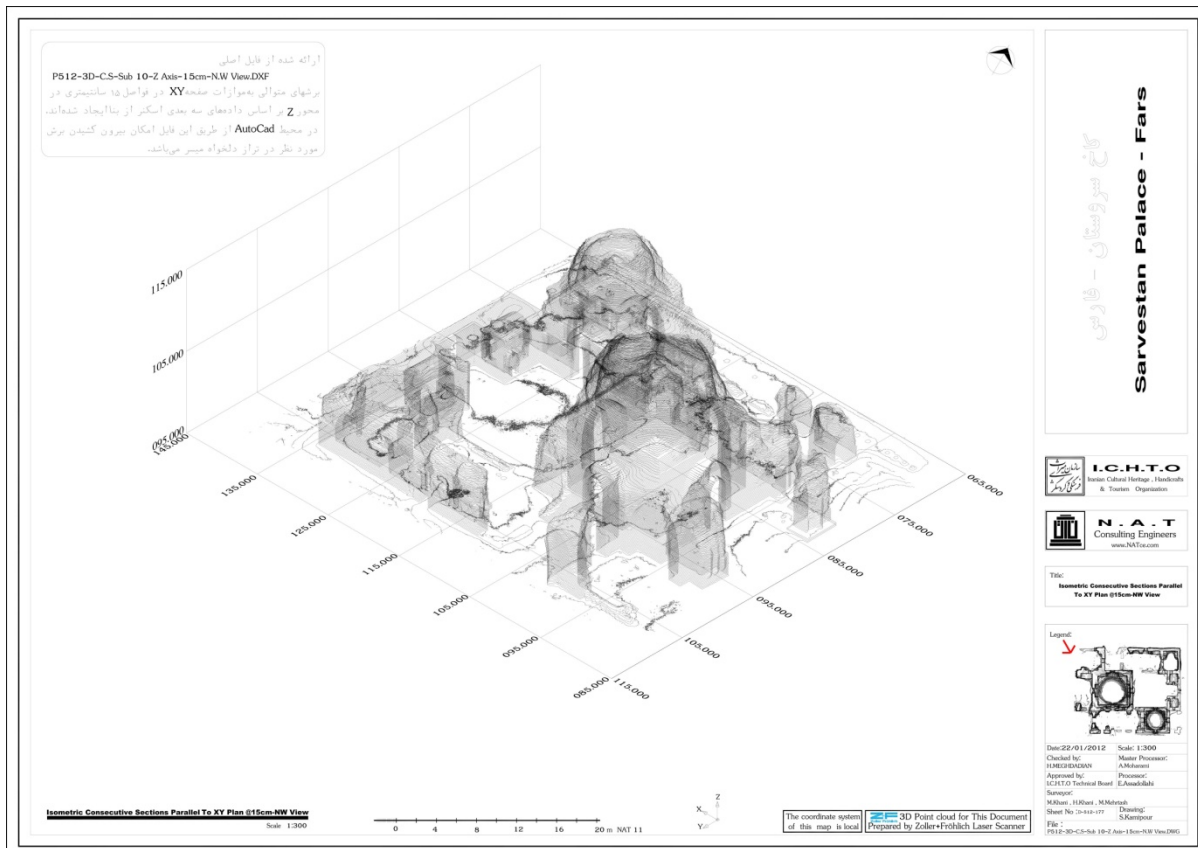


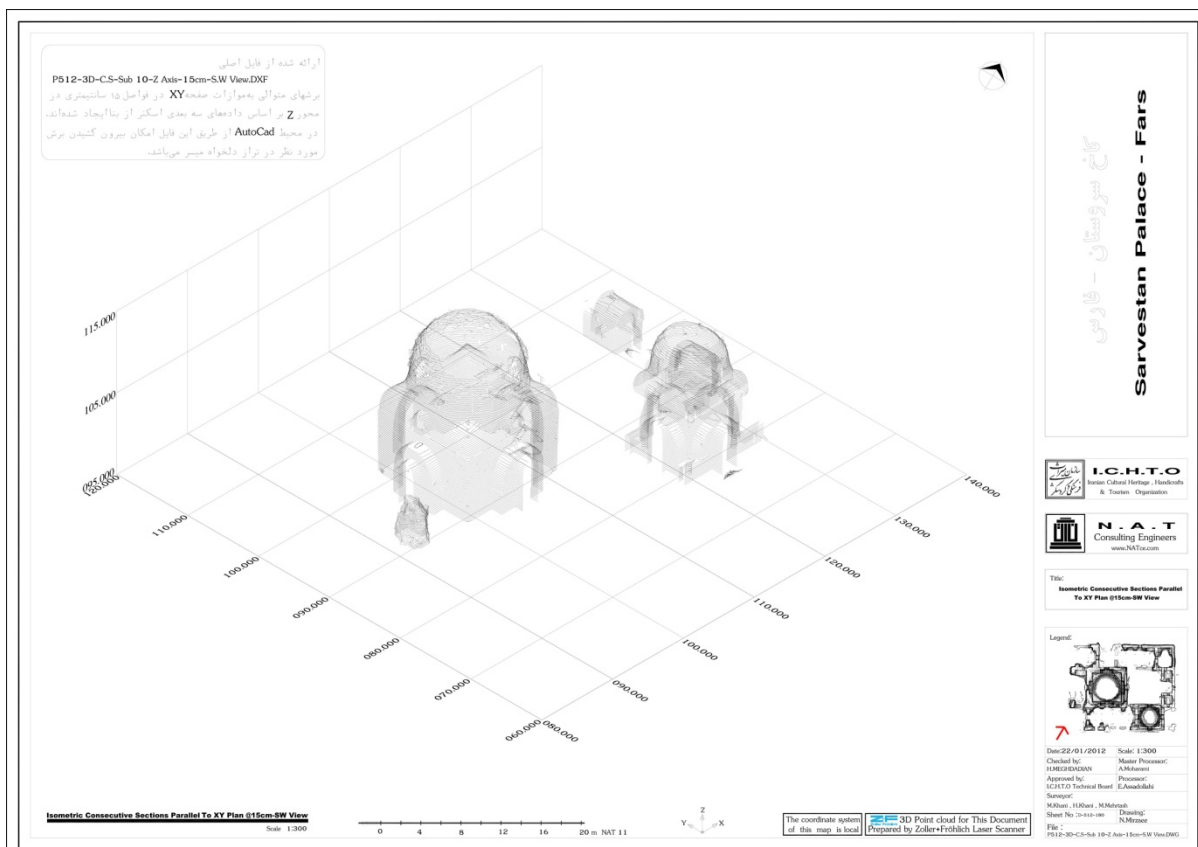
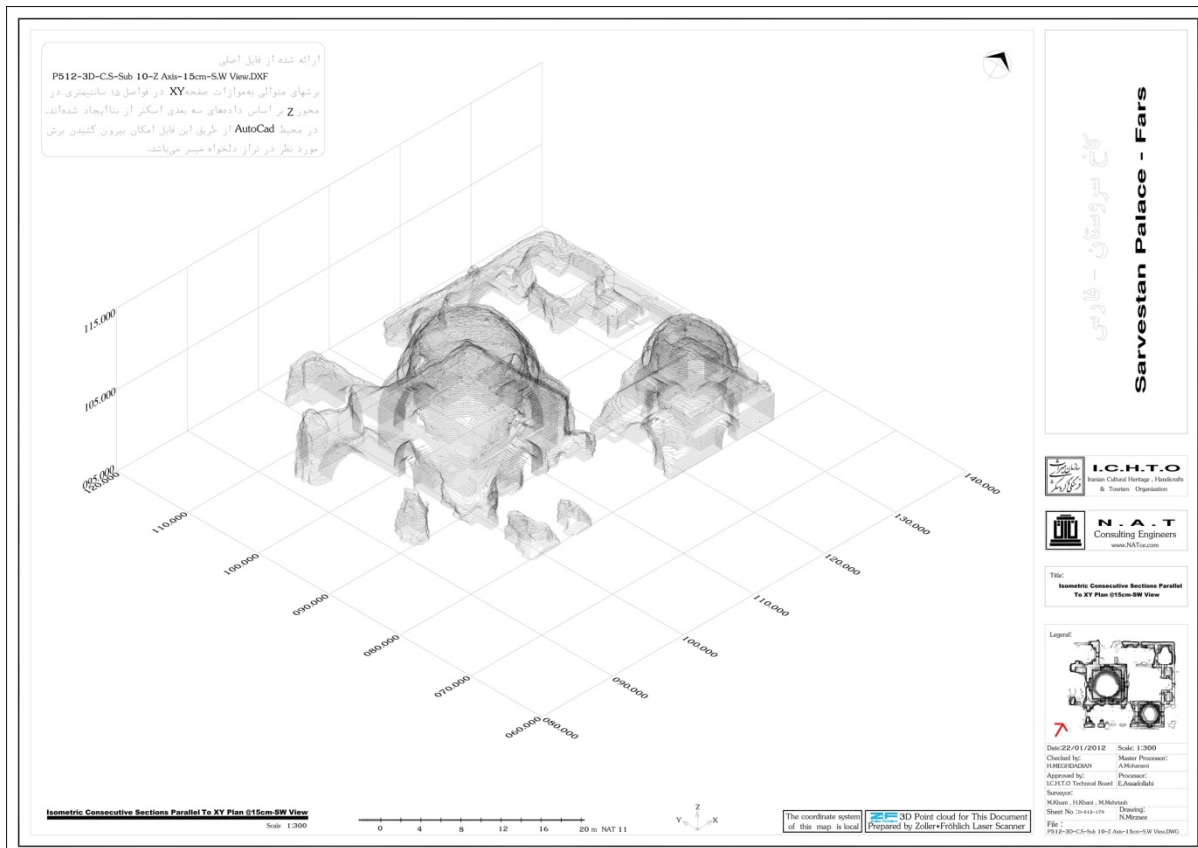


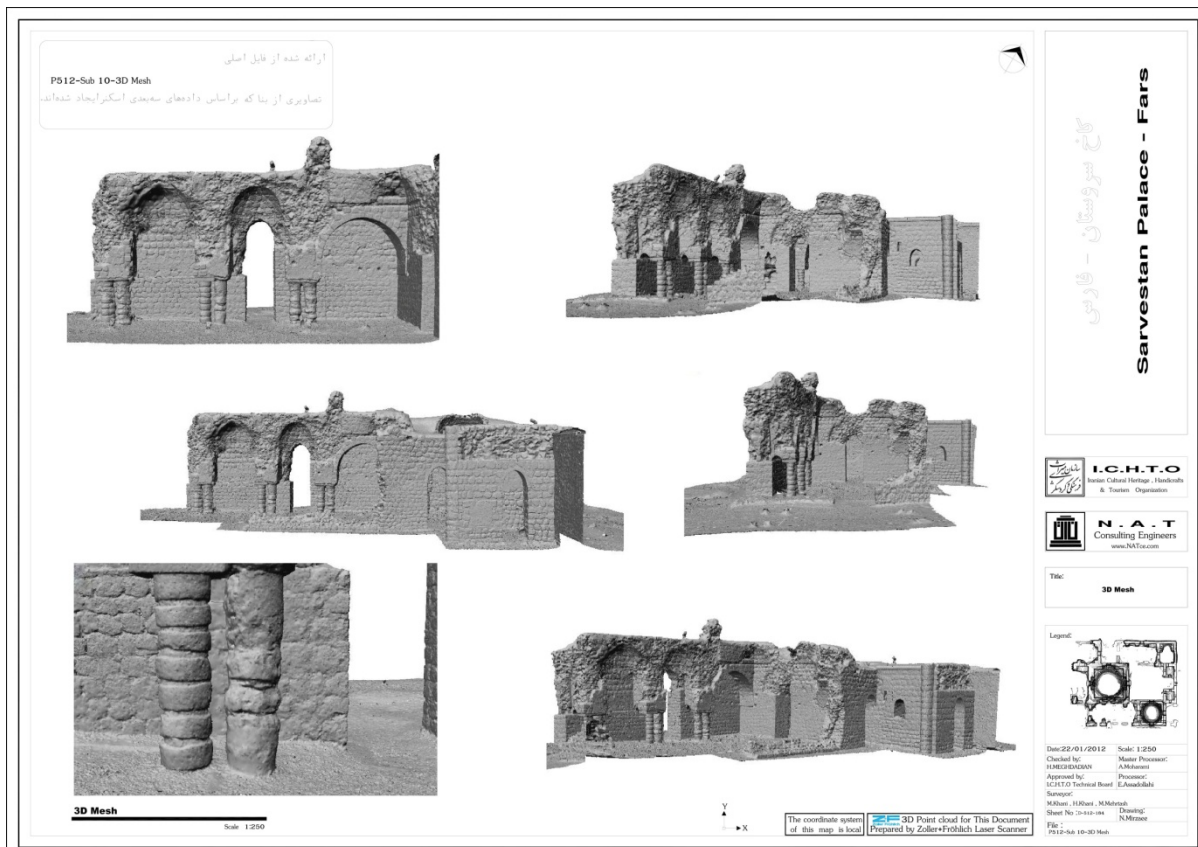


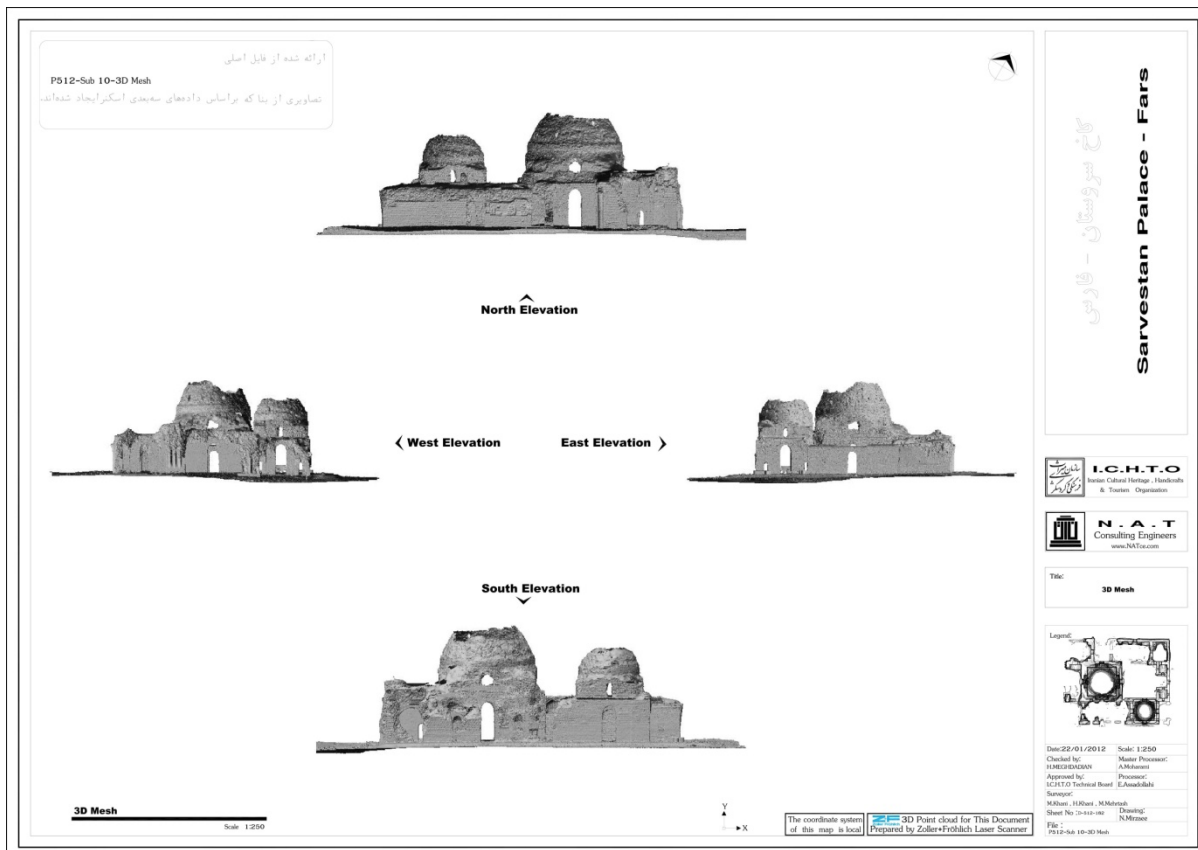


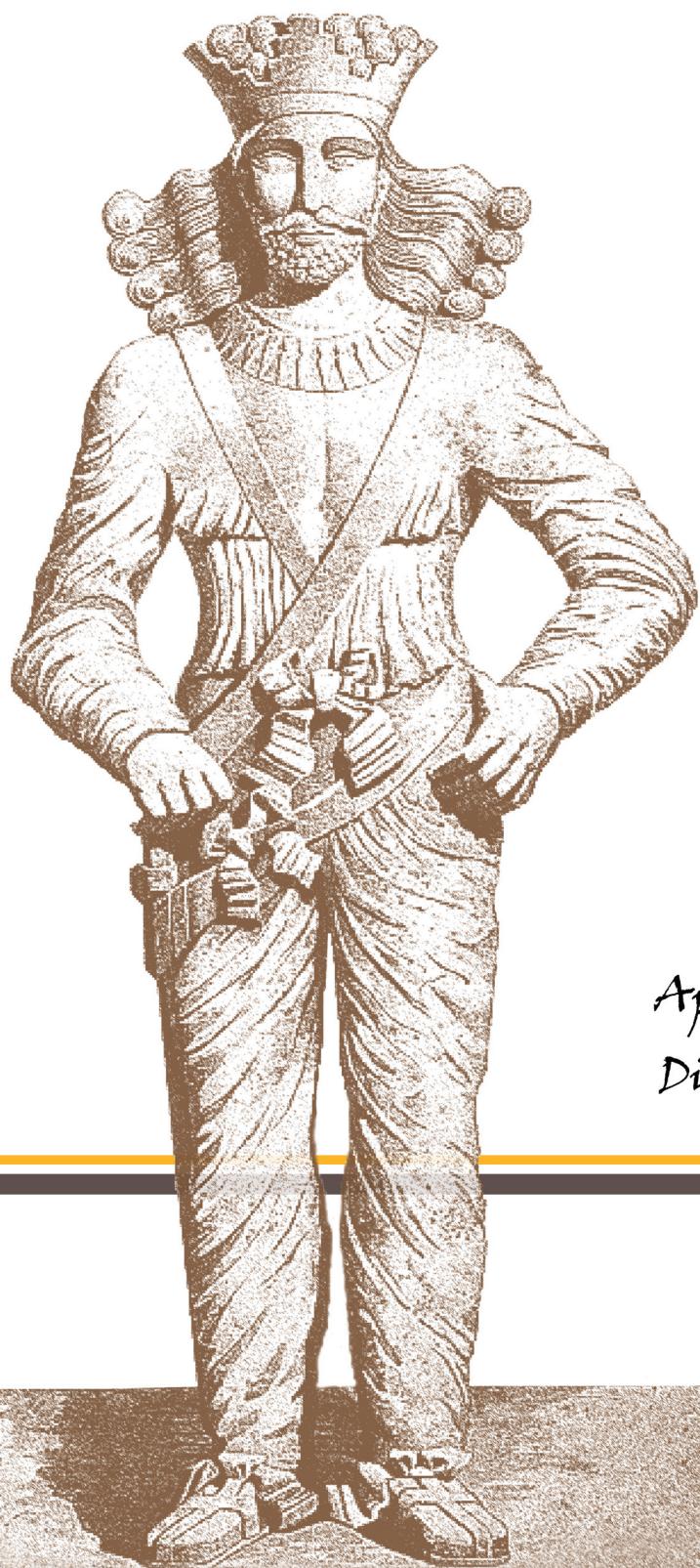












Appendix IV
Digital Archaeological Documentation

Appendix IV:

Digital Archaeological Documentation of Iranian Monuments (DADIM)

Project Proposal

Testing phase: Sassanian Palace of Firuzabad

Rouhollah Shirazi¹, Sandra Heinsch², Walter Kuntner² and Ali Darvishzadeh³

Introduction

The opportunities arising from the fast development in photogrammetry and structure from motion techniques have revolutionised the archaeological documentation especially what concerns 3D modeling and rendering of small finds as well as buildings. The limits of the feasible quite often derive from hardware capabilities or professional expertise rather than ideas and visions.

In the last decade the Department of Ancient Near Eastern Archaeology at the University of Innsbruck, Austria, has intensively invested into the development of cost-effective archaeological documentation strategies both theoretically within the Research Focal Point Scientific Computing⁴ and the Research Centre Digital Humanities⁵, and their practical applicability and usability within international cooperation projects with public institutions and private companies.

The department's employees can put forward a varied and highly professional expertise in archaeological field work research, documentation and cultural heritage salvage from experience through operating in the geographical area of Iran, Iraq, Armenia and Georgia since 1971.

Since 2006 major emphasis was put on the application of Open Source Software and Open Data strategies in Cultural Heritage Domain. In this respect open access policies to science and education yielded best outcomes as no third-party licenses has to be considered for the distribution of the software necessary to visualize and disseminate the digital data. This strategy strongly improved the development of cost-effective digital documentation techniques and concomitantly the vivid exchange of expertise with Open Archaeology communities worldwide.

The University of Sistan and Baluchestan with outstanding experiments on Iranian archaeology and with a good and technical staff also played a major role in the utilisation of new techniques in the field archaeology.

The Archaeology of Iran is outstanding in extent, variety and importance for humankind history. Therefore, its numerous monuments deserve special attention both from a scientific view as well as from the public in general. For the latter the sensitization of the public

1. University of Sistan and Baluchestan

2. University of Innsbruck

3. University of Vienna and OGUF

4. <http://www.uibk.ac.at/scientific-computing>

5. <http://www.uibk.ac.at/fsp-kultur/digital-humanities.html>

interests in Iranian Archaeology is of primary importance to promote successfully future-oriented documentation and conservation strategies and to facilitate a progressive reopening of the immense cultural heritage of Iran to public and especially to tourism. In this respect Open Source and Open Data strategies of dissemination are most advantageous as no political and economic restrictions are encountered.

Description of the project

The project DADIM-Digital Archeological Documentation of Iranian Monuments combines scientific, public and economic aspects of monument documentation, conservation and reconstruction.

The initial phase of the project is intended as a pilot project. The goal is the testing of the technical aspects and their implementation for scientific research and cultural heritage protection.

Within the initial phase the project will focus on the digital archaeological documentation of the Palace of Ardashir Pāpakan in Firuzabad. The Palace of Ardashir is one of the three main architecture complexes of the archaeological site of Firuzabad located 80 km south of Shiraz the capital of Fars province in south-western Iran. The monument measures approximately 118 x 54 m and is oriented to the north-east where it opens through its main *ayvan* on a water source (Fig. 1). The monument dates to the beginning of the reign of king Ardashir (224-239/40 CE), the founder of the Sassanian Empire and of its first capital Gur near modern Firuzabad fortified by a two perfectly circular mud brick walls with an outer diameter of nearly 2 km. The Palace of Ardashir is largely preserved in its original state. Among its original features the dome chambers deserve special mention as they represent the oldest instances for the use of squinches (Fig. 2).

The aims of the pilot project are:

- a) the photogrammetric documentation of the states of preservation and reconstruction of the monument;
- b) the creation of a high-resolution true color geo-referenced 3D model of the monument with an average resolution of 2 cm / pixel completed by a DTM of the archaeological zone with contour lines of 25 cm height;
- c) the creation of a high-resolution true color geo-referenced 3D model of the dome chambers with an average resolution of 1 mm / pixel;
- d) The drawing of the ground plan of the palace.

On the basis of the acquired data and of the 3D model it will be possible to walk through, rotate and zoom in and out and to draw plans, views and cross sections of the monument or of specific architectonic details from any visual angle and in any scale in its original state or alternatively completed by a suggested reconstruction. Thus, the model will provide a detailed architectural documentation as basis for future site monitoring and construction planning both for scientific research as well as monument preservation, reconstruction and maintenance.



Fig. 1: View on the main *ayvan* room (1) of the Ardashir Palace.

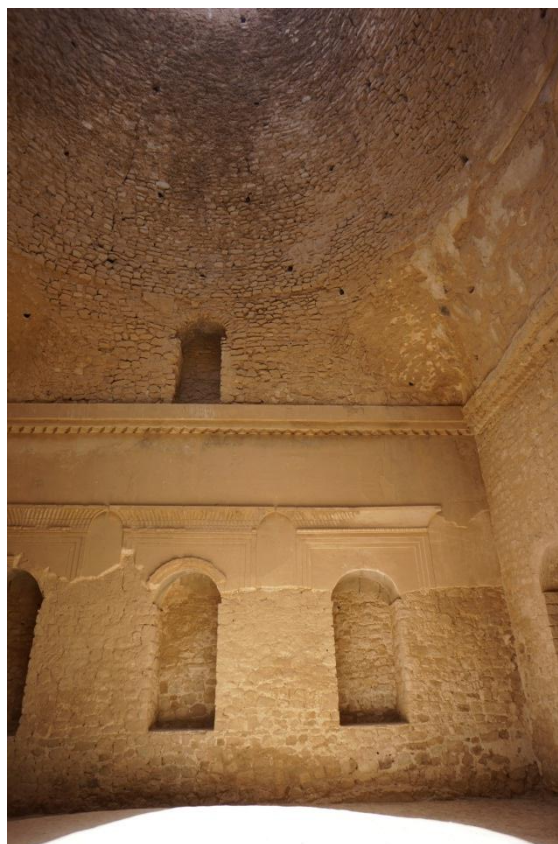


Fig. 2: Squinches in the northern dome chamber (8) with originally preserved stucco decoration and niches of the 3rd century CE.

Methodology

The project is based on three main working processes: first, the documentation consisting of the measurement of the complex and its surroundings with total station and GPS and the terrestrial and aerial photographic data acquisition (raw data), secondly, data processing encompassing the creation of a 3D model, and thirdly, data visualisation encompassing the rendering and scientific virtual reconstruction of the monument and data publication of the result as well as the raw and processed data in an open web-accessible database.

Documentation

First, the Palace of Ardashir will be measured with total station and GPS in order to set several control points with UTM coordinates. The control points are needed to geo-referenced the photos of the next documentation process, the data acquisition.

The data acquisition consists itself of three steps. In the first step all interior and exterior wall façades of the palace will be photographed in such a way that the photos will constantly overlap at least to 90 % to each other. Each wall will, moreover, be photographed in different vertical inclinations. Because of the height of the walls and storeys it is suggested that no more than three series will be necessary for each façade. By a supposed façade length of 50 m approximately 100 photos will be necessary for each series. Thus, in sum for each façade between 200 and 300 photos have to be taken.

The second step encompassed the aerial photographic documentation. For this step a drone (Hexacopter) will be applied to document both the palace complex from above as well as its immediate surroundings in order to generate a digital elevation model (DEM) of the area inside as well as outside the palace within a radius of approximately 50 m.

The third step encompasses, finally, the highly detailed documentation of the dome chambers of the palace of Ardashir and other complex architecture features by combining both techniques of terrestrial and aerial photographic documentation in order to improve the resolution of the architectural structures up to 1 mm/pixel or higher, if required.

The technical equipment for the measurement consists of a Trimble Total Station 3605DR with CU Controller and of a Trimble 5700 GPS-System. For the aerial photographic documentation the Hexacopter Naza-M V2 equipped with a Sony Alpha 6000 and for the terrestrial documentation a Nikon D800 will be used.

Data processing

A preliminary data processing will be performed on the site of Firuzabad in order to control the quality and correctness of the data acquisition. The final data processing will be performed at the Innsbruck University within the Research Focal Point Scientific Computing. Here are stored two of Europe's leading supercomputers LEO III and MACH.

LEO3 is the latest high performance compute cluster of the Focal Point Scientific Computing at the University of Innsbruck. It consists of 1944 Intel Xeon (Gulftown) compute cores and is equipped with 24GB RAM per node, i.e., about 4TB of main memory altogether. The nodes and GPFS storage system are joined by a 40Gb/s Infiniband high speed interconnect.

In addition, three of the nodes are equipped with NVidia Tesla M2090 graphics cards and 48 GB of main memory.⁶

MACH represents the first high performance computing system of the Austrian Center for Scientific Computing (ACSC) and is a collaborative effort of the Universities of Innsbruck and Linz. It comprises one large shared memory system with 2048 Intel Xeon (Westmere) cores and is equipped with an overall of 16 TB of main memory. The nodes are joined by SGI's NUMA link 5 interconnect.⁷

These engines ensure to get the maximum output of the data and to transform the cloud of points to a narrow textured mesh in markedly lesser time than with any commercial personal computer or workstation. Moreover, the big amount of data, presumably several Gigabyte, will highly surpass the capabilities of such computers. Only by the use of a supercomputer it will be possible to merge the façades, aerial views, DEM and dome chamber to one final 3D true-color geo-referenced model with an average resolution of minimum 2 mm/pixel.

The photogrammetric process will be performed by the combined use of MICMAC and open MVG, and meshing and texturing by the use of Mesh Lab and Cloud Compare. The software is distributed as Open Source. The geo-referenced photos will be processed with the photogrammetric software MICMAC, open MVG and Python Photogrammetry Toolbox to create a cloud of several thousands of points (Fig.3). The cloud is further processed with Mesh Lab and Cloud Compare by connecting the points with a mesh in order to generate a surface (Fig.4). Finally the color information of the geo-referenced photos is textured with Mesh Lab onto the mesh surface to create a high-resolution true color geo-referenced 3D model (Fig.5). Afterwards the textured meshes can be linked to each other thanks to their geo-referenced to a single 3D model and the edges cleaned (Fig.6).

Data Visualisation and Publication

The rendering of the high-resolution true colour geo-referenced 3D model will be implemented with POV-Ray.



Fig. 3: Case example of a cloud of points

6. <http://www.uibk.ac.at/zid/systeme/hpc-systeme/leo3/>

7. <http://www.uibk.ac.at/zid/systeme/hpc-systeme/mach/>

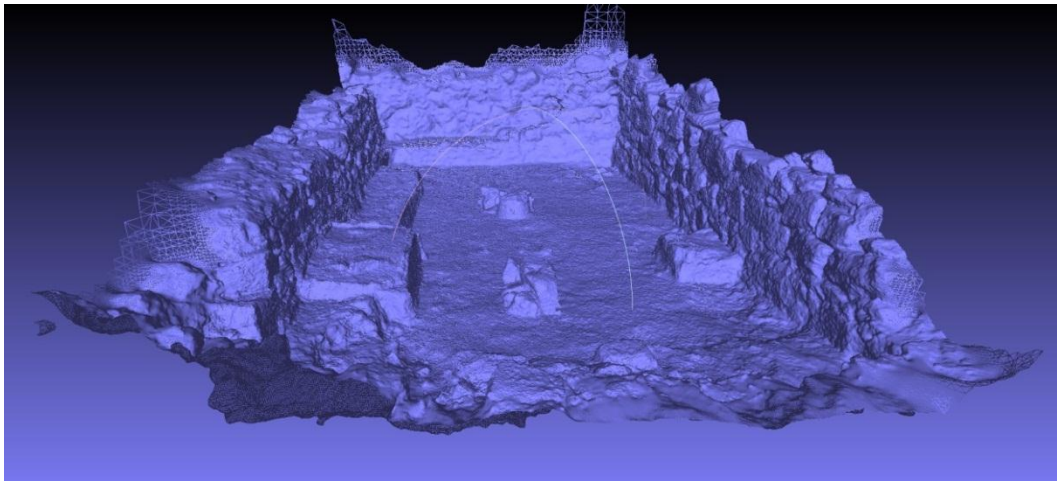


Fig. 4: Case example of a mesh

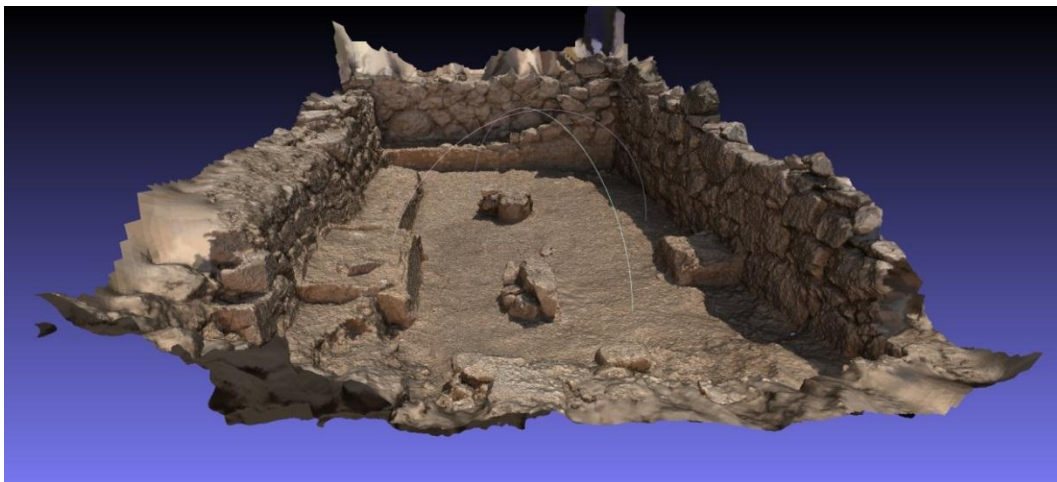


Fig. 5: Case example of a textured mesh

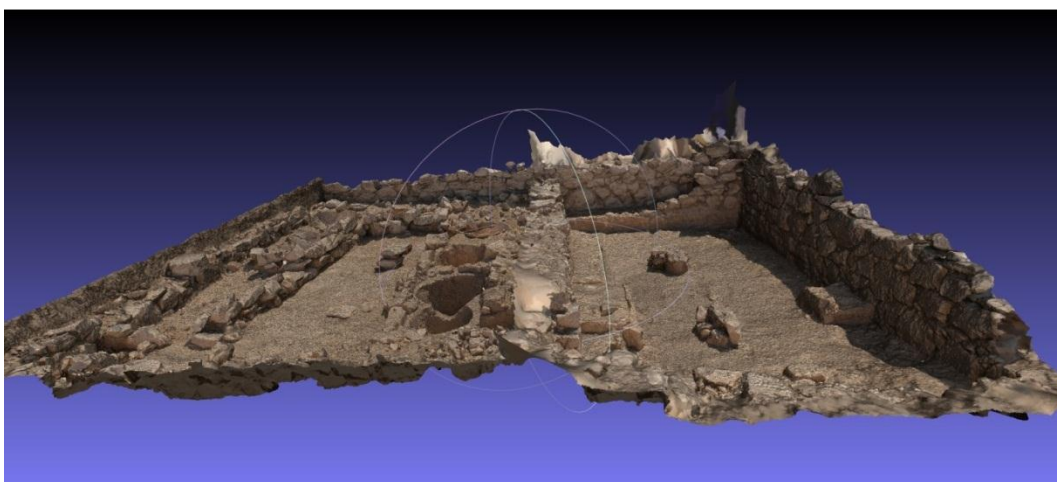


Fig. 6: Case example of a mosaic of two textured meshes

The raw data as well as the finished high resolution true-color geo-referenced 3D model will be stored on the servers of the University of Innsbruck. A digital copy of both raw data and 3D model will be delivered to ICHHTO.

The very fast upload and download rates of the Internet provider services of the University of Innsbruck can guaranty the visualisation of the model on the World Wide Web. The model will be uploaded and disseminated via a platform with scale-dependent rendering (for instance Google Earth) in order to avoid loss of data information. The degree of open data accessibility can easily be regulated by server settings. The open distribution will highly improve, however, the public awareness and appreciation of Iranian monuments and its importance. All stages of the project will be entered into an open web-accessible database encompassing the access to the scale-dependent rendering of the 3D model, the scientific description of the Palace of Ardashir and finally, a video tutorial explaining all the processes of the pilot project: from the data acquisition to its publication in the database.

Innovative aspects

A high-resolution true color geo-referenced 3D model represents the most accurate method of non-invasive archaeological monument documentation for scientific research and cultural heritage protection.

The results will generate a comprehensive architectural template and scientific guidance for the reconstruction and maintenance of the monument. Public advertisement with educational information will help to promote cultural heritage awareness and tourism. In this regard the digital archaeological documentation and the high resolution true colored geo-referenced 3D model of the Palace of Ardashir Pāpakan in Firuzabad will provide the scientific dossier for the proposal of the Iranian authorities to put this monument on the UNESCO World Heritage list.

One of the most innovative aspects is, however, the linkage of archaeological research and cultural heritage on an economic level in particular with the construction and tourism sectors. The 3D model will offer a scientific base for future projects of monument protection, conservation and reconstruction as well as to stimulate the awareness of cultural heritage in Iran by educational advertisement and by promoting tourism. In this respect the project will benefit from the planned cooperation of the Department of Ancient Near Eastern Archaeology in the newly established Research Centre “Tourismus und Freizeit” at the University of Innsbruck.⁸

Monument protection and conservation

The documentation of the monument and its environment by geo-referenced 3D models generated at regular intervals will help to document the process of decay due to erosion and gravity and will help to better assess the urgency and location for measures of monument protection. By comparing the surfaces of each 3D model the computer can calculate the mass/height difference in the elapsed time and help in monitoring the fissures in the masonry. Moreover, this technique can provide a comprehensive basis to calculate the danger by future erosion.

8. <http://www.uibk.ac.at/forschung/profilbildung/forschungszentrum-tourismus-und-freizeit.html>

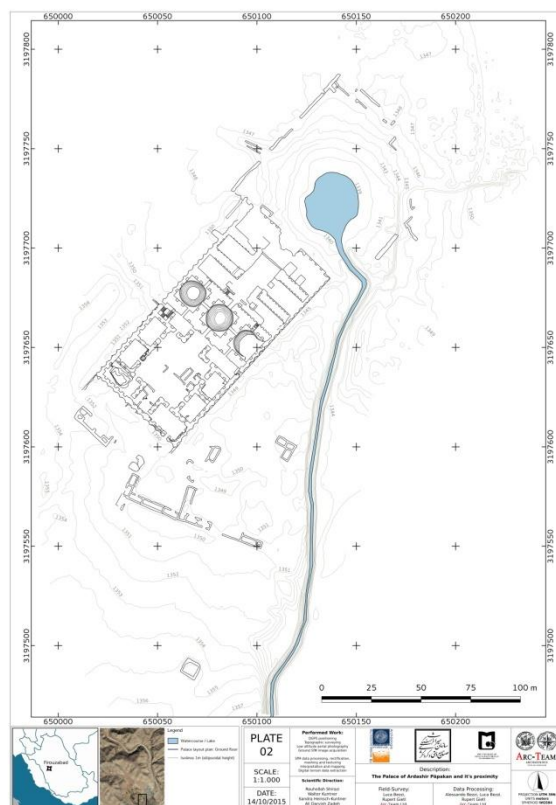
Monument reconstruction

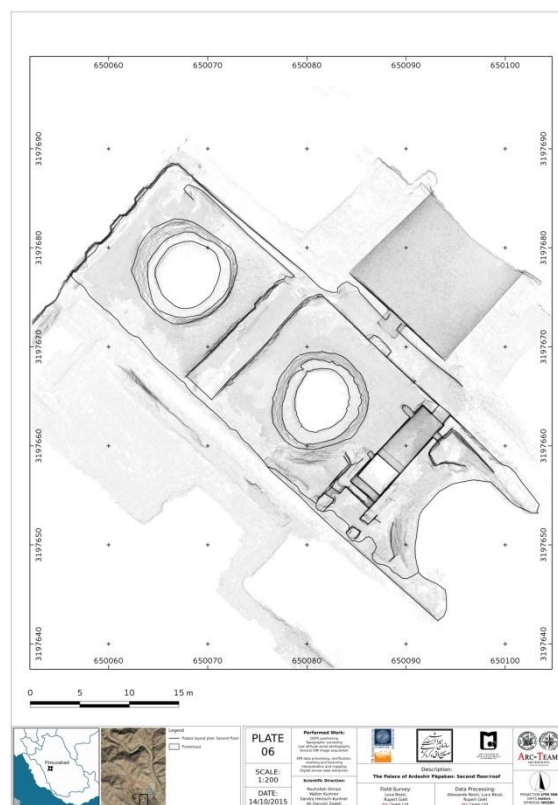
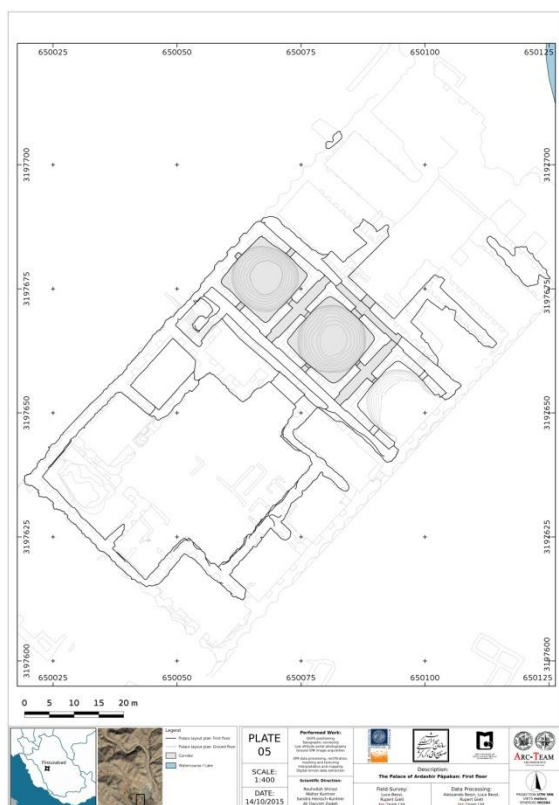
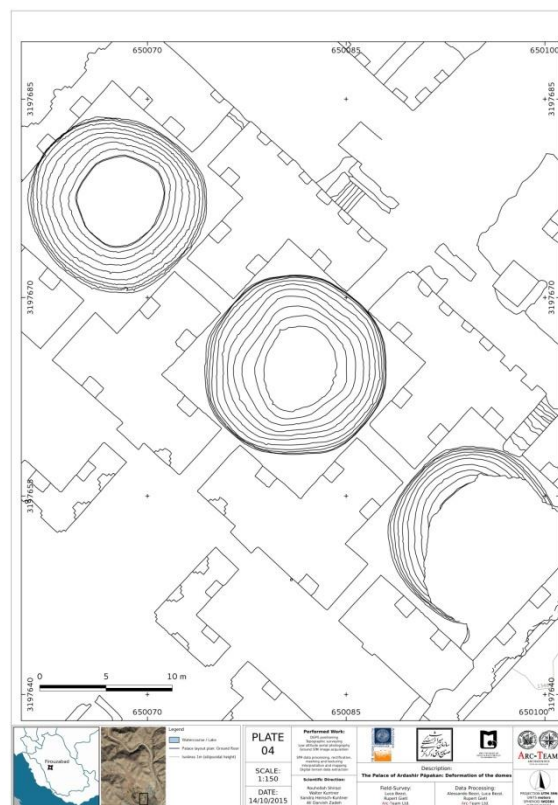
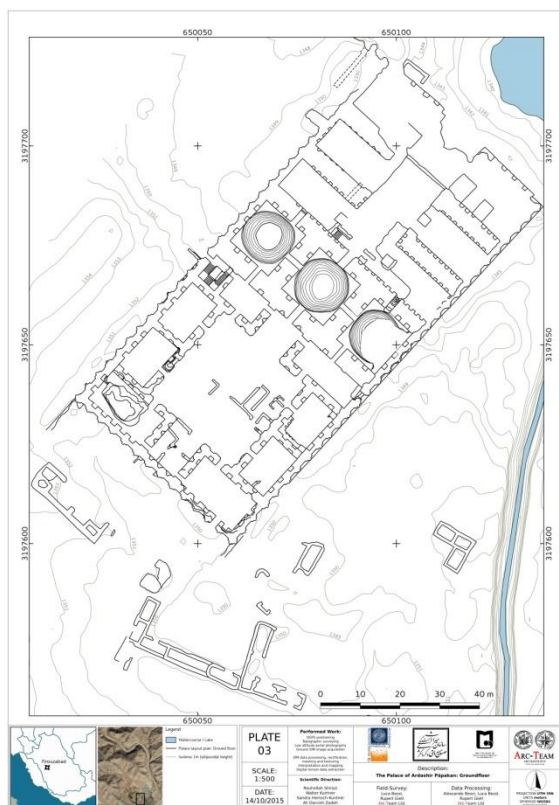
The scientific investigation within the DADIM project aims to link scientific archaeological research with both the construction sector and tourism. The archaeologically based reconstruction of the monument can be used both as a virtual 3D model for a more comprehensive visualisation and publication of the monument in the database as well as basis to plan future reconstructions of the monument. The accuracy of a true color geo-referenced 3D model enables to draw professional architectural plans (for example CAD) and views of the monument. Combined with the information achieved within the monitoring and the scientific documentation of the site the collected data can be used as reliable basis for both planning and expense budgeting of future restoration/conservation and reconstruction works of the monument as well as archaeological excavations.

Stuff:

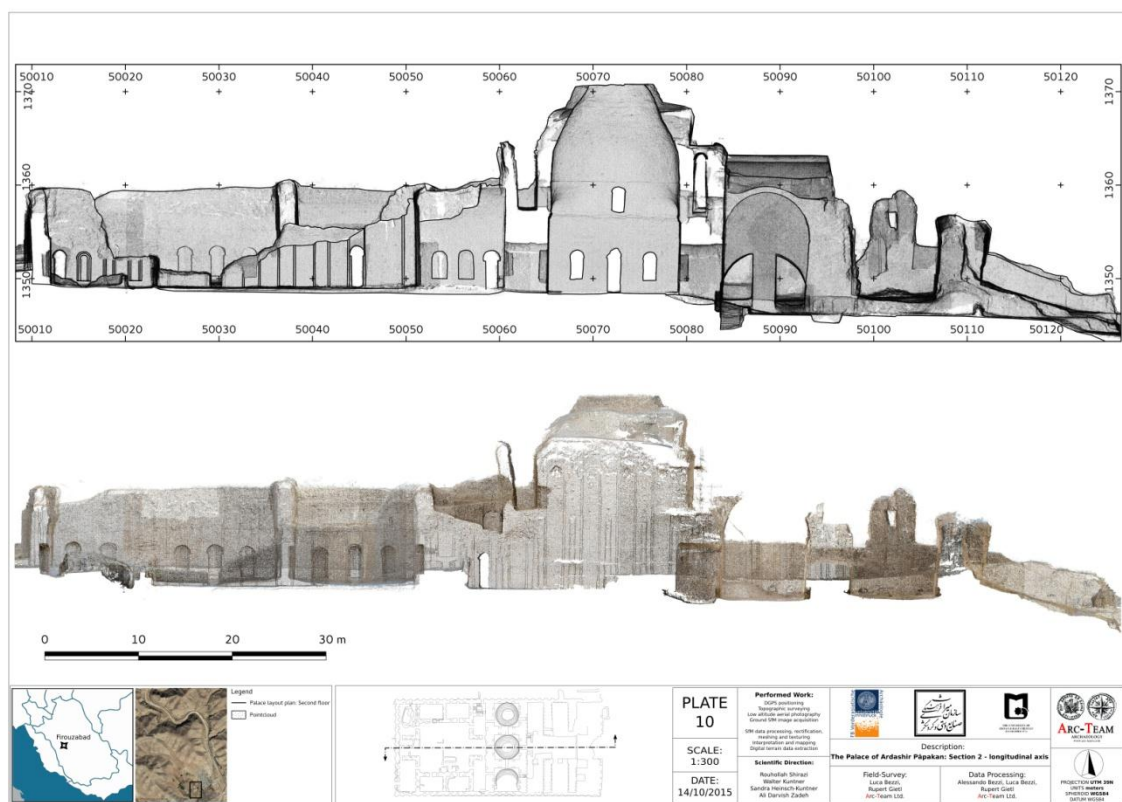
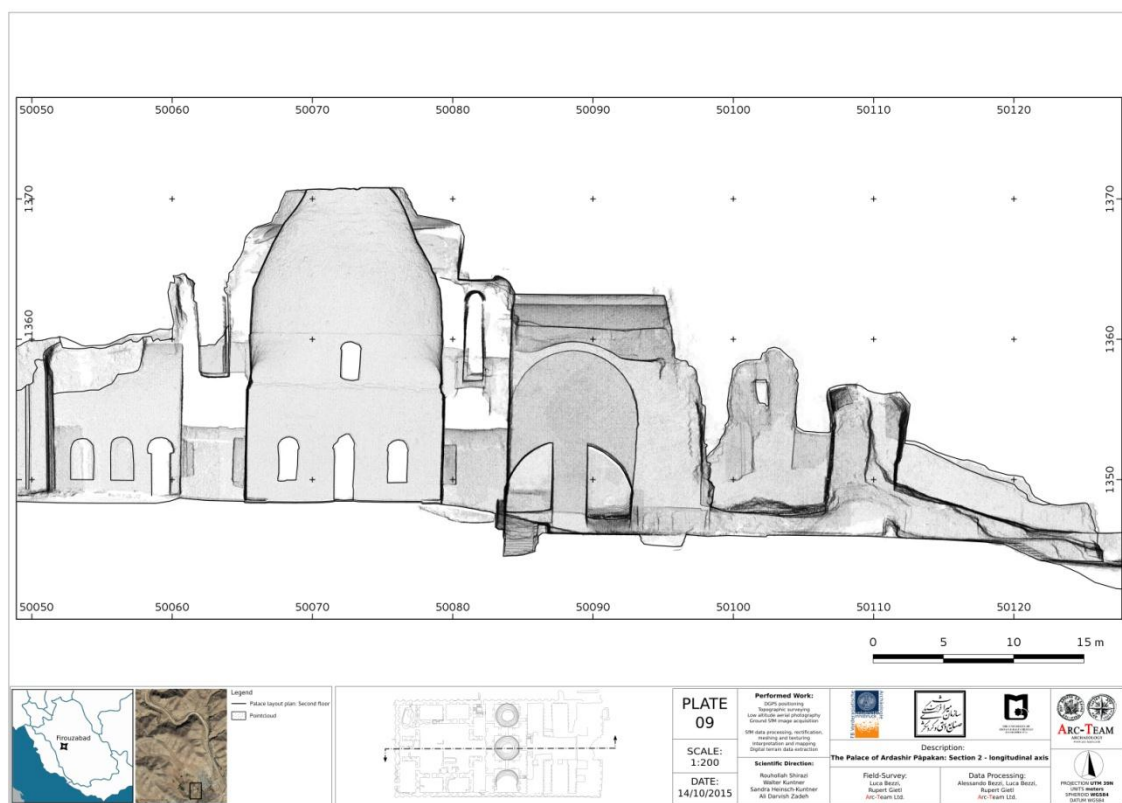
The stuff will consists in addition to the abovementioned project proposer of four persons:

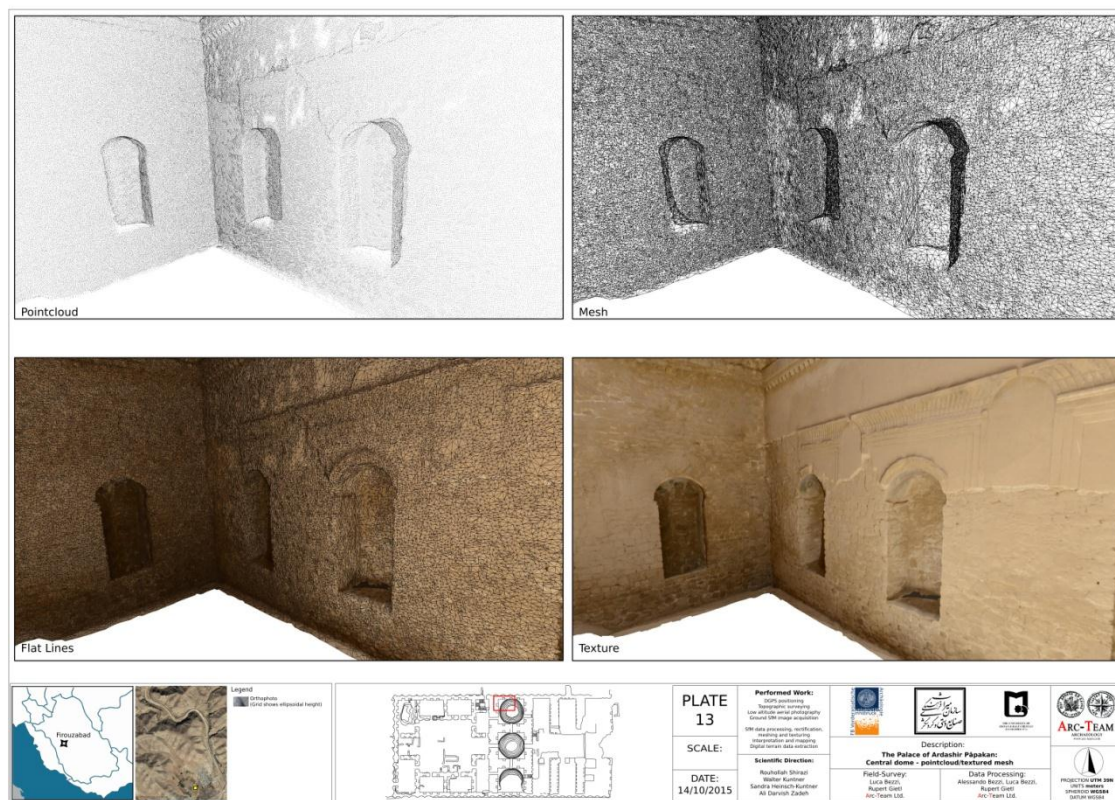
1. terrestrial and aerial Photographer (Rupert Gietl and Luca Bezzi, Arc-Team)
2. Data Processor
3. Data Visualisator

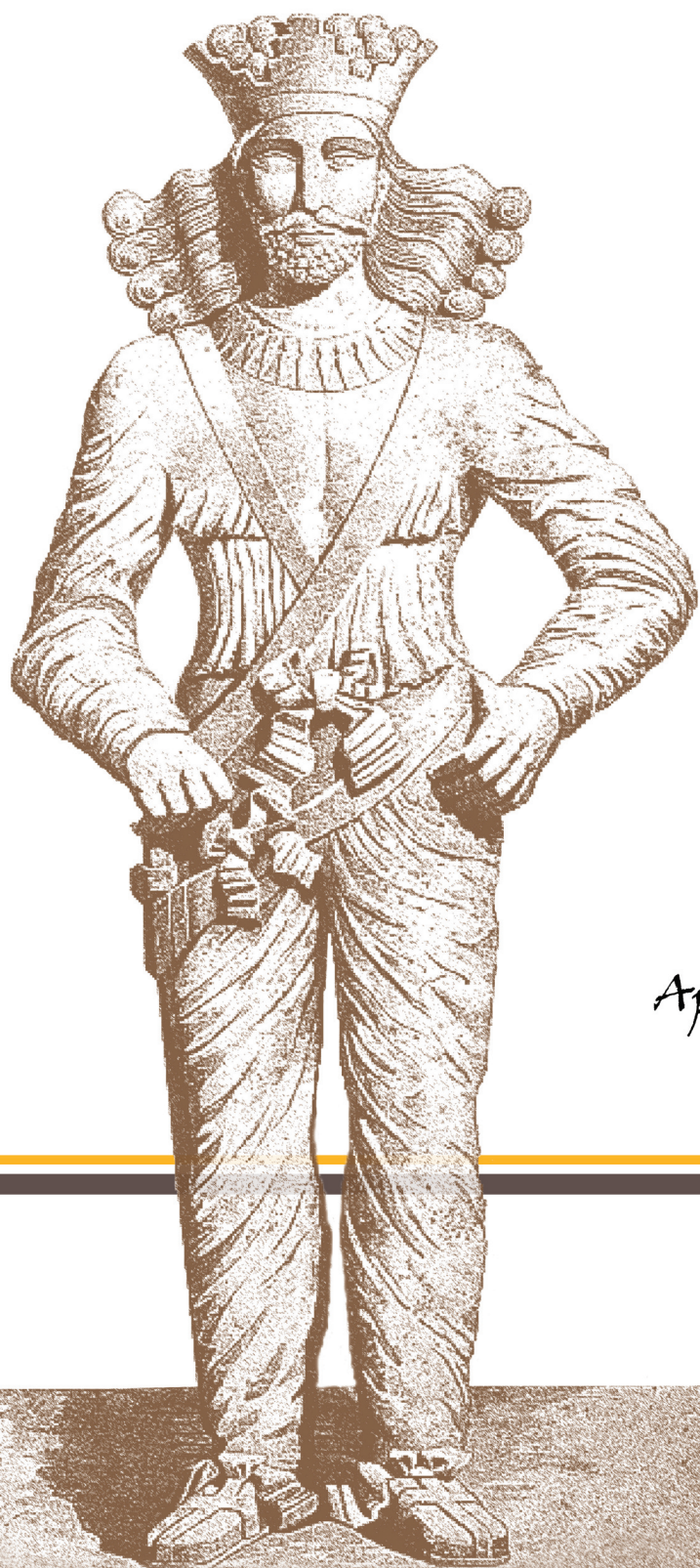












Appendix V

Conservation Documents

Appendix V:

A summary sample of detailed reports of Sassanid archeological landscape's conservational proceedings

Qal'eh Dokhtar**1974 to 1978**

- Conservation and restoration:
- Consolidation of some courtyard wall buttresses and the eastern body of the porch;
- *Kah-gel* covering of the roof;
- Critical restoration of the dome and tower;
- Preparation and assembling of a structural strip and executing conservation in Qal'eh Dokhtar.
- Archeological excavation, researching and studying;
- Photogrammetry;
- Installing a suspended cable car system;
- Utilization of the workshop, Laboratory and base.

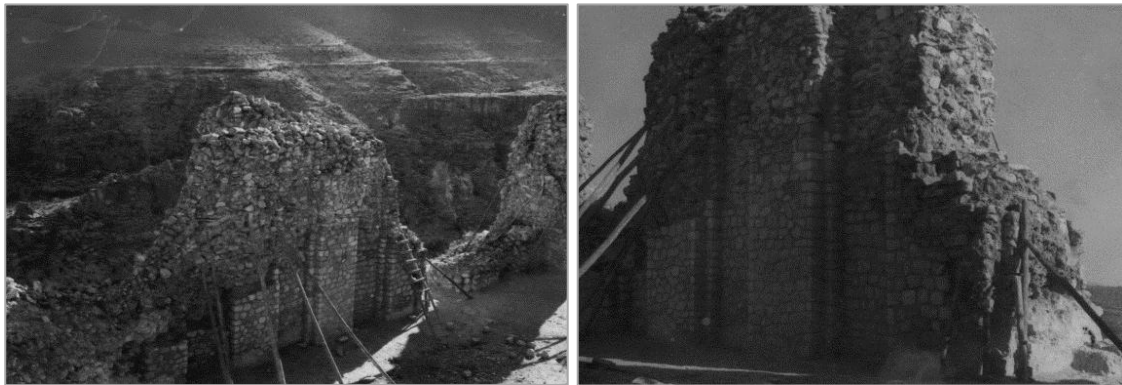


Photo 1. Placing Buttresses on walls

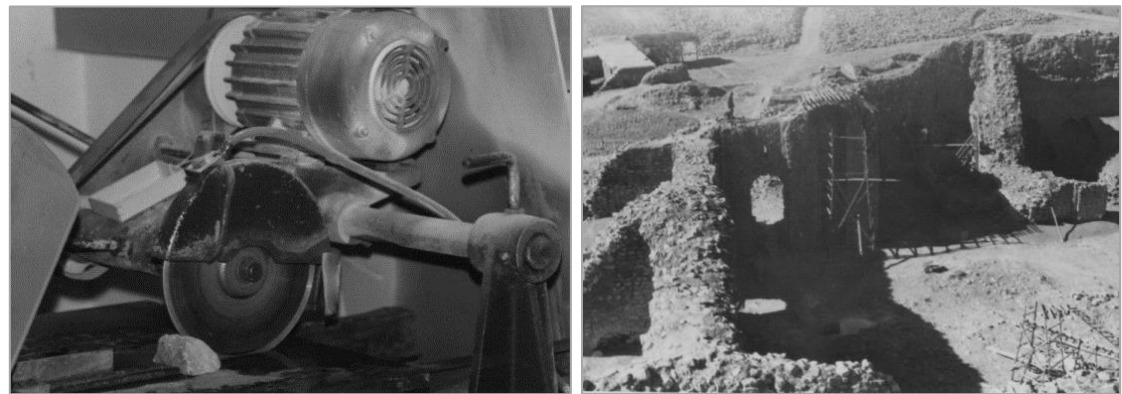
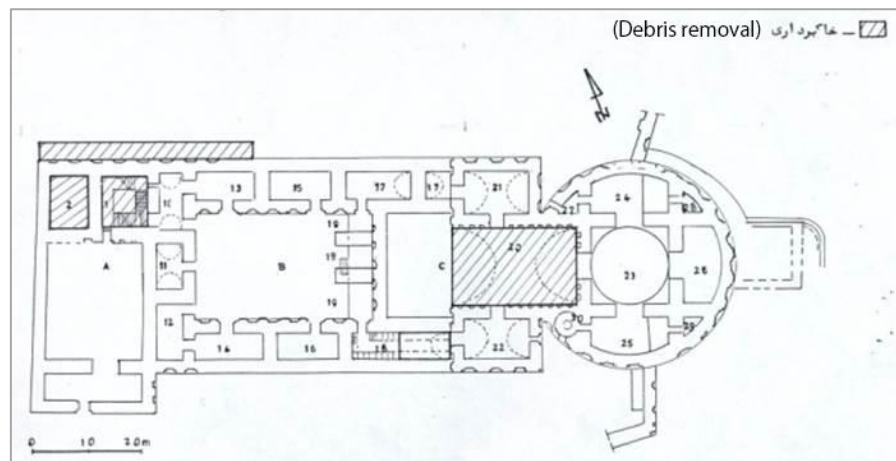


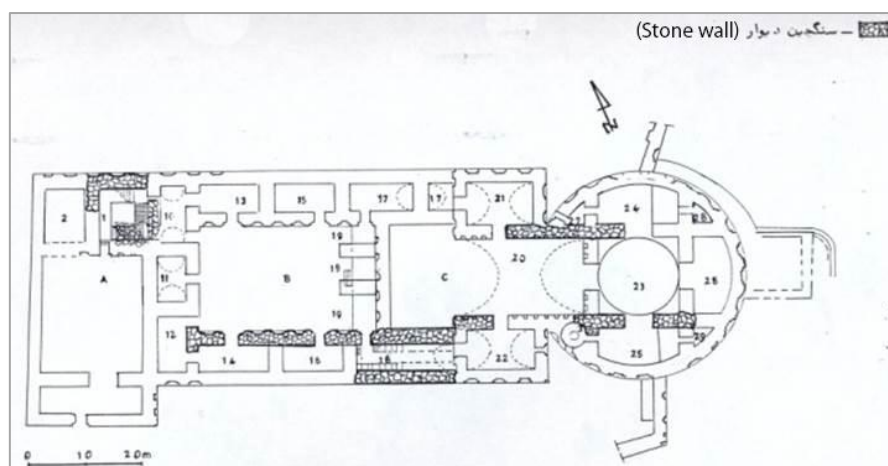
Photo 2. Right: Utilization of the workshop and Laboratory, year 1975. Left: Restoration of fort walls 1978 to 1983

1978 to 1983

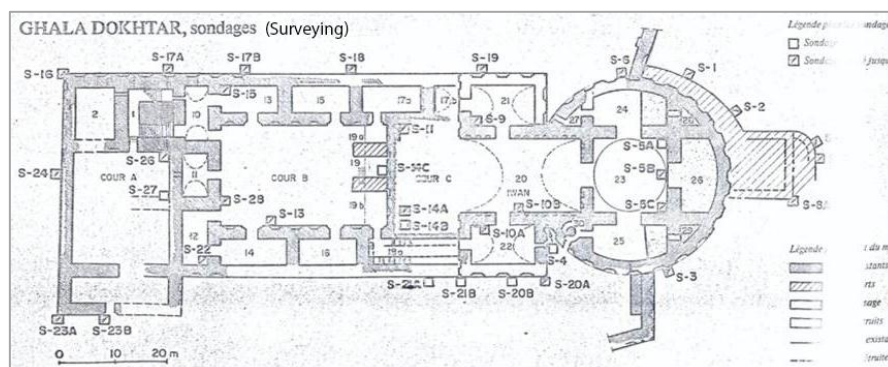
- Rubble clearing;
- Restoration of the foundation and walls: replacement of building materials – Filling of apertures with stones and gypsum grouting;
- Installing Gypsum crack monitors on existing cracks.



Map 1. Positioning of proceedings



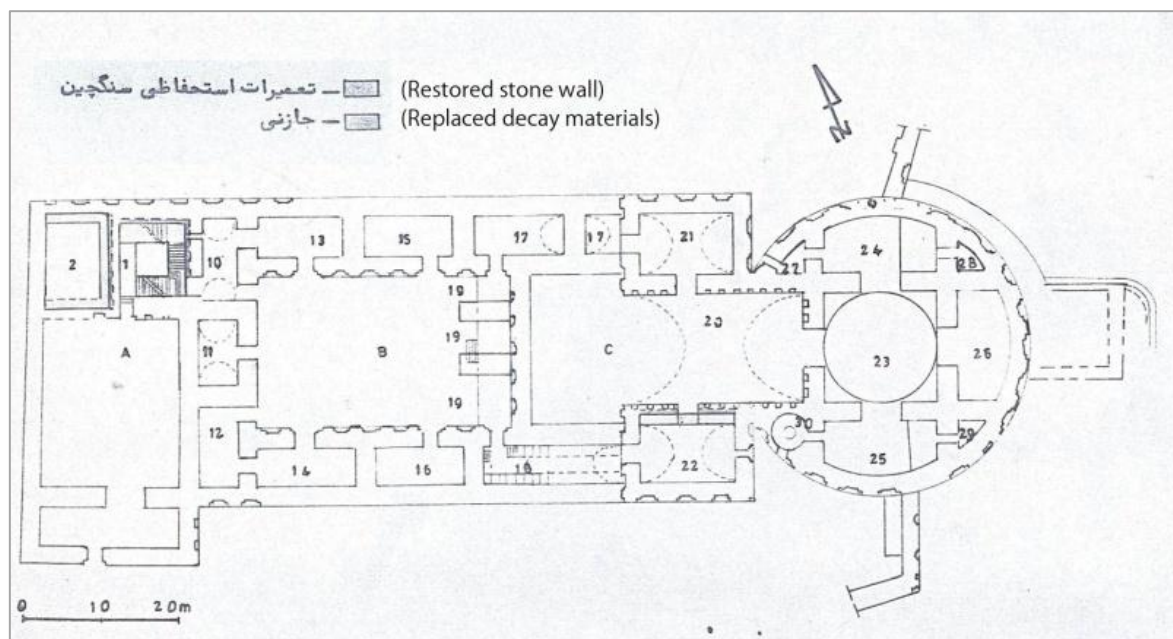
Map 2. Positioning of proceedings



Map 3. Positioning of proceedings

1983 to 1987

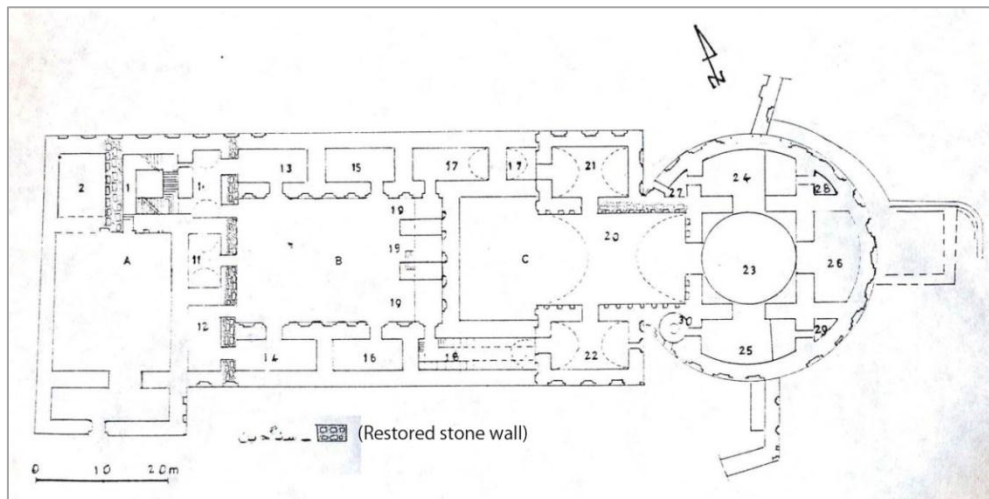
- Conservation and restoration:
- Grading and creating downspouts for directing rainwater;
- Consolidation of parts of the main porch walls;
- Restoration of entrance stairs and consolidation of walls with rubble trench;
- Underpinning of internal courtyard walls (northern side);
- *Kah-gel* covering:
- Arc wall located on the north side;
- Arc of the main stairs;
- Inside of the main porch located on the north side;
- Dome covering;
- Staircase;
- Internal area of room number 2.
- Excavation procedures:
- Taking out the rubble from the main staircase;
- Around the stairs for blocking humidity and pressure.



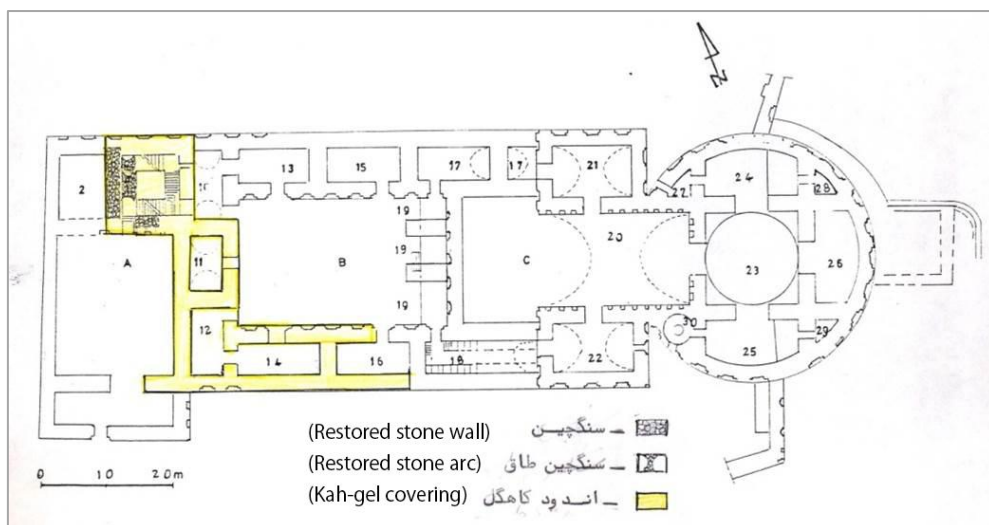
Map 4. Positioning of proceedings

1987 to 1992

- Conservation and restoration:
- Roof restoration: Grading for directing rainwater – *Kah-gel* covering of the dome;
- Restoration of the main porch located in front of the dome;
- Grading of the porch floor for directing rainwater;
- Filling of all existing trenches with stone, clay and lime: west, south and eastern sides of the main courtyard / southern side of the hall stairs / northern side of the main hall / southern side of room number 12 / northern side of room 14 / rooms 22 , 21 and 25 / main porch;
- Filling the cracks of rooms number 10 and 13;
- Clearing and removing all wild plants from the area.
- Creating a space for guards.



Map 5. Positioning of proceedings



Map 6. Positioning of proceedings

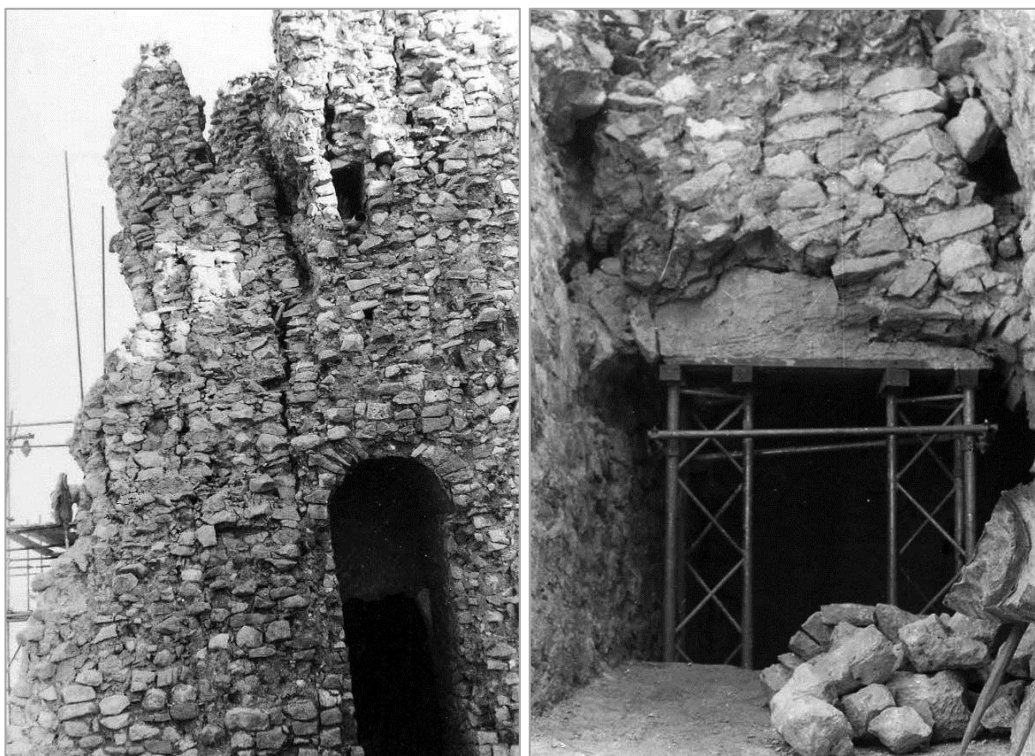


Photo 3. Left: entrance of the main stairs. Right: entrance of the second floor stairs

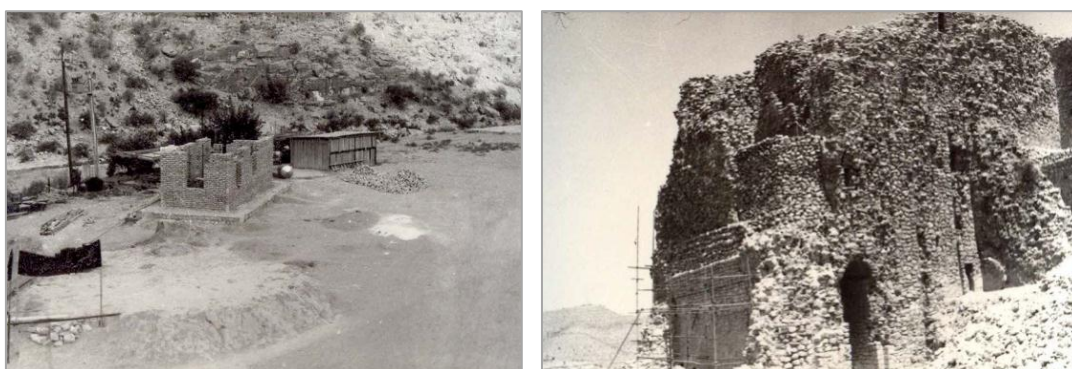
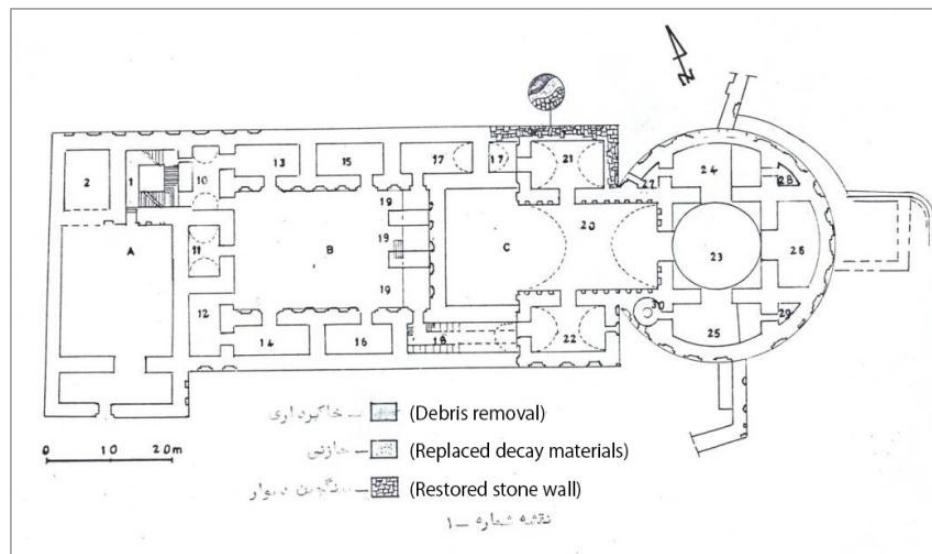


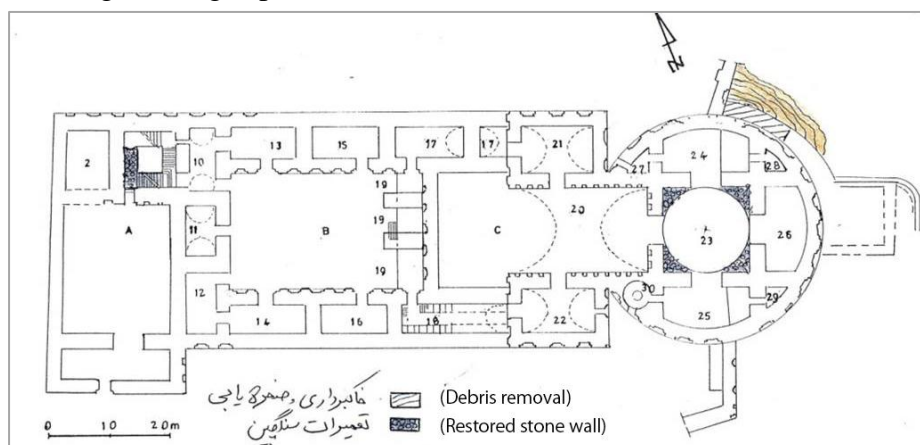
Photo 4. Left: stone settings of Qal'eh Dokhtar stairs. Right: Creating a space for guards



Map 7. Positioning of proceedings

1992 to 1997

- Conservation and restoration:
- Restoration of a stone in front of the main porch façade on the west side replacing of building materials and damaged mortars;
- Clearing rubble from internal spaces of the second floor stair cases for the purpose of lightening the back of the arc – restoring the arc of the first floor stairs with rubble trench;
- Restoration of the foundation of the east part of the main porch: excavating the foundation's surrounding for the purpose of status examination – replacing of building materials and mortars – partial consolidation and restoration of the foundation;
- Clearing of the area around the fort.
- Creating a storage space.



Map 8. Positioning of proceedings

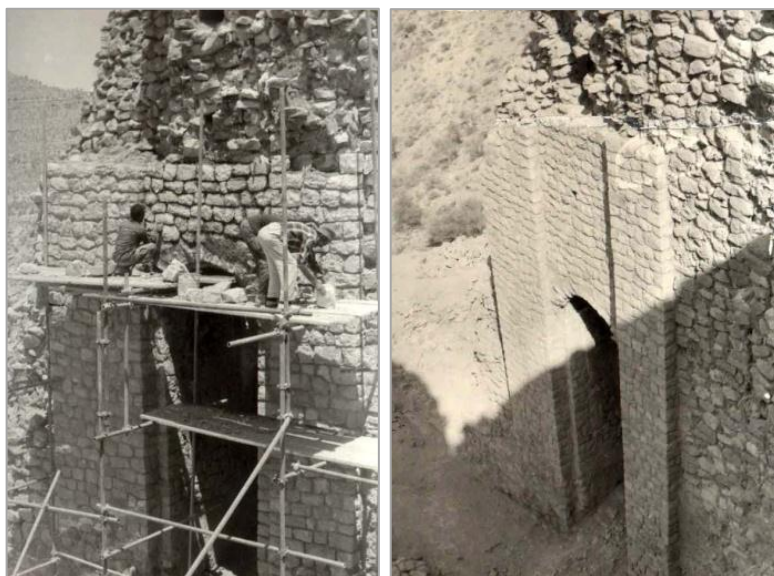
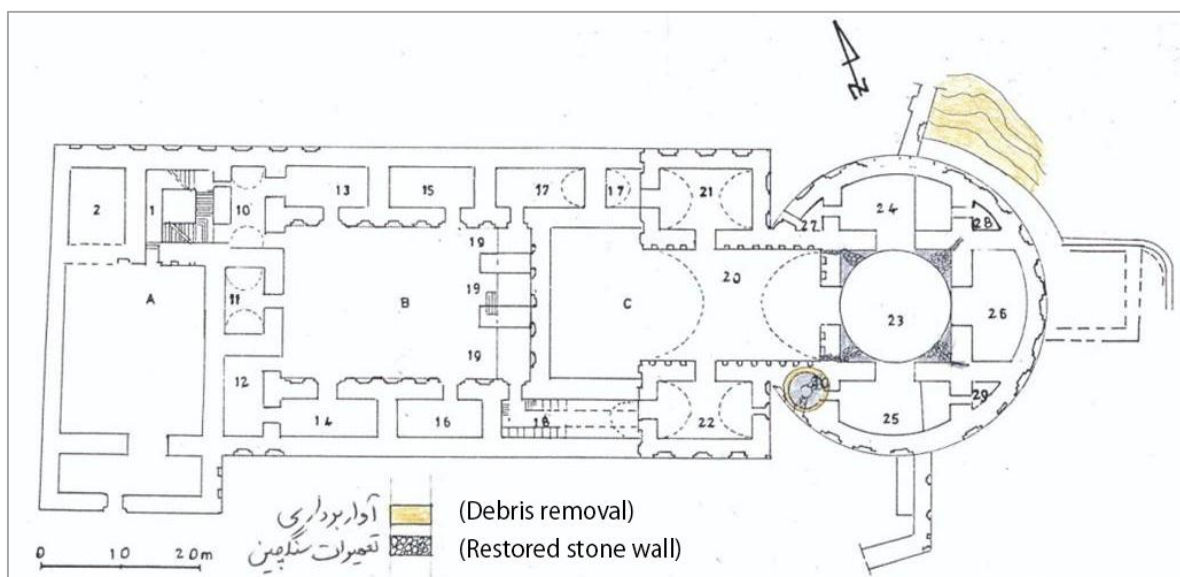


Photo 5. Right: Restoration of the entrance stairs' stone settings. Left: before restoration. Right: after restoration

1997 to 2004

- Rubble clearing of the south side of the stairs and the area and the east side of the dome;
- Grouting of cracks with the use of gypsum and lime.



Map 9. Positioning of proceedings

2004 to 2009

- Conservation and restoration:
- Conservational *Kah-gel* covering of walls and floors:
- Consolidation of stone materials which are falling;
- Suitable grading for ridding of rainwater.
- Utilization of the base.



Photo 6. Right: utilizing the workshop. Left: covering the spiral stairs.

2009 to 2015

- Conservation and restoration:
- Organization clays and uncovered relics;
- Restoration of the west and northern walls;
- Restoration of doorways on the eastern and western parts of the porch;
- Restoration of the dome;
- Restoration and the grading of all *Kah-gel* coverings;
- Restoration of the eastern porch wall;
- Restoration of the small room on the west side of the dome;
- Restoration of stairs;
- Removal of damaged and loose stone parts;
- Renewal of *Kah-gel* coverings.
- Installing of informative signs;
- Improving the state of the entrance stairs.



Photo 7. Right: restoration of the *Filpush* (squinch). Left: restoration of the western doorway

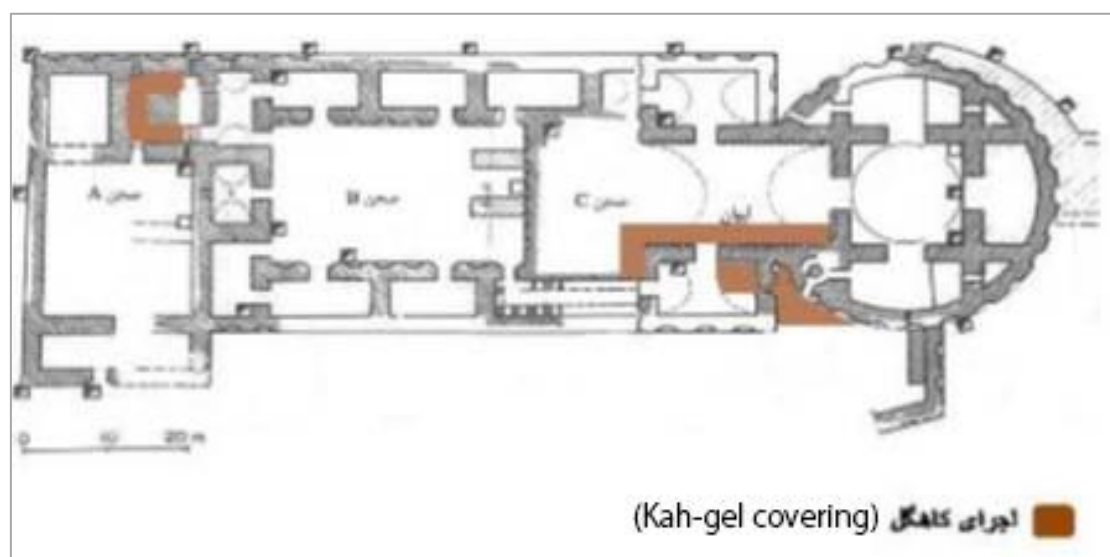


Photo 8. Right: restoration of the external wall of the west side. Left: building of parapets for the entrance stairs



Photo 9. Right: restoration of the eastern wall. Left: west side stone settings





Map 11. Positioning of proceedings



Photo 12 .Restoration of stairs

Victory Relief

2007-2008

One of the conservation measures conducted over the relief of Firuzabad and included geological and topographic inspections is related to the studies and research of Dr Bahraman in 2007-2008 .

Briefly mentioned below:

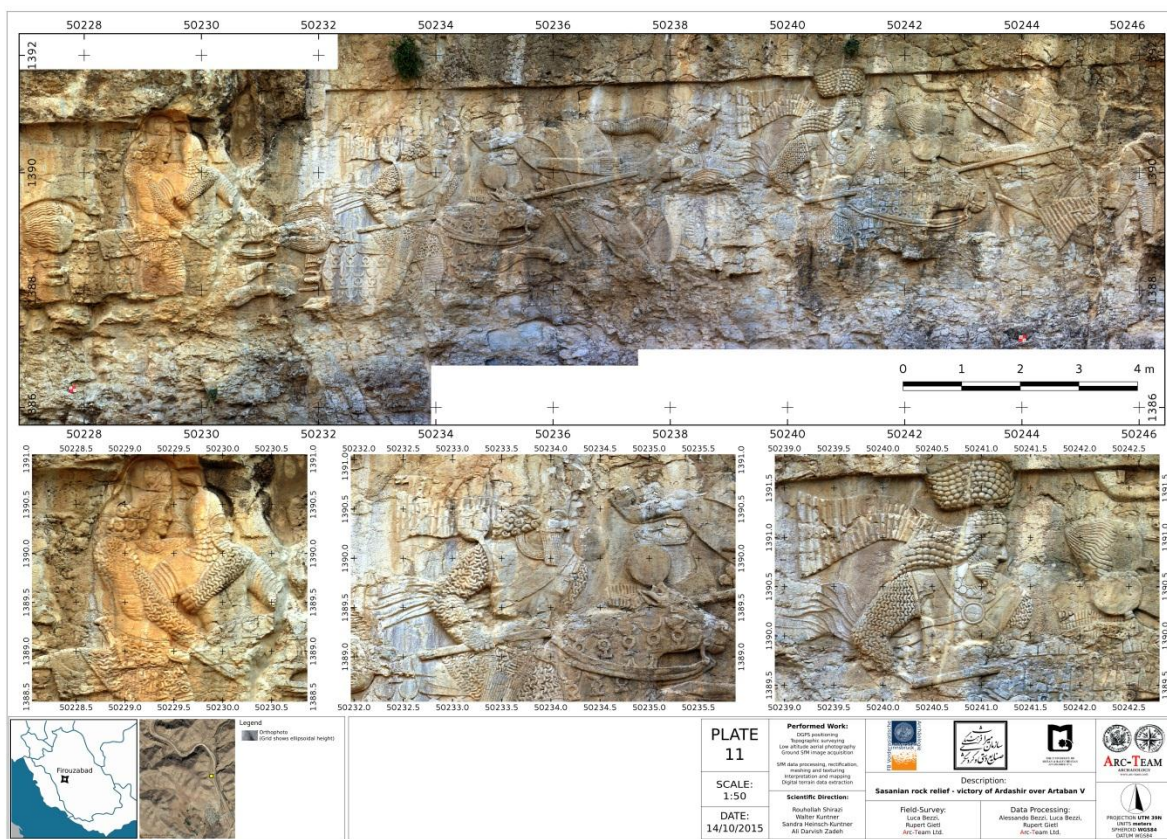
Fossilology, Mineralogy by microscopy method, Recognition of chemical characters (XRF,XRD), Recognition of mechanical resistance, Recognition of physical characters, determining the Deterioration on the Stone from Firuzabad Relief on the Basis of Tests done on the Stones and Environment, Environmental Studies, Biological Factors Deteriorating the Firuzabad Relief.

2015

Arc Team from Austria has conducted scanning by laser over victory relief of Firuzabad in 2015 and works done are mentioned below:

- DGPS positioning;
- Topographic surveying;
- Low altitude aerial photography;
- Ground SFM image acquisition.

SFM data processing, rectification, meshing and mapping digital terrain data extraction.



Ardashir Khurreh

1974 to 2005

- Excavation in the core zone;
- Identification of Sassanid era constructions and of early Islam in Ardashir Khurreh and the area surrounding it;
- Surveying and topography of the zone.



Photo 13. Surveying and topography

2009 to 2015

- Conservation and restoration:
- Restoration of the central tower (*Tirbal*);
- Conservational coverings of archeological findings.



Photo 14. . Left: restoration of the north side Right: restoration of Ardashir Khurreh workshop

Ardashir palace

1967 to 1974

- Conservation and restoration:
- Entrance arc;
- Consolidation of southern and western walls.
- Excavation and extraction of rubble from stairs and the area.

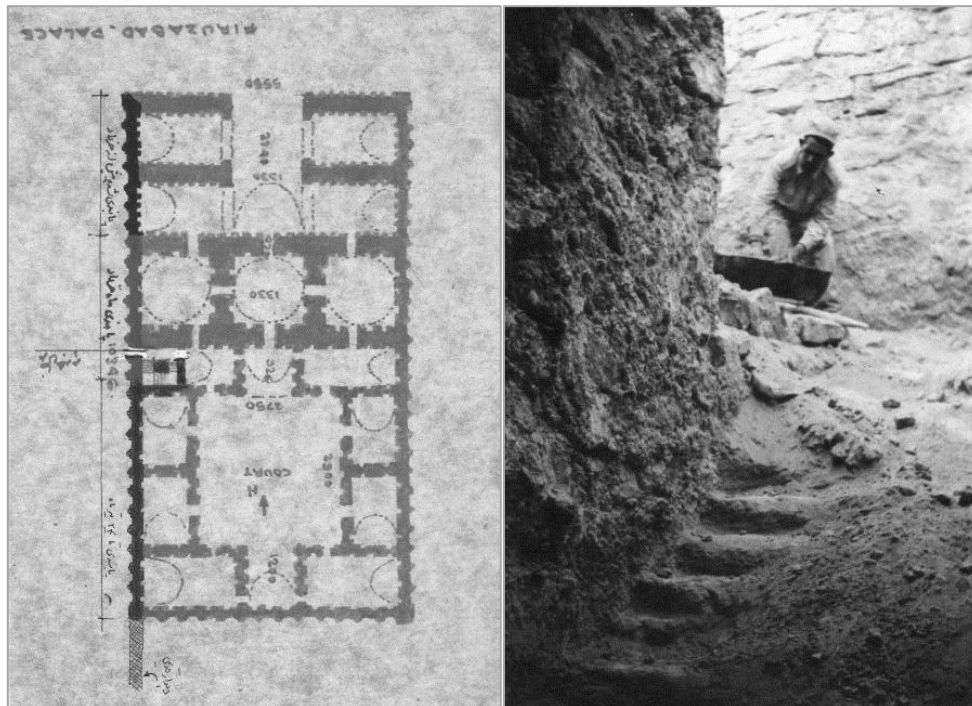


Photo 15. Left: rubble clearing from stairs, Right: instructional plan.

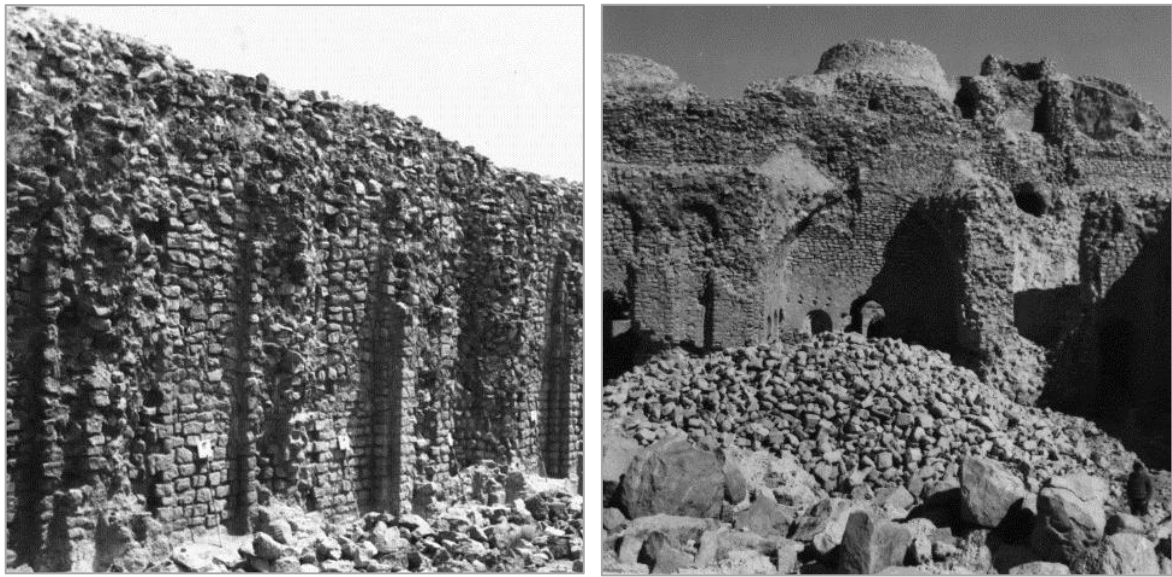


Photo 16. Left: rubble clearing of the courtyard, Right: consolidation of southern entablatures of the western walls.

1974 to 1978

- Conservation and restoration:
- *Kah-gel* covering with fescue wood on walls and canals;
- Scaffolding beneath the roof with wood;
- Restoration of the west porch wall;
- Restoration of western niches;
- Restoration of the landing around the arc;
- Stone restoration of the southern corridor on the second floor;
- *Kah-gel* covering.

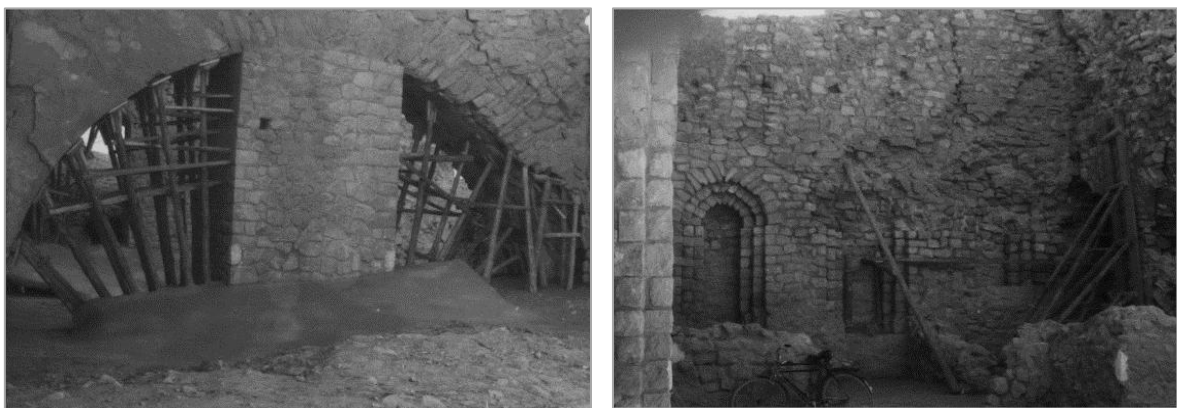
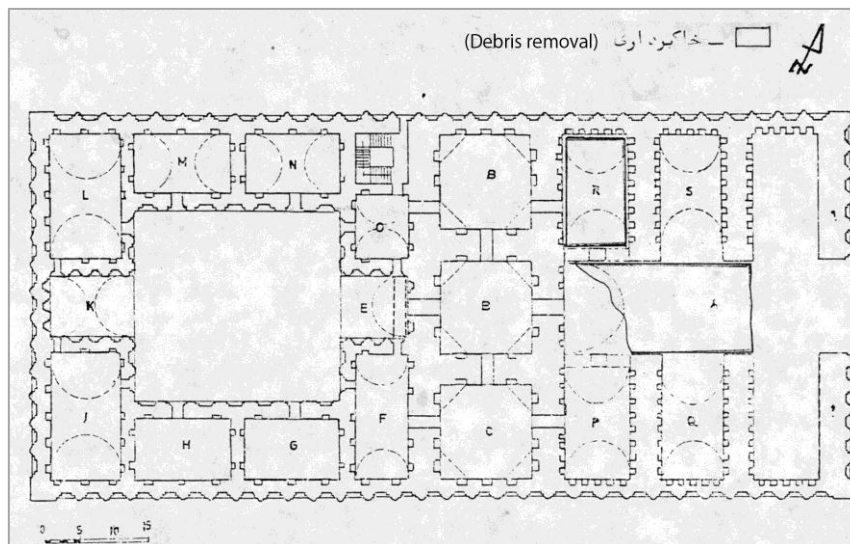


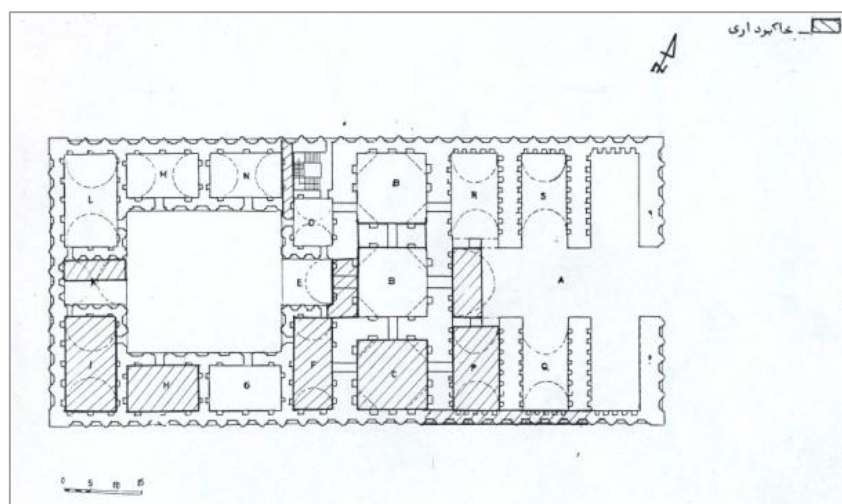
Photo 17. Right: placement of wooden buttresses. Year 1974. Left: *Kah-gel* covering of a column's base

1978 to 1983

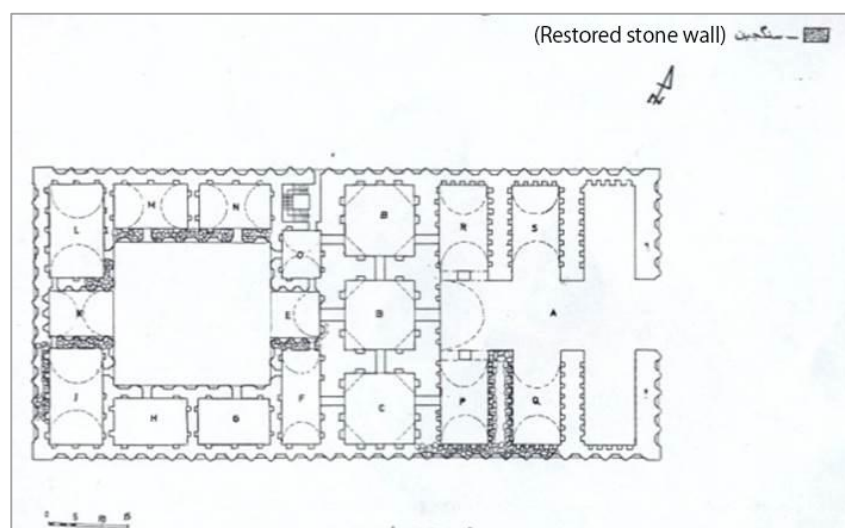
- Conservation and restoration:
- *Kah-gel* covering;
- Tending, replacing and restoring of building materials;
- Consolidation of the western wall's foundation and southern and northern walls;
- Filling the cracks with stone and gypsum grout;
- Restoration of niche arcs;
- Restoration of the northern body of space **K**;
- Restoration of the northern wall of space **D**;
- Restoration of bodies of space **H**, **G** and **C**;
- Preparation of waterspouts and directing water to the outside of the building.
- Rubble clearing of room **R**.



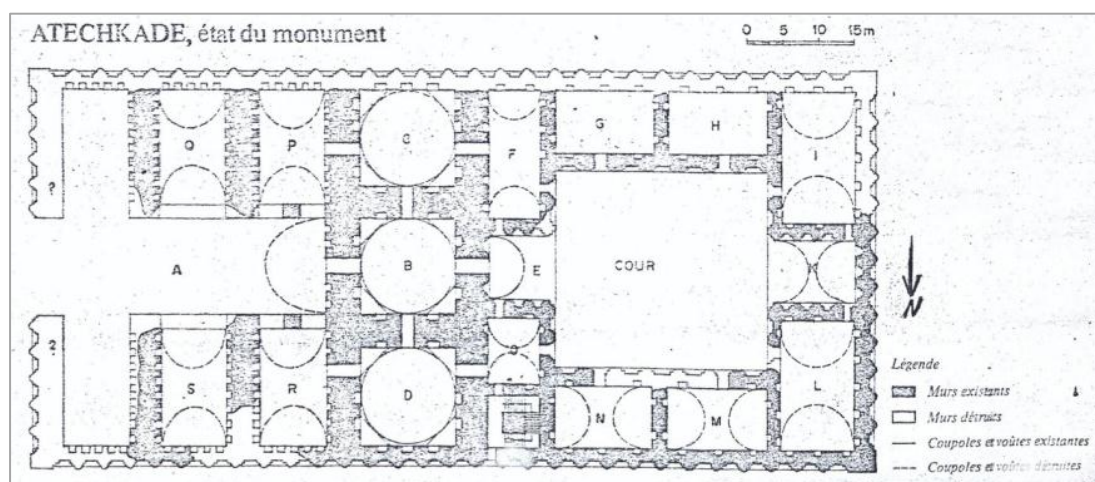
Map 12. Positioning of proceedings



Map 13. Positioning of proceedings



Map 14. Positioning of proceedings



Map 15. Positioning of proceedings



Photo 18. Right: stone repairs on the west wall and entrance doorway. Year 1980.
Left: Kah-gel covering of the room floor. Year 1980.

1983 to 1987

- Conservation and restoration:
 - Restoration of the entrance arc and wall between spaces **E** and **F**: replacement of building materials and mortars – restoration of eastern entrance wall – restoration of parts of the fallen arcs with stone and mortar;
 - Restoration and consolidation of the foundation and western and eastern walls of space **F**;
 - Restoration of eastern and northern walls of space **M**;
 - Restoration and repair of the round passageway on the west part of the dome **B**;
 - Restoration of the eastern wall of space **N**;
 - Restoration of eastern façade of space **O**: consolidation and restoration of the remaining arcs;
 - Restoration of the eastern wall of space **E**.

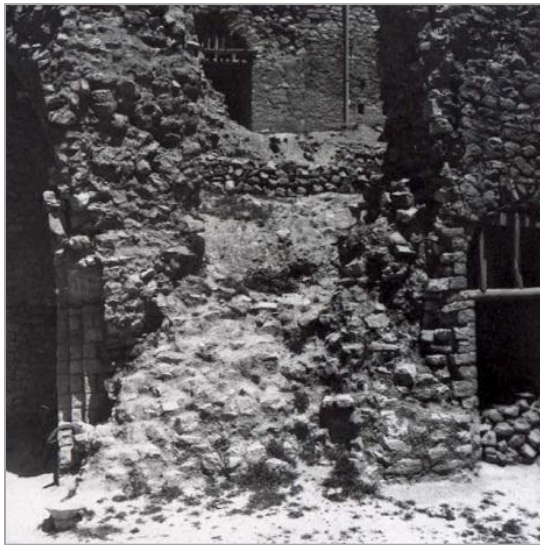


Photo 19. Renewal of a part of the western wall of Space F. Left: before restoration. Right: after restoration. Year 1983.



Photo 20. Restoration and filling of cracks. Left: before restoration. Right: after restoration. Year 1983.

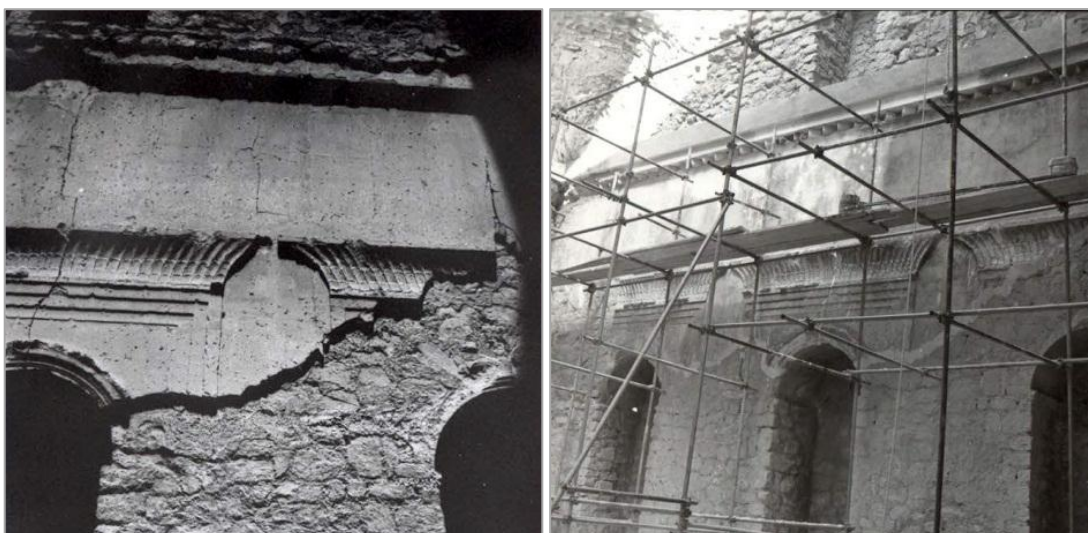
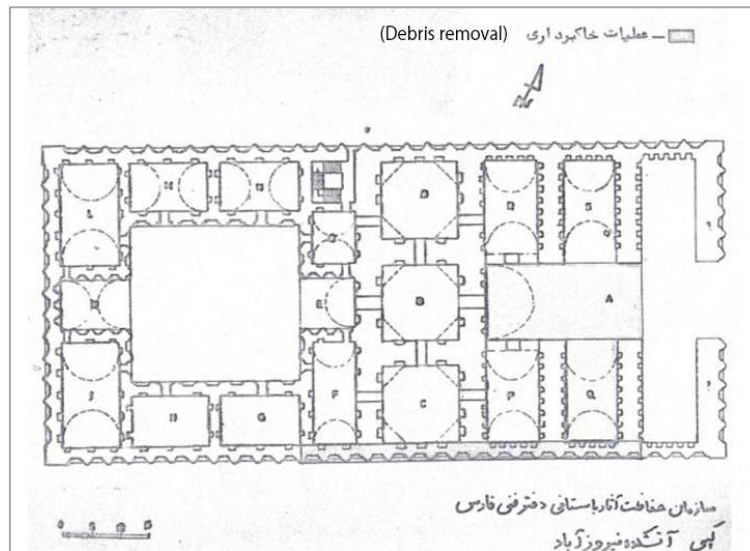


Photo 21. Right: Restoration of stuccos. Left: before restoration. Right: after restoration. Year 1983.

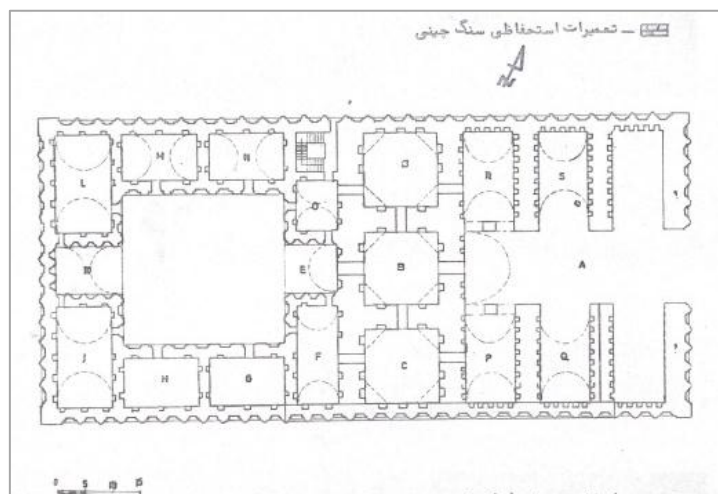


Photo 22. Restoration and consolidation of springs. Left: before restoration. Right: after restoration. Year 1983.

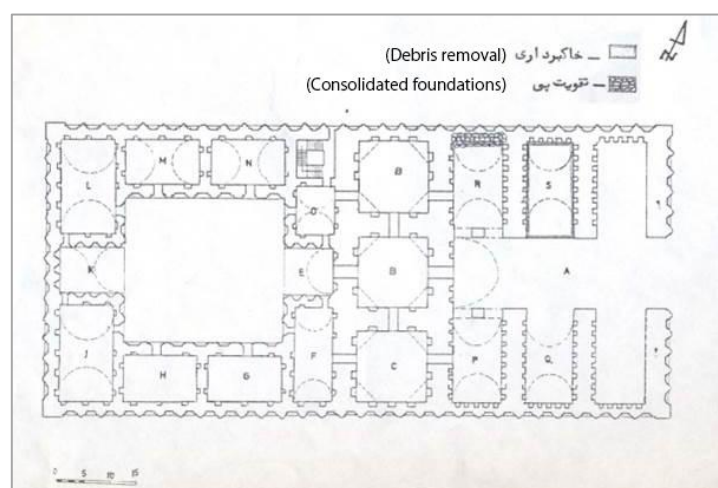
- Consolidation and grading of room **I**;
- Restoration of walls, doorways and skylight of room **C** with local rubble trench;
- Restoration of eastern wall and round passageway of the second floor with the use of local rubble trench, restoration of gypsum bodies and the dome stucco with paraloid and primal (rhoplex);
- Restoration of walls and foundations with the use of local rubble trench of rooms **H** and **Q**;
- Restoration of eastern and northern courtyard walls with local rubble trench;
- Restoration of the external façade of room **P**;
- *Kah-gel* covering:
- Walls of rooms **F** and **L**;
- Round passageway of the second floor and inside rooms **D, B** and **C**;
- Dome of room **D**;
- Floor of room **P**;
- Rooms **S** and **R**.
- Excavation procedures:
- Rooms **P, A, Q, C** and **K**.



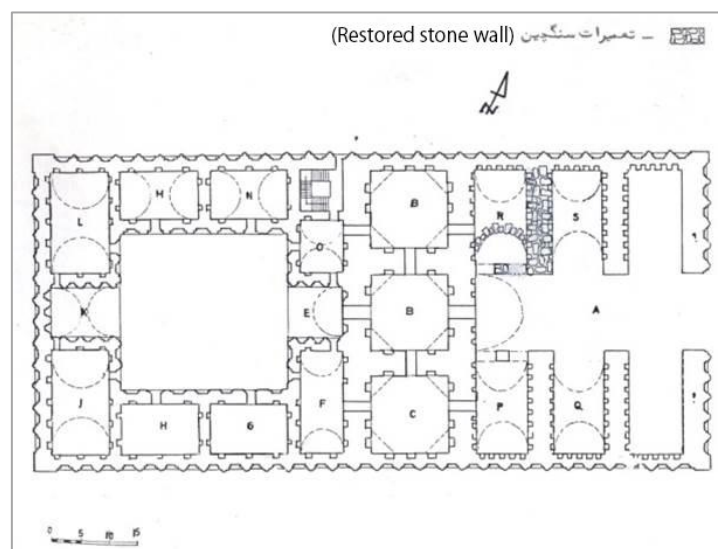
Map 16. Positioning of proceedings



Map 17. Positioning of proceedings



Map 18. Positioning of proceedings



Map 19. Positioning of proceedings

1987 to 1992

- Conservation and restoration:
- Excavation procedures: rubble clearing from rooms **S**, **R**, **P** and **Q**;
- Replacement of building materials and mortars – filling of apertures with stone in room **R**;
- Room **Q**:
- Surveying and drafting maps from the fallen parts of room **Q**;
- Replacement of building materials and mortars.
- Renewal and re-trimming of the arc of the round passageway on the second floor in domes **B** and **C**;
- Rubble clearing of room **S** – replacement of building materials and mortars;
- Conservational *Kah-gel* covering;
- Next to the southern part of porch **A**.
- Studying the research on the historical city of Ardashir Khurreh zone for determining the boundaries;
- Studying and researching on the west round passageway wall of the second floor for determining the main form of the existing skylights on the fort wall.

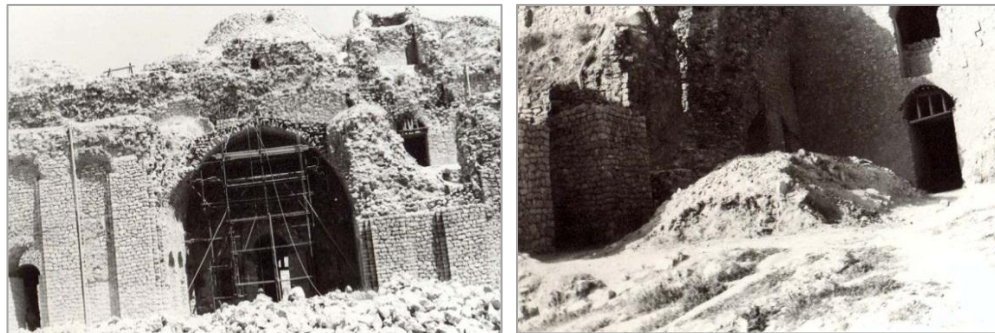


Photo 23. Left: rubble clearing from porch **A**. Right: creation and installation of wooden formwork

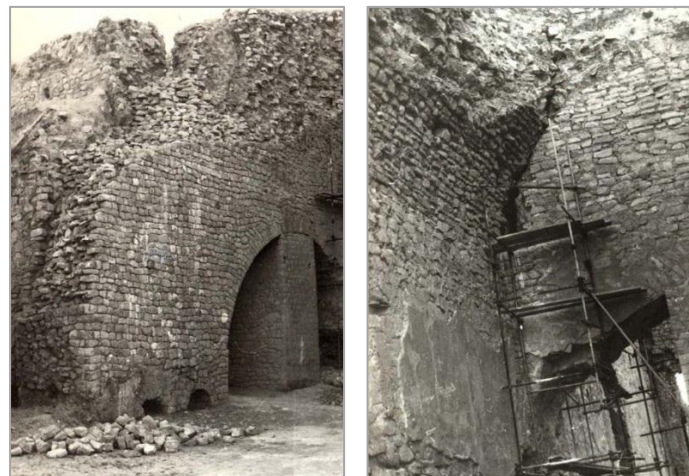


Photo 24. Left: restoration of southern stone settings. Right: restoration of the aperture between the porch and room **Q**

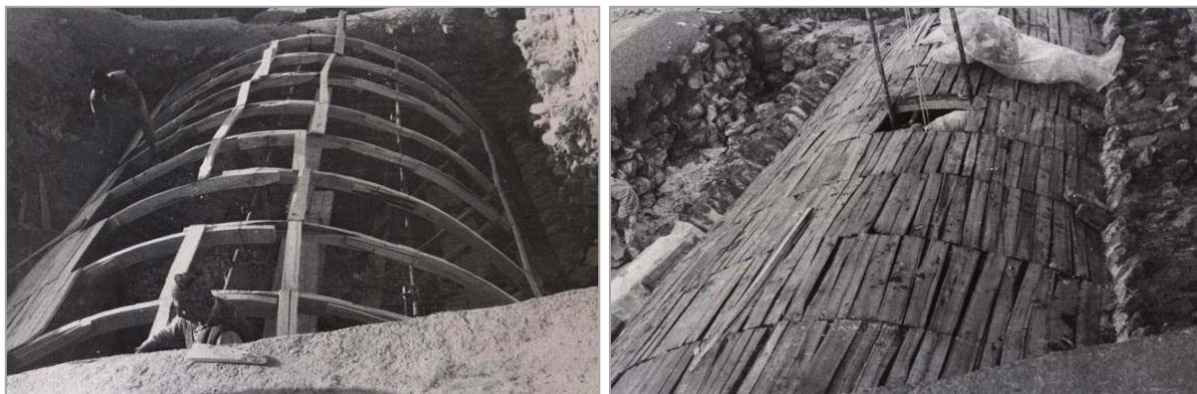
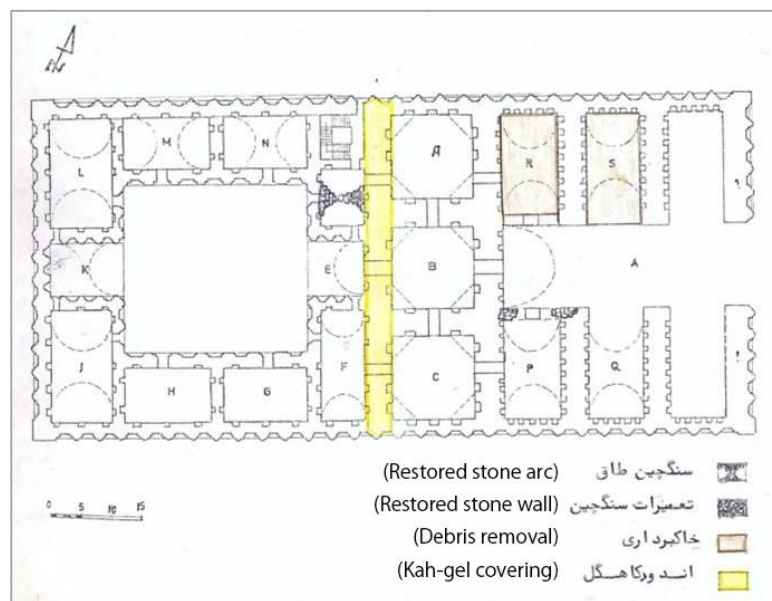


Photo 25. Formwork



Map 20. Positioning of proceedings

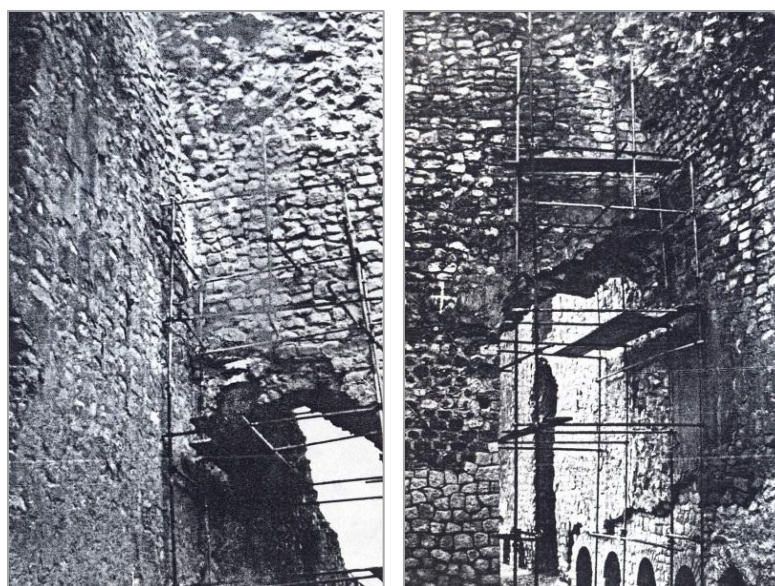


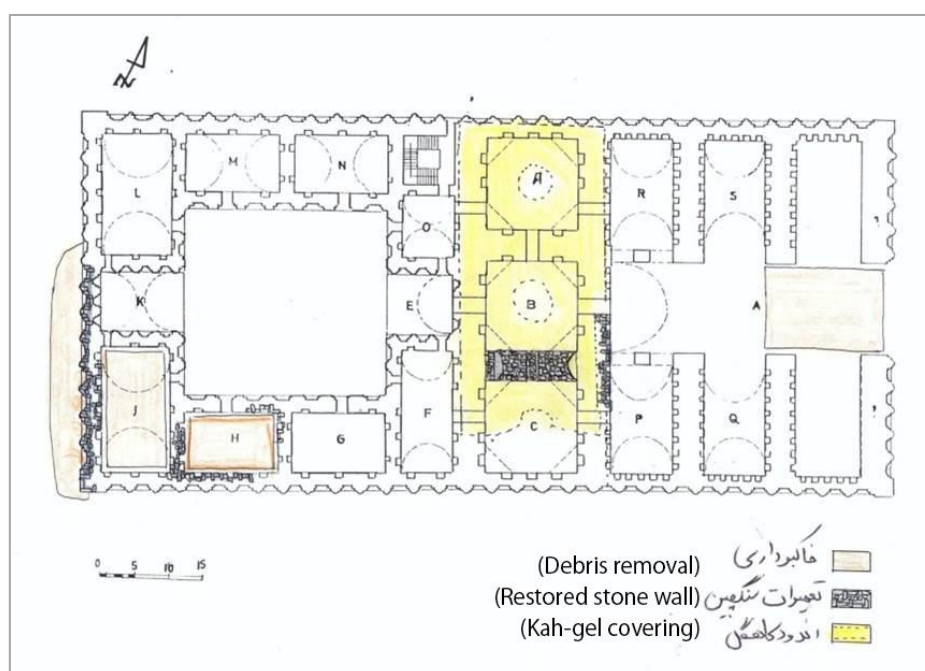
Photo 26. Right: room P. Left: room Q



Photo 27. Restoration of the arc in room P and porch A

1992 to 1997

- Conservation and restoration:
- *Kah-gel* covering on critical parts of the palace workshop;
- Grading of the courtyard and inside of the palace for directing rainwater;
- Rubble clearing of the round passageway;
- Clearing the courtyard and removing wild plants;
- Restoration, replacement of building materials and mortars of rooms **H**, **O** and **J**;
- Restoration of round passageways between domes **B** and **C** – **D** and **B** on the first floor;
- Restoration of decorations, cleaning paintings and stuccos / consolidation of painted stuccos;
- Restoration of rooms **P** and **R**: replacement of building materials and mortars.
- Partial improvement of site utilities.



Map 21. Positioning of proceedings



Photo 28. Rubble clearing of the internal round passageway between domes B and C on the first floor. Left: before rubble clearing. Right: after rubble clearing

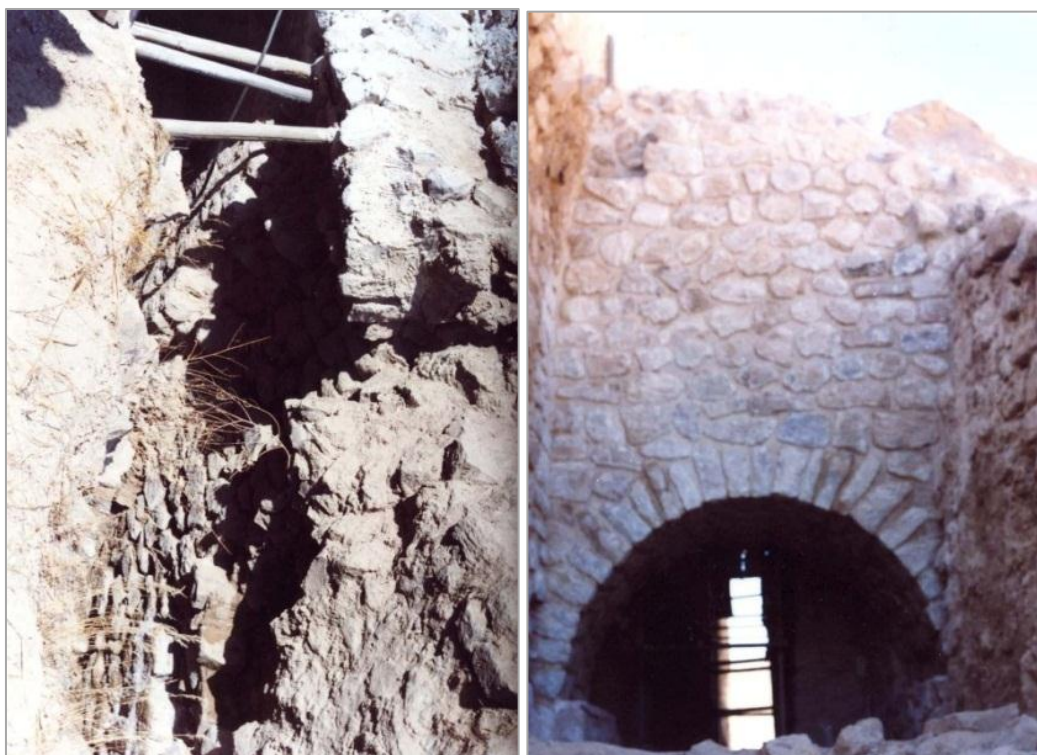


Photo 29. Round passageway of Dom B on the first floor. Left: before restoration. Right: after restoration.



Photo 30. Installing of formworks on the round passageway of dome B on the first floor 1997 to 2006

- Conservation and restoration:
- Rubble clearing of the round passageway of dome **B** on the first floor;
- Restoration of stone settings;
- Renewal and re-trimming of the arc of porch **A**: replacement of worn building materials and mortars / removal of loose parts which have separated from the walls / installing wooden formworks / stone setting on near walls / stone setting of the arc;
- Restoration of wall stone settings of the west and east sides of the room: stone setting with rubble trench;
- Restoration and cleaning of paintings and stuccos and consolidation of painted stuccos;
- *Kah-gel* covering critical points and parts of the round passageway of the eastern dome on the first floor.
- Clearing and organizing the area around the building.



Photo 31. Restoration of dome D. left: restoration of dome C

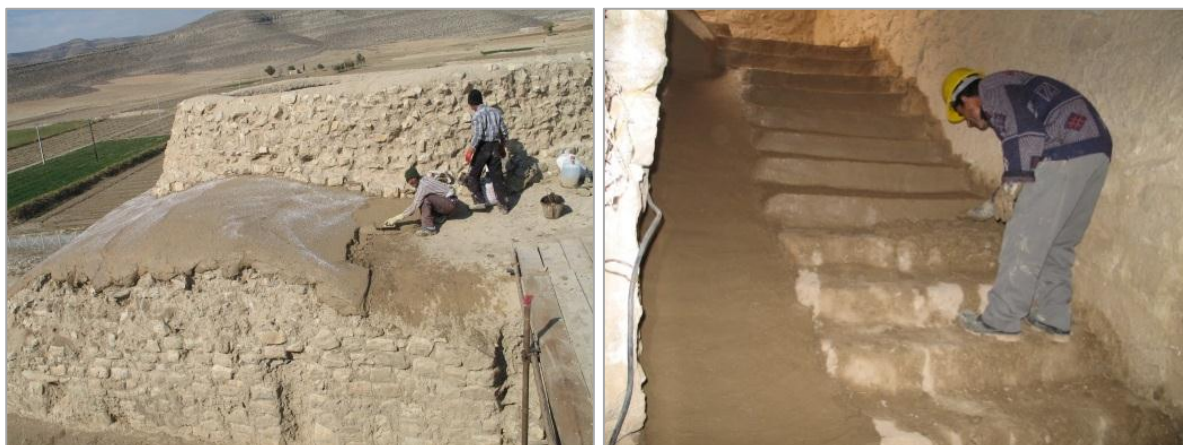
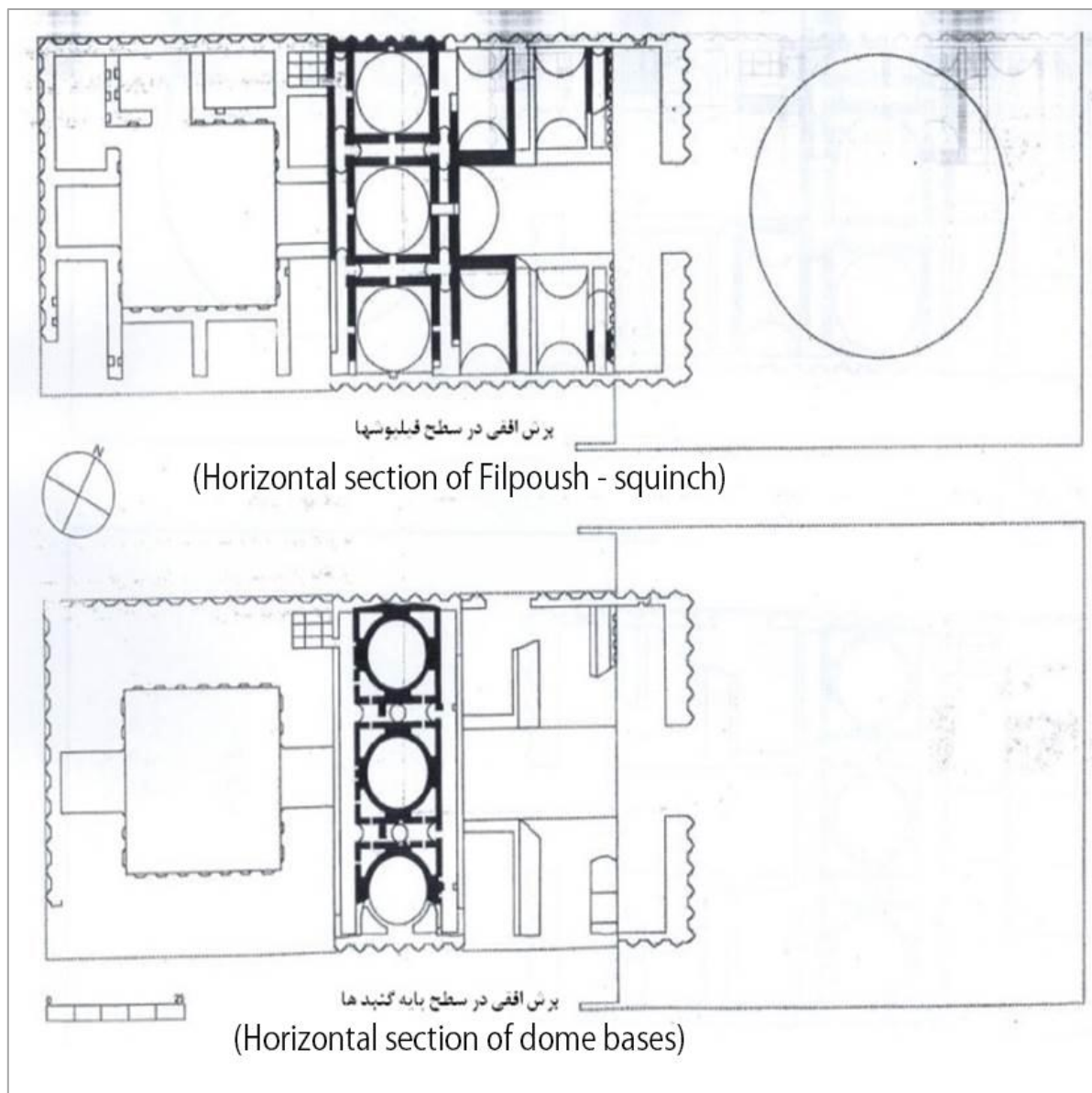
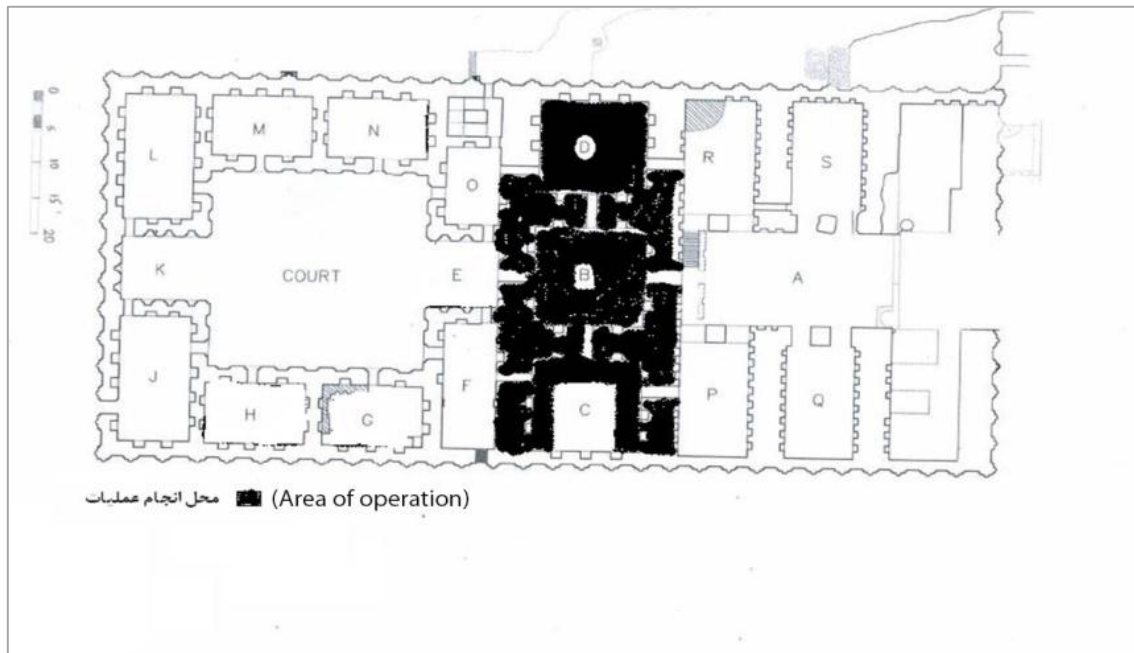


Photo 32. Right: *Kah-gel* covering of stairs. Left: *Kah-gel* covering of dome D



Map 22. Positioning of proceedings



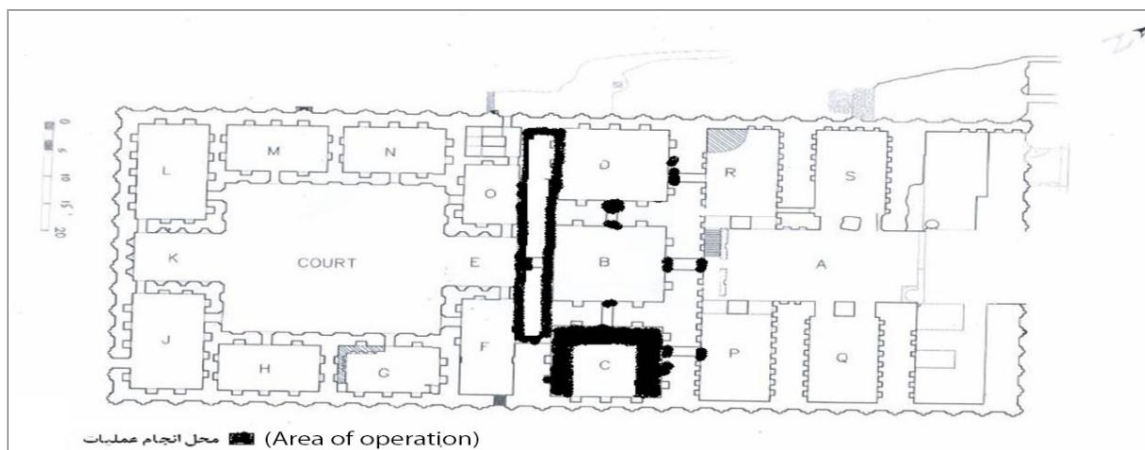
Map 23. Positioning of proceedings

2007 to 2015

- Conservation and restoration:
- Organizing relics and clays;
- Removing thorns and wild plants from the building walls and courtyard;
- Restoration of the eastern wall of dome **C**;
- Filling of the apertures near the lake;
- Restoration of west walls of the round passageway of dome **D**;
- Replacement of building material and mortars of damaged parts;
- Consolidation of coverings and decorative stuccos;
- Restoration of the west side niches of room **H**;
- Restoration of porch **K**;
- Restoration of the façade arc near porch **K**;
- Restoration of room **F**, **H** and **J** doorways;
- Restoration of west, north and eastern walls of the courtyard;
- Restoration of south walls of dome **B**;
- Restoration of room **G** walls;
- Restoration of south and north walls of porch **Q**.



Photo 33. Left: filling apertures with sand. Right: restoration of the round passageway wall.



Map 24. Map positioning of proceedings



Photo 34. Right: restoration of wall F. Left: restoration of wall J



Photo 35. Right: restoration of the arc of doorway J. Left: restoration of room G wall



Photo 36. Right: restoration of northern wall of dome C.
Left: stone setting in front of the engaged columns near the lake



Photo 37. Restoration of the upper part of porch Q

Bishapur and Tange Chogan

1966 to 1971

- Conservation and restoration:
- Tending and conservation of reliefs;
- Improvement of relief walkways for visitors;
- Fencing of the boundaries and improving the state of security guards;
- Improving the states of canals;
- Controlling of surface waters.

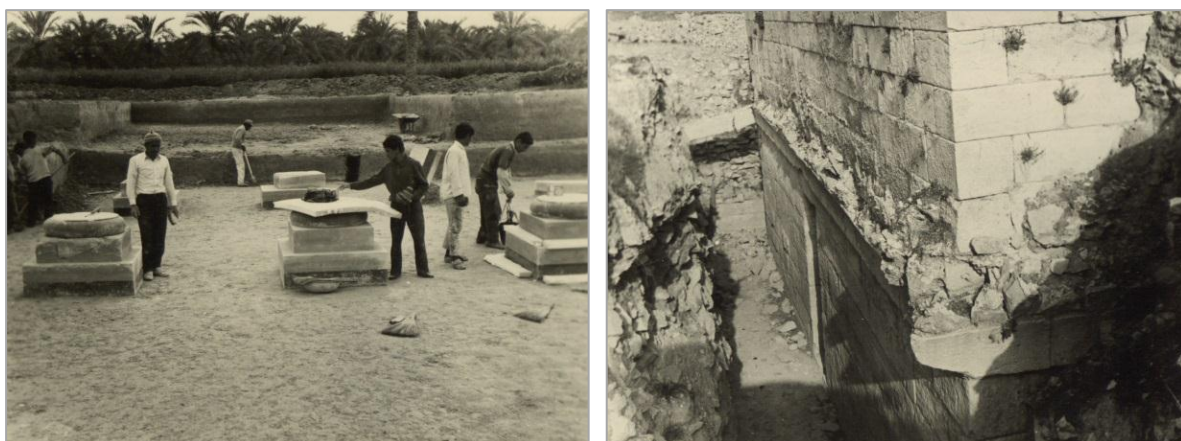


Photo 38. Right: clearing around the *Anahita* temple walls. Left: clearing of mud around the column bases after rainfall. Year 1970. Center of heritage documents.



Photo 39. Right: *Anahita* temple after clearing. Left: *Ale bouye* Mosque before excavation. Year 1969. Center of heritage documents

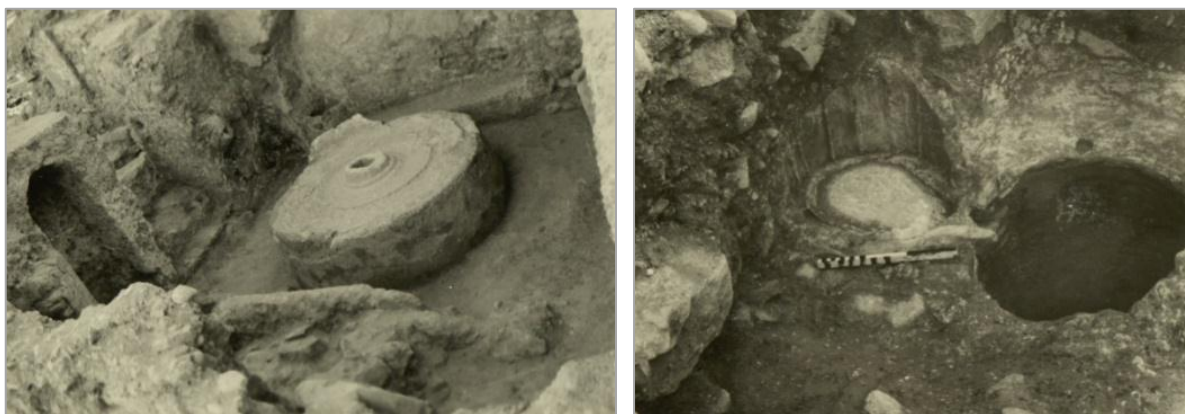


Photo 40. Right: oil extraction. Left: grain mill workshop. Year 1969. Center of heritage documents. 1976 to 1981

- Conservation and restoration:
- Restoration of corridors around the temple, western mosaic porch and Shapur ceremonial hall;
- Placement of memorial column pieces in the votives area and installing them;
- Roofing of *Anahita* temple's corridors for protecting against climatic factors;
- Fencing of the site.

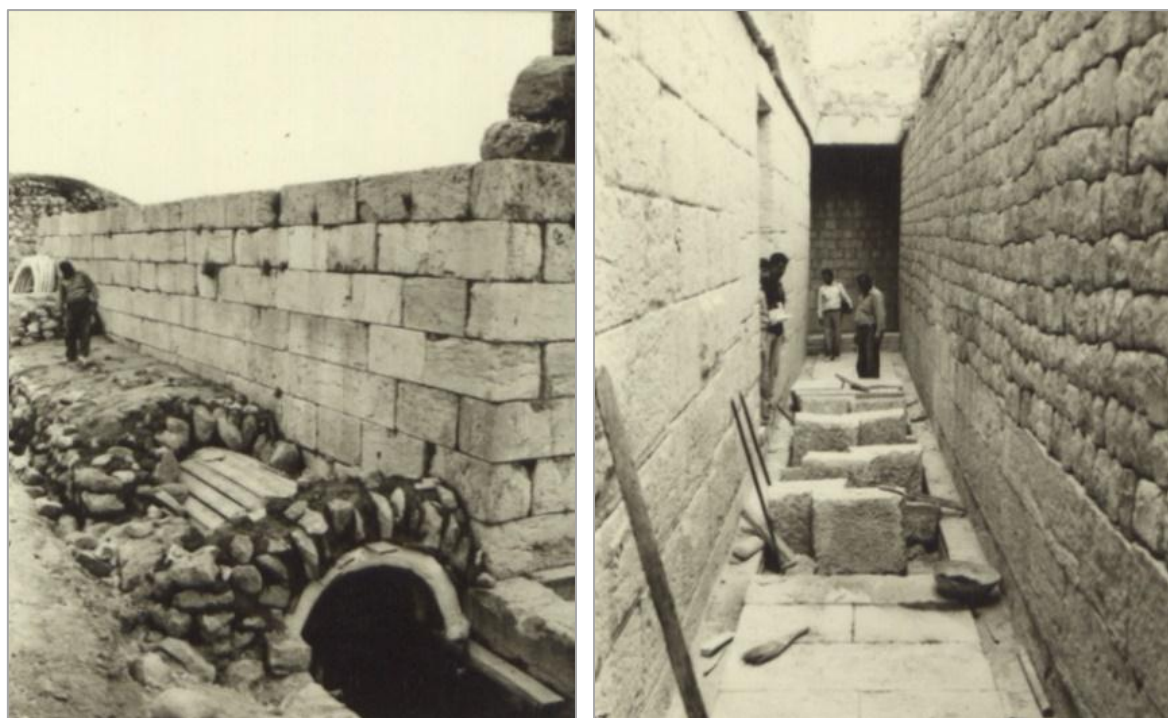


Photo 41. Restoration of *Anahita* temple's corridors

1976

- Conservation and restoration:
- Tending and conservation of reliefs;
- Removing plants from the relief
- Controlling surface waters.



Photo. Conservation measures over the relief in 1976

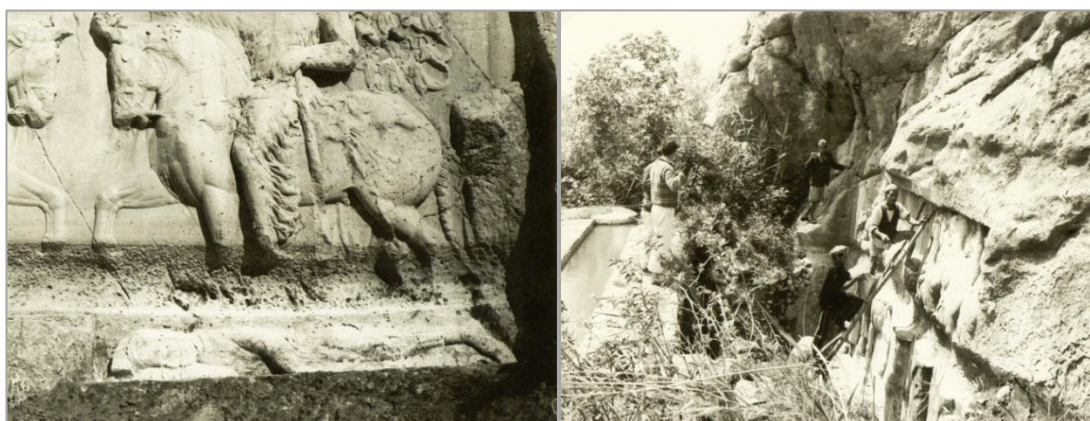


Photo. Removing plants from the relief

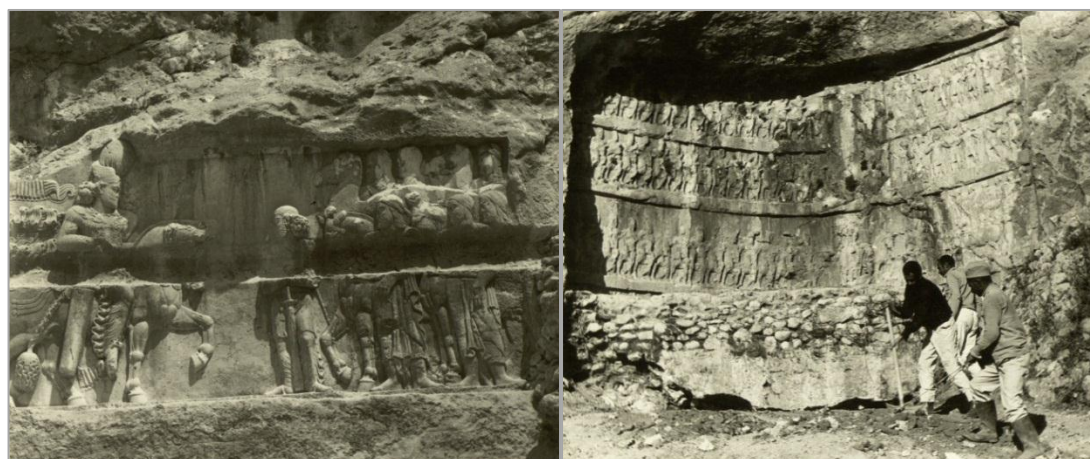


Photo. Visual reorganization of relief



Photo. Cleaning the relief

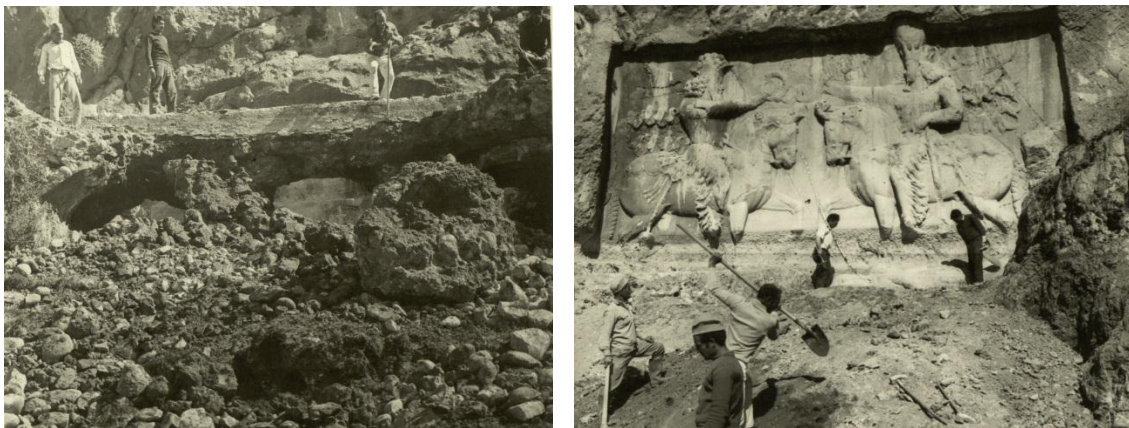


Photo. Conservation measures over the reliefs

1981 to 1986

- Conservation and restoration:
- Conservational restoration of the *Chahar taq*;
- Restoration of column bases of Saljuqi mosque;
- Clearing of the site;
- Restoration of the pool located at the north western edge of the temple;
- Restoration and replacement of damaged coverings and building materials of the fence walls;
- Temporary covering of the Valerian palace / restoration and replacement of damaged building materials and mortars;
- Rubble clearing and restoration of northern façade wall of *Anahita* temple;
- Rubble clearing and conservational restoration of the ceremonial hall;
- Consolidation and restoration of western and eastern walls of the mosaic porch;

- Improvement of walkways of *Tang-e Chogan*'s reliefs;
- Restoration of the Shapur statue.
- Review of maps and obtaining of the status quo.

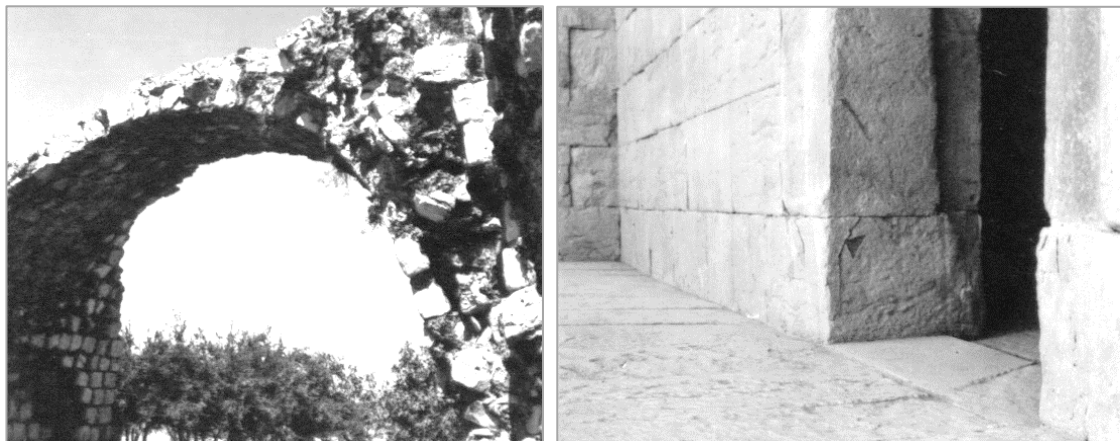


Photo 42. Right: restoration of the *Chahar taq*. Left: restoration of the base of *Anahita* temple's walls



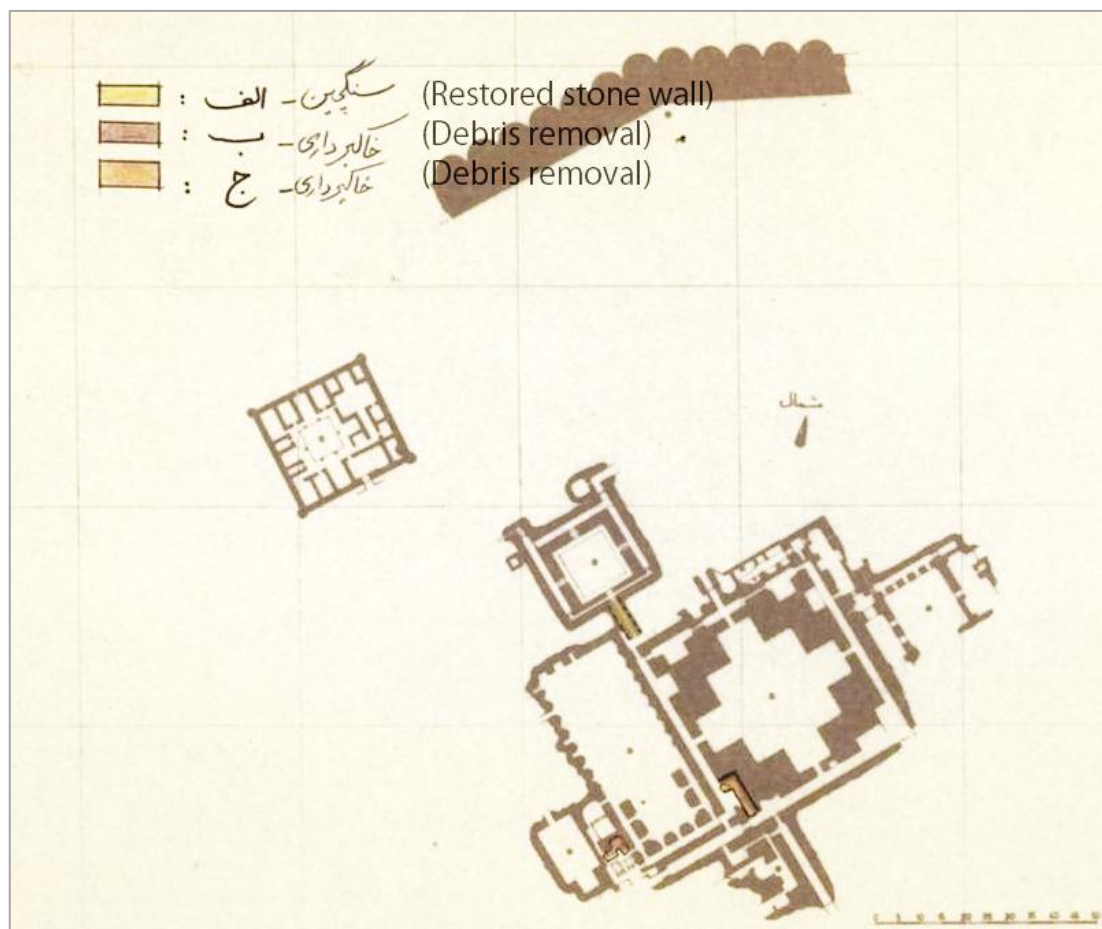
Photo 42. Right: restoration of the pool near *Anahita* temple. Left: restoration of stone settings of the ceremonial hall. 1982. Center of heritage documents.



Photo 43. Right: part of the eastern fence's wall. Left: the remains of the *Chahar taq*. 1983. Center of heritage documents.



Photo 44. Right: the ceremonial hall. Left: installing fences around the site. 1985. Center of heritage documents.



Map 25. Positioning of proceedings

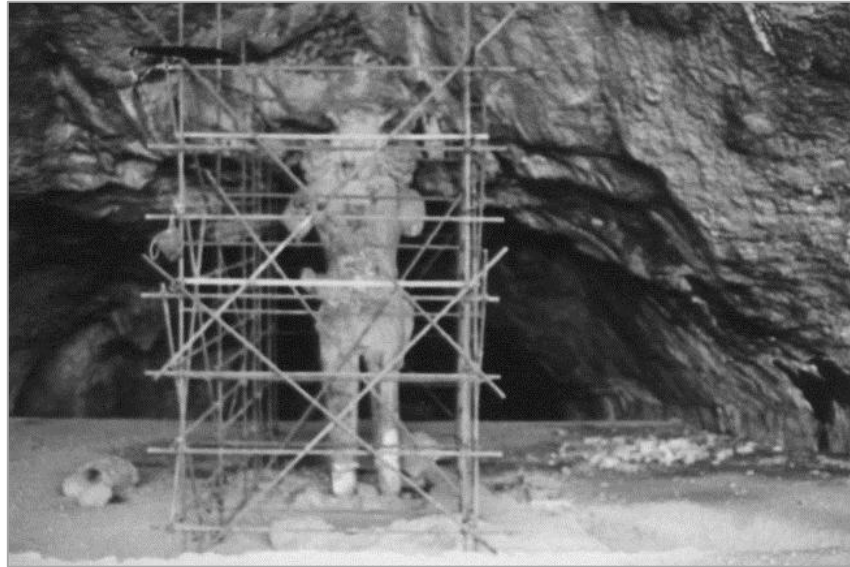


Photo 45. Restoration of the Shapur statue

1986 to 1991

- Conservation and restoration:
- *Anahita* temple: rubble clearing / restoration of the façade body of the western entrance stairs / restoration of the wall facing the northern courtyard of the temple / replacement of damaged building materials and coverings;
- Ceremonial hall: rubble clearing of the north eastern edge walls / restoration of south western edge walls, eastern corridor / rail installment for rubble transfer / replacement of building materials and coverings;
- Fence installment around the complex;
- Shapur cave: continuation of the Shapur statue restoration / restoration of accessibility stairs for visitors;
- *Tang-e Chogan's* Reliefs: restoration and water proofing / cleaning and filling apertures existing on the top parts of the reliefs.
- Executing the designed entrance for the complex.



Photo 46. Right: south eastern edge walls of the private hall. Left: the wall of *Anahita* temple



Map 26. Positioning of proceedings

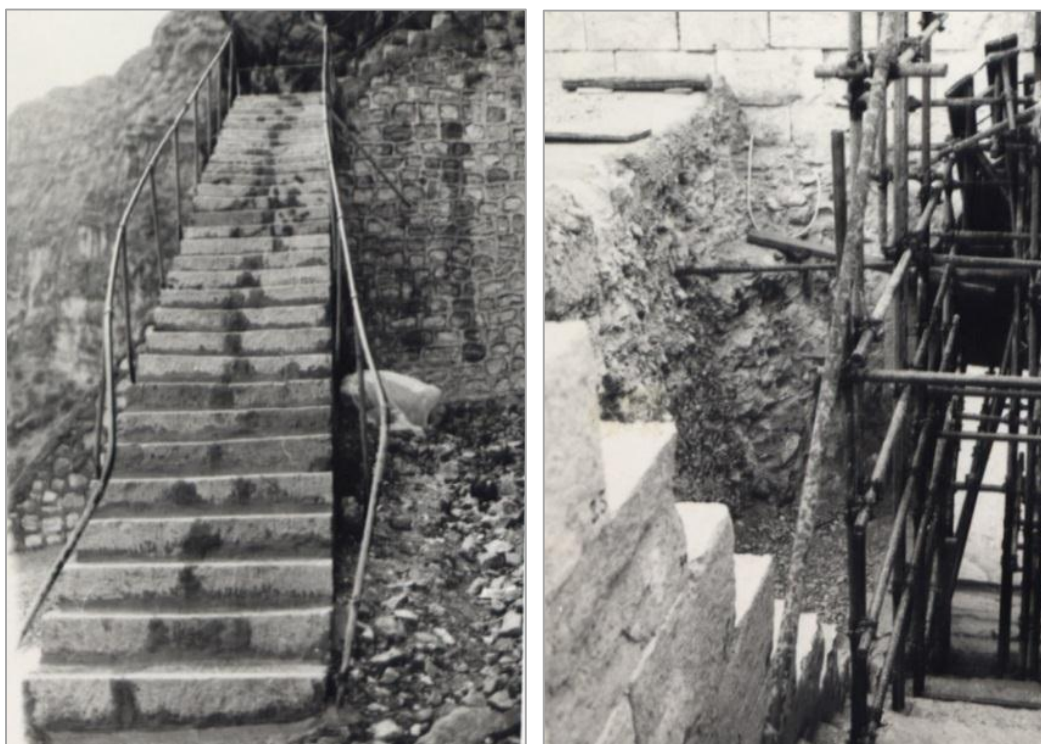


Photo 47. Right: stone stairs for cave accessibility. Left: restoration of *Anahita* temple's stairs. 1987. Center of heritage documents.

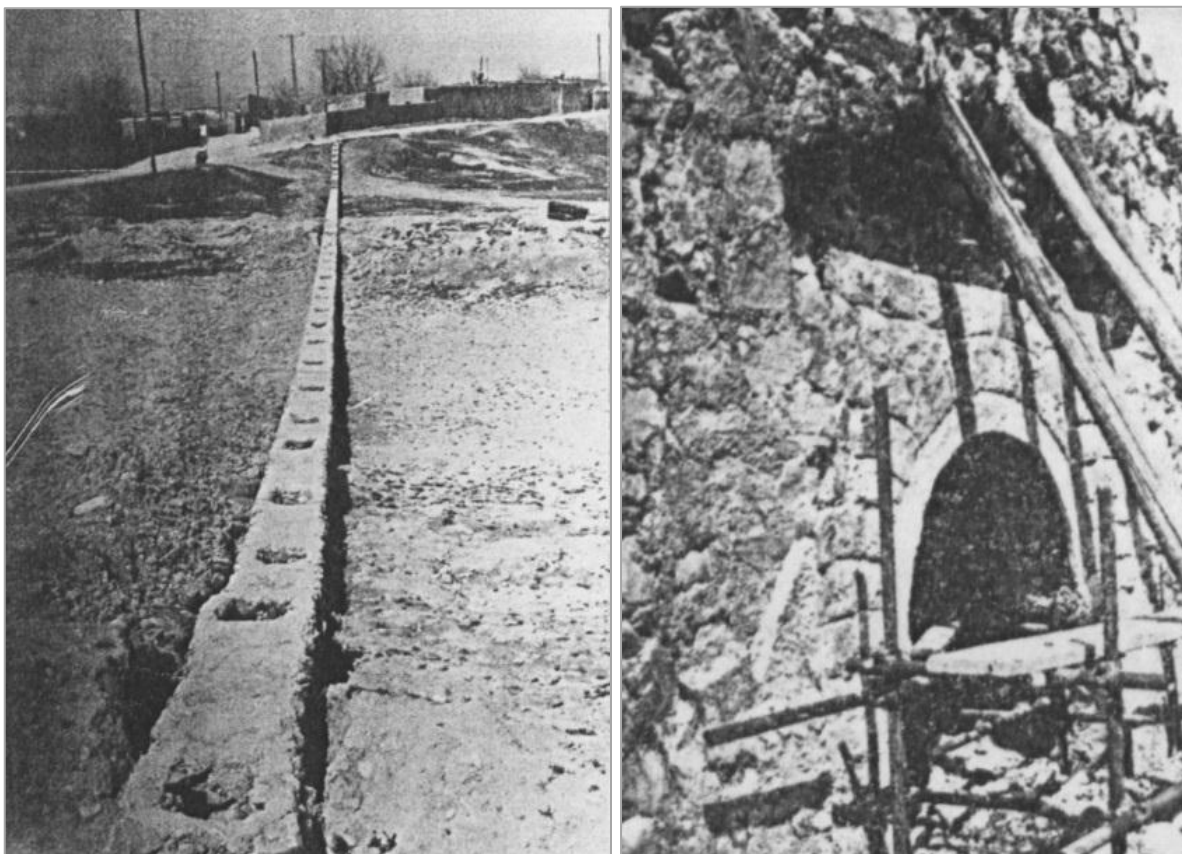


Photo 48. . Right: building the foundation for fence installment. Left: restoration of the ceremonial hall's arc

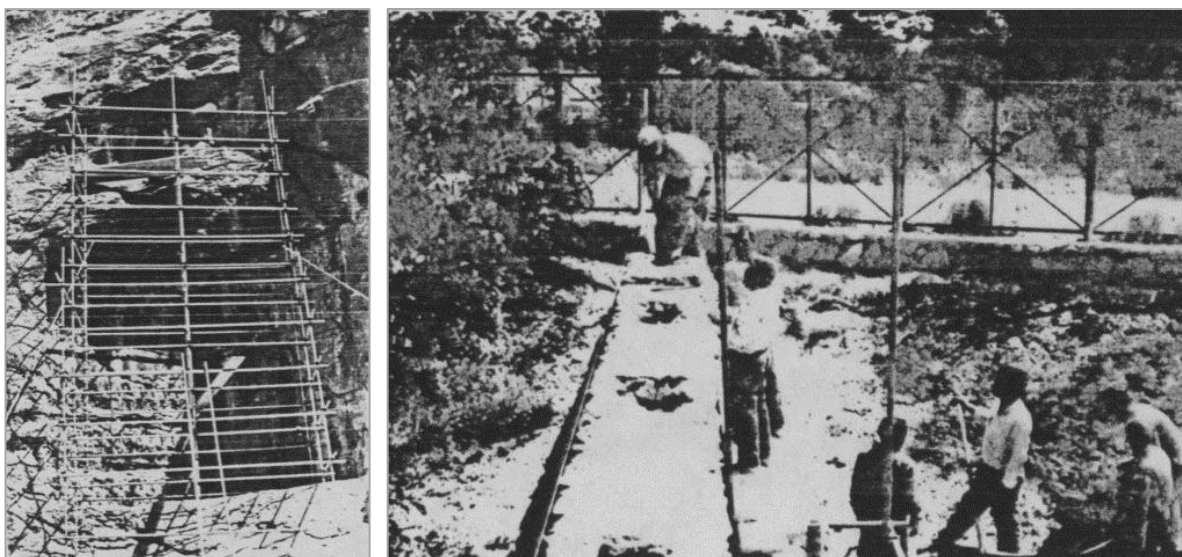


Photo 49. Right: installing the fence of the site. Left: restoration of Reliefs. 1990. Center of heritage documents.

1991 to 1996

- Conservation and restoration:
- *Anahita* temple: restoration of the stone setting of the temple's southern corridor's wall / replacement of building material and coverings;
- Restoration of the western mosaic porch: restraining of the porches foundations / installing a temporary covering for the rest of the porch.



Photo 50. Improvement of the base status

2006 to 2012

- Establishing a permanent conservation and restoration workshop;
- Improvement of tourism status:
- Building a Sassanid specified museum;
- Improving of the passages: securing – introduction signs;
- Improving of the existing hazardous areas of the complex's visitor passages (installing protective coverings over a number of the complex's active Qantas' access shafts).
- Organization of the Shapur river's margin with the cooperation of the regional water organization of Fars province;
- Organization and site building assimilatory with the Chogan Natural – historical properties;
- Archeological excavations in the surrounding areas of the Valerian palace and the ceremonial hall with the following purposes: distinguishing, restoration and conservation – distinguishing of boundaries;
- Reviewing and conducting field studies for boundary correcting;
- Improving the state of facilities;

- Surveying and completing previous maps;
- Conservation and restoration:
- Organization of the treasury and objects of the museum;
- Restoration of the treasury objects;
- Lighting;
- Restoration of *Tang-e Chogan* reliefs;
- Decorational gypsum of the mosaic porch and the ceremonial hall;
- Cleaning and consolidation;
- Creating a protective roof over the decorational gypsums.
- Clearing wild plants from the site;
- Consolidation and conservation of the architectural spaces around the memorial columns;
- Restoration of the Arg shahi battlement and the arc abutment of the Chalipa corridor of the ceremonial hall;
- Restoration of the decorational gypsum of the tower and battlement;
- Consolidation of parts of the tower, battlement, walls and the corridors near the mosaic porch;
- Conservation, monitoring of the *Tang-e Chogan*'s reliefs;
- Improvement of the security status: electronical protection / protection unit.



Photo 51. Right: the separation of sediments from scuddos are visible. Left: there is the grouting of the battlement can be seen.



Photo 52. Right: there is the consolidation stones in the eastern porch wall. Left there is the temporary roof.

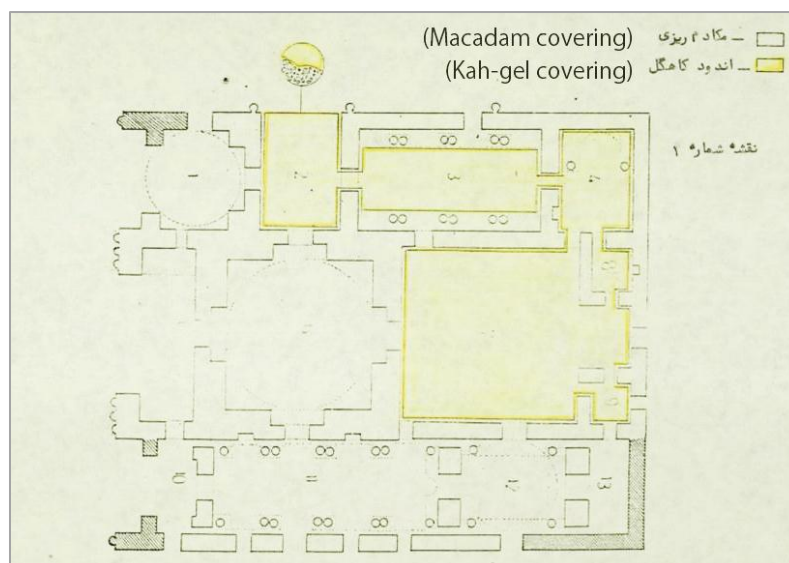


Photo 52. Right: the improvement of aqueducts are observable. Left: the study and recovery of museum objects.

Sarvestan

1974 to 1990

- Conservation and restoration:
- Studying and investigating the archeological primary procedures;
- Surveying and drafting maps of initial repairs;
- Rubble clearing and proceeding to repair and restore the foundations of all buildings;
- Restoration of parts of the walls, columns and engaged columns of the building;
- Restoration of the corners of the building's domes;
- Restoration of the base of the small dome;
- Restoration of the serrated gypsum decorations;
- Graveling the floor of most architectural spaces of the building;
- Protective *Kah-gel* covering of the floor;
- Protective *Kah-gel* covering of the roof for rain proofing it;
- Creating pathways to the monument from the main Shiraz-Fasa road;
- Utilizing the workshop;
- Specification of area and boundary criteria.



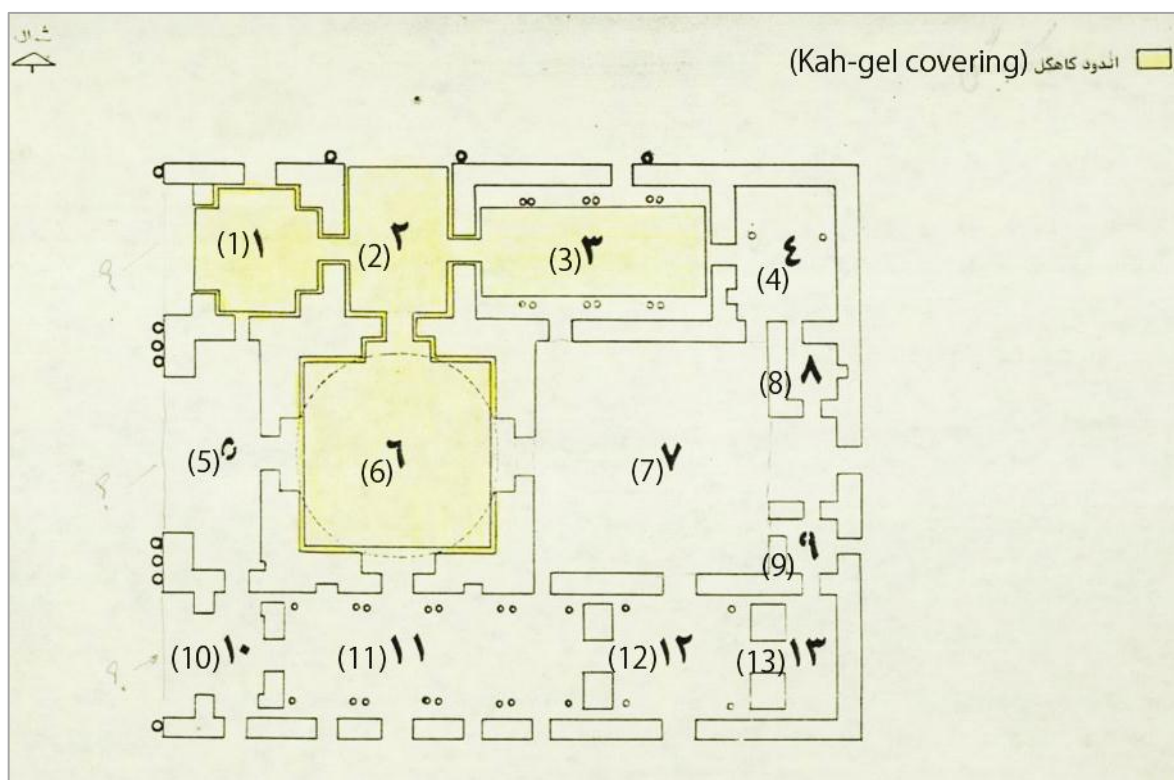
Map 27. Positioning of proceedings

1991 to 2015

- Conservation and restoration:
- *Kah-gel* covering of the floor for the purpose of directing rainwater;
- Restoration of the north room of the small dome using rubble trench;



Photo 53. *Kah-gel* covering surfaces for directing rainwater. Left: flooring of the dome house. 1991. Center of heritage documents.

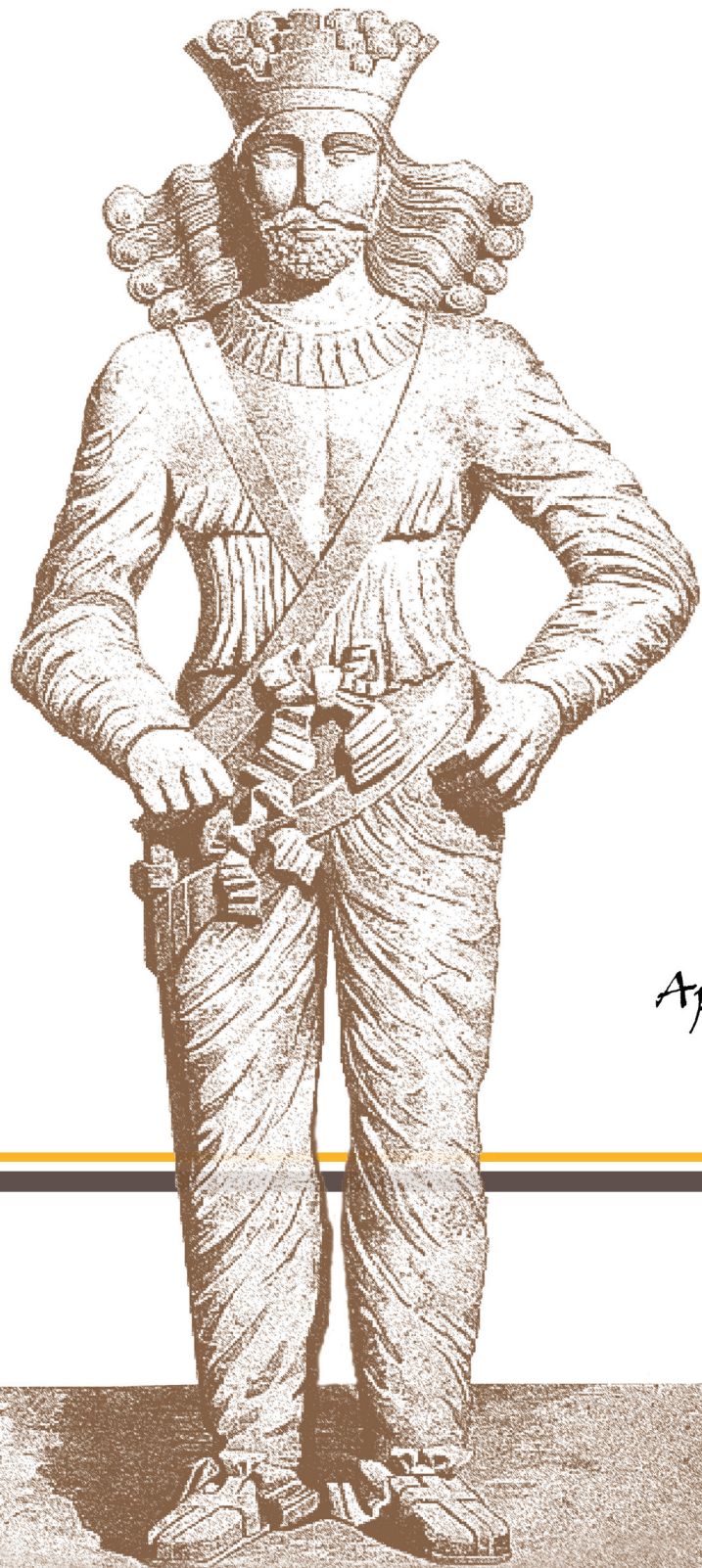


Map 28. Positioning of proceedings

- Grading of the room floors;
- Specification of visitor pathways;
- Restoration and consolidation of cracks with traditional materials and grouting.
- The continuing of archeological researches, restorations, building conservation and executing the first season of archeological estimations in the palace boundaries (2002):
- Cleaning and clearing of the site;
- Creating a temporary parking area for visitors;
- Lighting of the site;
- The continuation of researches regarding conservation, restoration and the archeology of the building.



Photo 54. Renewal of the gypsum coverings



Appendix VI
Archaeologist & Researchers

Appendix VI: Archaeologists and researchers

The conservation activities of SALF began with Ghirshman's archeological excavations in the Bishapur cities in 1935 under the supervision of the antiquities office and were a beginning point for the start of research and conservation activities of there. These activities continued years later on other sites of this unique complex and under the supervision of experts and professionals. Some of the Authors, Researchers, Archaeologist & Architect which have studied the Sassanian Destiny are as fallows:



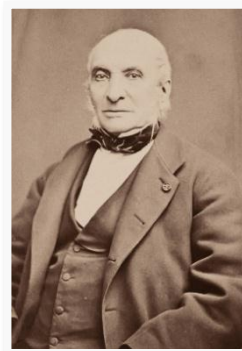
Sir Gore Ouseley
1770-1844

‣ British Diplomat, Entrepreneur & Linguist



James Justi Morier
1780-1849

‣ British Novelist & Diplomat
‣ He have Sketched the first Illustration of Bishapur in 1809



Xavier Pascal Coste
1787-1879

‣ French Architect
‣ Sarvestan, 1843
‣ Firuzabad, 1854



Jean-Baptiste Eugène Flandin
1809-1889

- French Orientalist, Archaeologist & Painter
- Sarvestan, 1843
- Firuzabad, 1854



Marcel August Dieulafoy
1844-1920
Jane Dieulafoy (Juan-Paul Rachel)
1851-1916

- French Civil Engineer
- Sarvestan & Firuzabad, 1884-1885



Sir Marc Aurel Stein
1862-1943

- Hungarian-British Archaeologist & Iranologist
- Sarvestan & Firuzabad, 1936



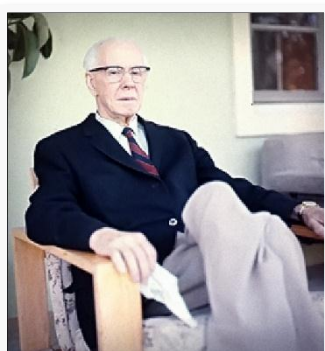
Ernst Emil Herzfeld
1879-1948

- German Archaeologist & Iranologist
- Tang-e Chogan, 1910 & 1928
- Firuzabad, 1926 & 1940-1941



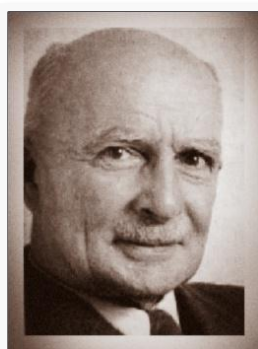
Oscar August Reuther
1880-1954

› German Archaeologist Historian



Arthur Upham Pope
1881-1969

› American Archaeologist & Architecture



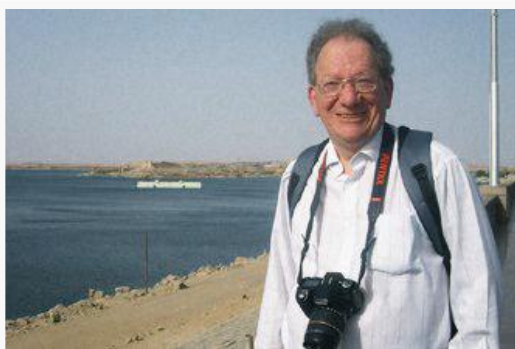
André Godard
1881-1965

› French Archaeologist ,Architecture & Historian
› Firuzabad, 1938



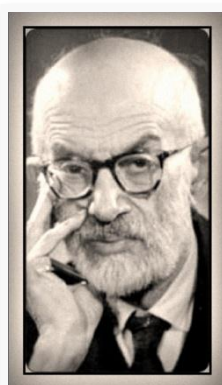
Roman Ghirshman
1895-1979

› French Archaeologist
› Bishapur, 1935-1937
› Firuzabad, 1947
› Tang-e Chogan, 1950



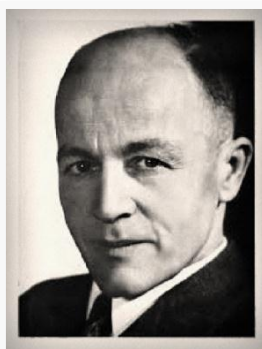
Martin Charlesworth
1895-1950

› British Classical Scholar



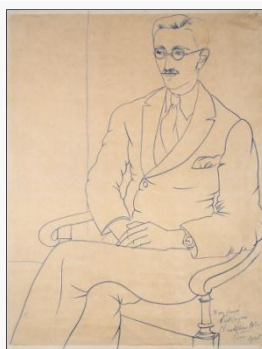
Saeed Nafisi
1895-1966

› Iranian Scholar, Fiction Writer and Poet



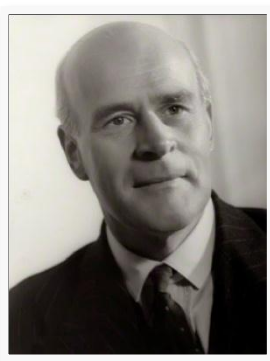
Erich Friedrich Schmidt
1897-1964

› German-American Archaeologist



Gerald Robert Reitlinger
1900-1978

› British Art Historian



David Talbot Rice
1903-1972

- › British Art Historian
- › Bishapur, 1935
- › Tang-e Chogan, 1964



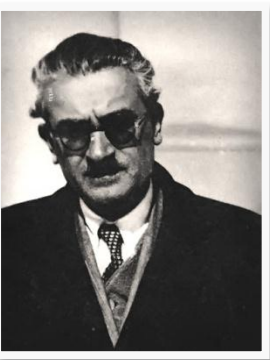
Robert Byron
1905-1941

- › British Author, Historian, Art Critic



Maxime Siroux
1907-1976

- › French Archaeologist
- › Kazerun, 1938
- › Sarvestan, 1973



Ali Sami
1910-1989

- › Iranian Excavation & Researcher



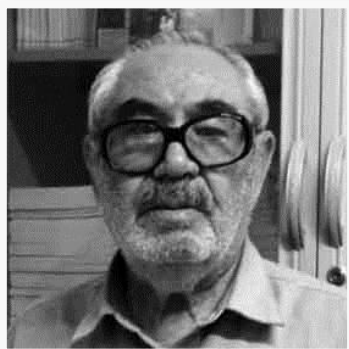
Richard N. Frye
1920-2014

› American Iranian & Central Asian Studies



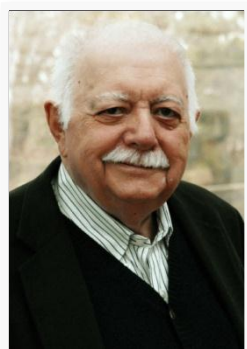
Louis Vanden Berghe
1923-1993

› Belgian Archaeologist



Ali Akbar Sarfaraz
1928

› Iranian Archaeologist
› Bishapur, 1970-1971



Oleg Grabar
1929-2011

› French Art Historian & Archaeologist
› Sarvestan, 1968



Dieterich Huff

1934

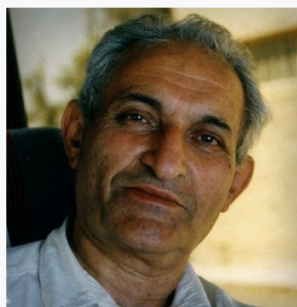
- › German Architecture
- › Firuzabad, 1969, 1972 & 1975



Georgina Herrmann

1937

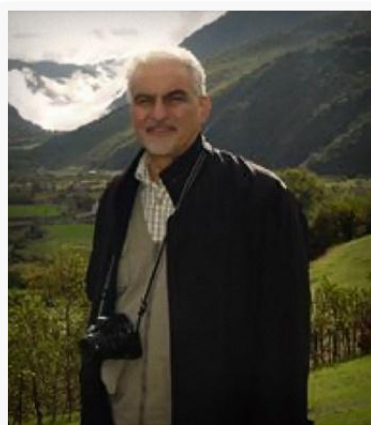
- › British Archaeologist



Mohammad Mehryar

1939-2004

- › Iranian Archaeologist & Restoration
- › Bishapur, 1995 & 1998-1999



Masoud Azarnoush

1945-2008

- › Iranian Archaeologist
- › Firuzabad, 2007



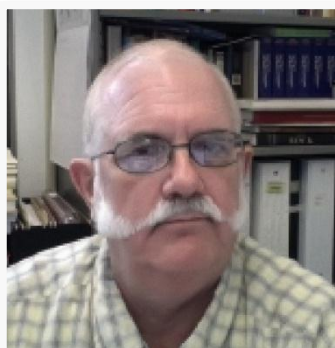
Remy Boucharlat
1948

› French Archaeologist



Vesta Sarkhosh Curtis
1951

› Responsible for the British Museum's
collection of pre-Islamic Iranian coins



Donald Whitcomb

› American Archaeologist



Barbara Kaim

› Head of the Polish Archaeological
Mission in Iran and Central Asia



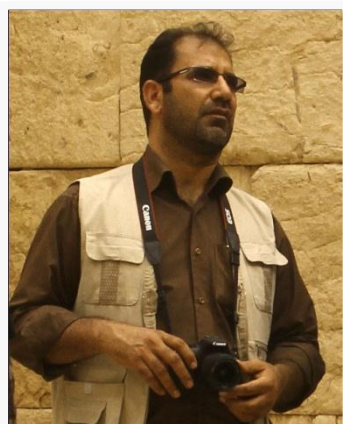
Bruno Overlate
1958

› Belgium Archaeologist



Mosayeb Amiri
1967

› Iranian Archaeologist
› Firuzabad, 1999



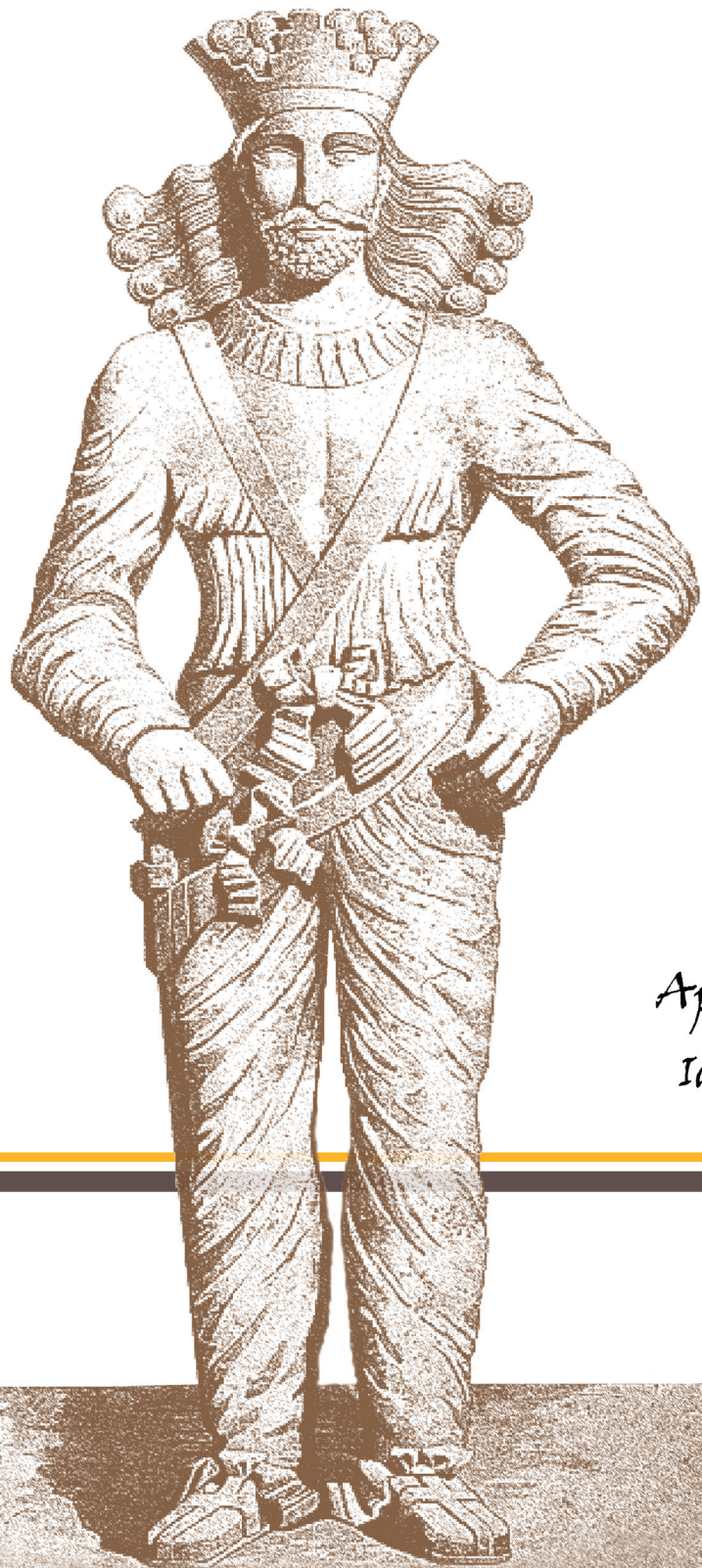
Reza Norouzi
1970

› Iranian Archaeologist
› Bishapur, 2001



Alireza Askari Chaverdi
1976

› Iranian Archaeologist
› Sarvestan, 2001-2003



Appendix VII
Identification of Museum Objects

Appendix VII: Identification of museum objects

During archaeological excavations, a large number of Sassanid relics including Coins, pottery, etc. have been found and displaying in several Iraninan and international museums such as British Museum, Louvre and Iraninan National Museum (Iran-e Bastan). Some of which are Presented below:



Silver Bowl

Technical description:

- › Sassanian period, circa 4th-6th century A.D.
- › The rounded bowl decorated on the interior with a central medallion with an eagle facing right, its wings spread, the feathers with hatched chevrons and stippling, enclosed by eight smaller medallions each with different types of birds in various poses arranged in facing pairs, the rim off-set on the interior 6.13/16 in. (17.3 cm) in diameter.

Source: www.pinterest.com/ Found on christies.com
(Accessed 2015-06-16)



Silver plate

Technical description:

- › Sassanian period, 225-650 CE
- › Silver plate showing a king hunting

Source: www.pinterest.com/ Found on benedante.blogspot.com.br
(Accessed 2015-06-16)



Decorated Plate

Technical description:

- › Sassanian period
- › A post-Sassanian prince, Pour e Vahman, engaged in a royal hunt of boars and lions. The ancient Iranian practice of the Royal Hunt, especially in the hunting of boars and lions, is one of many Near Eastern traditions that have parallels in European culture and mythology.
- › Hermitage Museum, St. Petersburg.

Source: www.pinterest.com/ Found on eurasianhuns.blogspot.com.au
(Accessed 2015-06-16)



Silver-Gilt Plate

Technical description:

- › Sassanian period
- › Dating To 600-700 AD.
- › Miho Museum, Japan

Source: www.pinterest.com/ Found on flickr.com
(Accessed 2015-06-17)



Decorated Dish

Technical description:

- › Sassanian period, 225-650 CE.
- › Dish decorated with boars

Source: www.pinterest.com/ Found on benedante.blogspot.com.br
(Accessed 2015-06-16)



Plate

Technical description:

- › Plate Persia, 225-630 AD
- › The Museum of Fine Arts, Boston

Source: www.pinterest.com/ Found on omgthatartifact.tumblr.com
(Accessed 2015-06-17)



Silver Plate

Technical description:

- › Sassanian Dynasty
- › 457-483 AD
- › Hermitage Museum, St. Petersburg.

Source: www.pinterest.com/ Found on jashnhaz.blogfa.com
(Accessed 2015-06-17)



Silver Plate (Plate with king hunting rams)

Metropolitan Museum of Art

Technical description:

- › late 5th -early 6th century; Sassanian period; Iran
- › Silver, mercury gilding, niello inlay; H. 1 7/8 in. (4.6 cm), Diam. 8 5/8 in. (21.9 cm)
- › Fletcher Fund, 1934 (34.33)
- › The king as hunter becomes a standard motif on royal Sassanian silver plates during the reign of Shapur II (309–79). The theme symbolized the invincibility and the prowess of Sassanian rulers and dominated the royal plates, which may have been used as gifts to neighboring courts. The king has various royal attributes:
A crown and fillet, covered globe, nimbus with beaded border, and beaded chest halter with fluttering ribbons. The identity of the Sassanian king on this plate is uncertain. His crown identifies him as either Peroz (r. 459-84) or Kavad I (r. 488-97, 499-531)

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-21)



Silver Plate (Delegation of power)
British Museum

Technical description:

- › The central scene shows a seated king offering a ring as a symbol of power to a standing figure. The royal throne is supported by mythical winged beings, who act as guardians of kingship. The lower register shows two figures. One stands and offers a diadem (headband) to a seated figure. A banquet scene surrounds the central theme.

Source: www.britishmuseum.org
(Accessed 2015-06-17)



Silver Plate

Technical description:

- › Sassanian period

Source: www.pinterest.com
(Accessed 2015-06-17)



Silver Plate

(Plate with a hunting scene from the tale of Bahram Gur and Azadeh)
Metropolitan Museum of Art

Technical description:

- › 5th century; Sassanian period; Iran
- › Silver, mercury gilding; Diam. 7.9 in. (20.1 cm)
- › Purchase, Lila Acheson Wallace Gift, 1994 (1994.402)
- › The great Iranian epic the *Shahnameh*, or Book of Kings, as recorded by Firdausi in the late tenth to early eleventh century, includes a tale of the Sasanian king Bahram V (r. 420–38), who was challenged to feats of archery by his favorite lyre player, Azadeh. With great skill, Bahram "Gur" (Wild Ass) shot an arrow that removed the horns of a male gazelle, transforming his appearance into that of a female, and shot two arrows into the head of a female gazelle, transforming her appearance into that of a male. The story became a favorite theme in the arts of Islam but was unknown on works of Sasanian date until the appearance of this gilt-silver plate

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-21)



Silver Plate

(Silver Gilt Plate Depicting a King Wrestling a Leopard)

Technical description:

- › Silver gilt, 5th-6th century C.E.
- › D. 21 cm

Source: www.flickr.com (Text and image from the website of the Miho Museum)
(Accessed 2015-06-21)



Silver Plate

(Sassanian Silver Gilt Plate Depicting a Royal Lion Hunt)

Technical description:

- › Silver gilt, 5th century C.E.
- › D. 23 cm

Source: www.flickr.com (Text and image from the website of the Miho Museum)
(Accessed 2015-06-21)



Silver Plate (Plate with youths and winged horses)

Metropolitan Museum of Art
On view in Gallery 405

Technical description:

- › Period: Sassanian
- › Date: ca. 5th-6th century A.D.
- › Geography: Iran
- › Culture: Sassanian
- › Medium: Silver, mercury gilding
- › Dimensions: H. 5.2 × Diam. 21 cm, 572g (2 1/16 × 8 1/4 in.)
- › Credit Line: Fletcher Fund, 1963
- › Accession Number: 63.152

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-21)



Silver Plate (The king Yazdgard I, slaying a stag)

Metropolitan Museum of Art
On view in Gallery 405

Technical description:

- › Period: Sassanian
- › Date: ca. A.D. 399-420
- › Geography: Iran
- › Culture: Sassanian
- › Medium: Silver, mercury gilding
- › Dimensions: Plate: Diam. 23.3-23.4 H. 3.3 Thickness at rim: 0.24-0.29
Foot: Diam. 7.6-7.7 H. 1.1 Thickness: 0.22-0.26 Weight: 713 gm
- › Credit Line: Harris Brisbane Dick Fund, 1970
- › Accession Number: 1970.6

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-21)



Silver Plate (From Narseh to Shapur II)

British Museum
Room 52: Ancient Iran

Technical description:

- › Sassanian period
- › king hunting
- › Height: 12.8 cm, Width: 11.5 cm, Depth: 2.6 cm
- › Bequeathed by Sir A.W. Franks

Source: www.britishmuseum.org
(Accessed 2015-06-17)



Silver Plate

(A Sassanian Silver Plate with Herakles and the Erymanthian Boar)

Technical description:

- › Silver partially gilt, 5th-7th century C.E
- › Diam. 19.9 cm.; W. 500.53 grams
- › Made from a disc of silver sheet hammered into shape, leaving a thickened rim. The emplacement for the relief parts are outlined, grooved out, the background roughened. The relief elements are solid and prepared by hammering; once inserted the joins are annealed. The whole is touched up in the cold; the flowers punched in, the details of the feline's skin and the decoration of the pot done with tracer and punch. Different parts are mercury-gilt: The edge of the dish, the wavy line for the ground and all the inlays save for the faces and necks of Herakles, Eurystheus and the latter's hands. The plate was then burnished and polished; its foot, a hammered ring of silver made from a strip, soldered on.

Source: www.flickr.com (Text and picture from the website of George Ortiz)
(Accessed 2015-06-16)



Silver Plate

Metropolitan Museum of Art

Technical description:

- › Period: Sassanian, ca. A.D. 310-79
- › Geography: Iran, Sassanian
- › Medium: Silver, partly gilt
- › Dimensions: Height: 1.9 inches (4.8 cm), Diameter: 9.13 inches (23.2 cm)
- › Credit Line: Cora Timken Burnett Collection of Persian Miniatures and Other Persian Art Objects, Bequest of Cora Timken Burnett, 1956
- › Accession Number: 57.51.19

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-22)



Silver Plate

Technical description:

- › Sassanid era
- › Silver plate with gold coating,
- › Azerbaijan Museum, Tabriz, Iran

Source: commons.wikimedia.org
(Accessed 2015-06-30)



Silver-gilt Dish

Technical description:

- › Tabaristan (south of the Caspian Sea), northern Iran, 8th century.
- › Diameter: 19,7 cm.
- › On this dish a ruler in Sassanian costume and his wife are seated on a sofa, surrounded by musicians, under an overhanging vine with ripe grapes. The dish shows further wine jugs in a cooler, a water bottle made of animal skin and a pot suspended over a fire, all items needed for an outdoor banquet.
- › Photo Taken on: October 4, 2012, Canon 7D.

Source: www.flickr.com (© License Copyright All rights reserved by f_snarfel)
(Accessed 2015-07-12)



Silver Plate, Simurgh (Sēnmurw)

Technical description:

- › Sassanid era
- › 7th or 8th century CE

Source: <https://en.wikipedia.org/> (© License Copyright All rights reserved by Nickmard Khoey) (Accessed 2015-11-12)



Bowl with female busts in medallions

Metropolitan Museum of Art

Technical description:

- › Period: Sassanian
- › Date: ca. 3rd-4th century A.D.
- › Geography: Iran
- › Culture: Sassanian
- › Medium: Silver
- › Dimensions: Diam. 23.6-24.1 H. 8.1 thickness: at rim 0.62 Weight: 1235 gm.
- › Credit Line: Harris Brisbane Dick Fund, 1970
- › Accession Number: 1970.5

Source: www.metmuseum.org/ The Collection Online (Accessed 2015-06-22)



Gilt Elliptical Bowl

Technical description:

- › Silver Gilt, 6th-7th century B.C.E.
- › W. 13.3 cm
- › The decoration on the exterior of the bowl is characteristically Sasanian. Grapevines and ornamental scrolls cover the surface. In the field in between the tendrils are four creatures: a pheasant, a fox, a jackal, and a saluki, or hunting dog. A small guinea fowl appears in a central medallion. References to animals of the hunt and Game Park as well as to grapevines are appropriate on a luxury vessel undoubtedly used at court banquets and festivities. The design is in relief, the background having been carved away and covered with gilding. Beneath the rim is a band of beading and a half-palmetto pattern.

Source: www.pinterest.com/ Found on flickr.com (Text and image from the website of the Miho Museum)/ (Accessed 2015-06-16)



Oval bowl with grapevine scrolls inhabited by birds and animals

Metropolitan Museum of Art

Technical description:

- › Period: Sassanian
- › Date: ca. 6th-7th century A.D.
- › Geography: Iran
- › Culture: Sassanian
- › Medium: Silver, mercury gilding
- › Dimensions: 2.76 × 4.37 × 9.17 in. (7.01 × 11.1 × 23.29 cm)
- › Credit Line: Fletcher Fund, 1959
- › Accession Number: 59.130.1

Source: www.metmuseum.org/ The Collection Online (Accessed 2015-06-22)



Bowl with a male bust within a medallion

Metropolitan Museum of Art

Technical description:

- Period & Date: Sassanian; ca. A.D. early 4th century
- Geography & Culture: Iran; Sassanian
- Medium: Silver
- Dimensions: Diam. 23.3-23.6 H. 7.2 Thickness at rim: 0.44-0.56 Weight 597 gm
- Credit Line: Harris Brisbane Dick Fund, 1955
- Accession Number: 55.57

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-23)



Bowl

The Cleveland Museum of Art

Technical description:

- Iran, Sassanian, 6th-8th century
- Silver, Overall
- H: 5.00 w: 13.40 cm (h: 1 15/16 w: 5 1/4 inches).
- Purchase from the J. H. Wade Fund 1966.369

Source: www.clevelandart.org/ The Collection Online
(Accessed 2015-06-23)



Oval bowl with running tigresses on each side

Metropolitan Museum of Art

On view in Gallery 405

Technical description:

- Period & Date: Sassanian; ca. 6th-7th century A.D.
- Geography: Iran
- Culture: Sassanian
- Medium: Silver, niello inlay
- Dimensions: 3.86 × 6.42 in. (9.8 × 16.31 cm)
- Credit Line: Gift of Norbert Schimmel Trust, 1989
- Accession Number: 1989.281.37

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-23)



Half-lobed Bowl

Metropolitan Museum of Art

Technical description:

- Period: Sassanian
- Date: ca. 6th century A.D.
- Geography: Iran
- Culture: Sassanian
- Medium: Silver
- Dimensions: 2.05 × 5.2 × 7.87 in. (5.21 × 13.21 × 19.99 cm)
- Credit Line: Rogers Fund, 1991
- Accession Number: 1991.73

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-23)



Bowl

The Cleveland Museum of Art

Technical description:

- › Iran, Sassanian, 4th-6th Century
- › Silver, Overall
- › H: 6.40 w: 14.00 l: 28.40 cm (h: 2 1/2 w: 5 1/2 l: 11 1/8 inches).
- › John L. Severance Fund 1963.478
- › Location: Gallery 102a

Source: www.clevelandart.org/ The Collection Online
(Accessed 2015-06-27)



Sassanian Coin (Ardashir I wearing a bejeweled Crown)

British Museum

Technical description:

- › The Sasanian kings always wore a distinctive crown, often bearing the symbol of their favorite *yazata* or divine being. As the coin inscriptions mention the personal name of the king, it is possible to identify different kings on rock-reliefs and small objects by their crown.
- Ardashir I (224-241) wore several different combinations of headgear during his reign: a tall bejeweled hat; a *diadem* or headband; and a cap with a *diadem* and silk-covered ball of hair. All these types have on the back the Zoroastrian fire altar and throne. The rock relief pictured here, from Naqsh-e Rostam near Persepolis, southern Iran.

Source: www.britishmuseum.org
(Accessed 2015-06-20)



Sassanian Coin (Shapur I and Fight against Rome)

British Museum

Technical description:

- › Shapur I, the eldest son of Ardashir, was appointed joint ruler in 240, towards the end of his father's reign. He is depicted in a number of rock-reliefs wearing a stepped crown. Coins show him alongside his father wearing a plain hat. Sometimes he is shown with a hat terminating in a bird's head; this may have been the image of Shapur as crown prince or joint ruler.

Source: www.britishmuseum.org
(Accessed 2015-06-20)



Sassanian Coin (The reign of Bahram II)

British Museum

Technical description:

- › This coin was minted during the reign of Bahram II (ruled 276-293), great-grandson of Ardashir I. He is frequently depicted, as here, with his wife and heir. The inspiration for such family portraits on coins seems to have come from Rome, with which the Sasanians had frequent contact through trade and war.
- Bahram II always wears a diadem (headband) with feathers, the symbol of Verethragna, his favourite *yazata*. Verethragna is the warrior god, the victorious force against Evil, who together with Atar (fire) protects the God-given Glory, the *khvarenah*.

Source: www.britishmuseum.org
(Accessed 2015-06-20)



Sassanian Coin (The founder of the dynasty)
British Museum

Technical description:

- › The front of this gold coin shows Ardashir I, the first Sasanian ruler. He is depicted with long hair and a tall, bejewelled crown. An inscription in Middle Persian gives his personal name and describes him as worshipper of Ahura Mazda, the Zoroastrian Wise Lord, and as king of kings of Iran. The back of Ardashir's coin depicts a Zoroastrian fire altar and a royal throne. This combination symbolizes the unity of religion and state. The throne has lion's paw legs, which were copied from ancient Persian reliefs of the fifth century BC at Persepolis.

Source: www.britishmuseum.org
(Accessed 2015-06-20)



Sassanian Coin (War with Byzantium)
British Museum

Technical description:

- › This coin shows on the front Khusrow II with his winged crown, the symbol of Verethragna, the god of Victory. A star and moon crescent tops the crown and also appears in the margin. The back shows Anahita, the goddess of Fertility and all Waters, whose symbols are a star and moon crescent. A halo of flames surrounds her head.

Source: www.britishmuseum.org
(Accessed 2015-06-20)



Sassanian Coin (The Arab-Sassanian period)
British Museum

Technical description:

- › These coins show the portrait of Khusrow II (590-628) on the front and a Zoroastrian fire altar on the back. This silver "Dirham" was minted by Ziyad-ibn Abi Sufyan, Arab governor in southern Iran. There are inscriptions on both sides of the coin: The governor's name on the front and the mint and date on the back are in Middle Persian. The margin, however, shows in Arabic *bismillah rabbi*, 'in the name of Allah, the Lord'. The Sassanian crescent and star has remained popular to this day.

Source: www.britishmuseum.org
(Accessed 2015-06-20)



Sassanian Coin (Drachma)

Technical description:

- › Sassanian, Iran, reign of Hormizd II, 303-309

Source: www.pinterest.com/ Found on clevelandart.org
(Accessed 2015-06-21)



Sassanian Coin (Silver dirhem)

Technical description:

- › King Peroz I, 459-484 AD., Second Crown. Crowned and cuirassed bust right, ribbons rising from shoulders, degraded Pahlavi legend around / Fire altar with attendants and ribbon, star and crescent flanking flames. Struck on nice full flan with high relief & lustrous surfaces.

Source: www.pinterest.com/ Found on ancientresource.com
(Accessed 2015-07-12)



Silver-Gilt Vessels

Technical description:

- › Sassanian period
- › 5th-7th Century AD

Source: www.pinterest.com/ Found on iranichamber.com
(Accessed 2015-06-16)



Bottle decorated with figures of female dancers

Louvre Museum

Department of Near Eastern Antiquities: The Middle East after Alexander's Conques

Technical description:

- › This gilded silver bottle decorated with elegant female dancers is typical of Sassanid metalwork. It hints at the sumptuous luxury of royal and religious feasts during the Sassanid era.
- › H: 18 cm; L: 11 cm

©2008 RMN/Franck Raux
Source: www.louvre.fr/en (Accessed 2015-06-17)



Vessels

Metropolitan Museum of Art

On view in Gallery 405

Technical description:

- › Period: Sassanian
- › Date: ca. 6th-7th century A.D.
- › Geography: Iran
- › Culture: Sassanian
- › Medium: Silver, mercury gilding
- › Dimensions: 6.81 in. (17.3 cm)
- › Credit Line: Rogers Fund, 1962
- › Accession Number: 62.78.2

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-22)



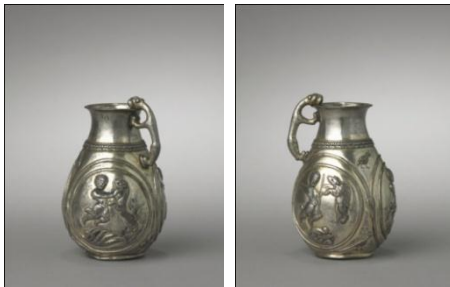
Silver Gilt Vase Decorated with Attacking Lions

Miho Museum

Technical description:

- Period: Sassanian; 7th-8th century C.E.
- H. 16.5 cm
- Each of the three principle scenes on this vase—which are enclosed by medallions—portrays a lion attacking a weaker animal: an ibex, a wild sheep, or an onager (wild ass). The spaces in between are filled with a bird and a rosette, with either a rabbit, a caprid, or a dog. All of the decoration, including the distinctive collar around the shoulder of the vessel, is rendered in repoussé, which is set against the gilt background.

Source: www.pinterest.com/ Found on flickr.com (Text and image from the website of the Miho Museum) (Accessed 2015-06-27)



Hunt Pitcher

The Cleveland Museum of Art

Technical description:

- Sassanian, Iran, 6th-7th Century
- Silver, Overall
- H: 13.40 w: 9.00 cm (h:5 1/4 w:3 1/2 inches).
- Purchase from the J. H. Wade Fund 1961.200
- Location: Gallery 102a

Source: www.clevelandart.org/ The Collection Online (Accessed 2015-06-27)



Vessels

Technical description:

- Period: Sassanian

Source: www.pinterest.com/ Uploaded by user (Accessed 2015-06-27)



Silver-Gilt Vessels (Ewer with dancing females within arcades)

Metropolitan Museum of Art

Technical description:

- 6th century; Sasanian style; Iran
- Silver, mercury gilding; H. (a) 13.4 in. (34 cm)
- Purchase, Mr. & Mrs. Douglas Dillon Gift and Rogers Fund, 1967 (67.10a,b)
- Late Sassanian silver vessels, particularly bottles and ewers, often were decorated with female figures holding a variety of festal objects. The appearance of these motifs attests to the continuing influence of Greek imagery associated with the wine god Dionysus. On this silver-gilt vessel, floral arches, supported by low pilasters, frame four dancing female figures. Each holds a ceremonial object in either hand: grape and leaf branches, a vessel, a heart-shaped flower. Beneath one arcade, birds peck at fruit, and beneath another a tiny panther drinks from a ewer. Both the females and their decorative motifs recall representations of the maenads, attendants of Dionysus.

Source: www.metmuseum.org/ The Collection Online (Accessed 2015-06-21)



Stepped Pitcher

The Cleveland Museum of Art

Technical description:

- › Sassanian, Iran, 5th-7th Century
- › Silver, Overall - h: 35.60 cm (h: 14 inches) Wt: 1,589 grams.
- › Purchase from the J. H. Wade Fund 1966.21
- › The Sassanians are best known today for their expert work in silver. This Museum is fortunate to have one of the most important collections of Sassanian silver vessels in the world.
- › Location: Gallery 102a

Source: www.clevelandart.org/ The Collection Online
(Accessed 2015-06-27)



Stepped Pitcher

The Art Walters Museum

Technical description:

- › 7th-8th century (late Sassanian-early Islamic)
- › Brass with copper inlay; 14 5/8 × 7 7/8 × 7 in. (37.2 × 20 × 17.8 cm)
- › This ewer with geometric and floral designs, exemplifies a group of cast brass ewers, which may belong to the earliest known examples of Islamic metalwork. It is distinguished by its pear-shaped body, elegant palmette handle, and vegetal designs in bold relief.
- › Accession Number: 54.457

Source: www.art.thewalters.org/ The Collection Online
(Accessed 2015-06-27)



Ewer

The Smithsonian's Museums of Asian Art

Technical description:

- › Sasanian period, Iran
- › Silver gilt
- › H: 34.6 W: 15.5 D: 12.2 cm

Source: www.asia.si.edu/collections
(Accessed 2015-07-12)



Footed cup with human busts in medallions

Metropolitan Museum of Art

Technical description:

- › Period: Kushano-Sassanian
- › Date: ca. 3rd–4th century A.D.
- › Geography: Bactria
- › Culture: Kushano-Sassanian
- › Medium: Silver, gilt
- › Dimensions: Height with foot 2-5/16 in. (5.8 cm) Diam. rim 3.33 in. (8.5 cm) Height without foot 1.5 in. (3.5 cm) Weight 145.9 gm
- › Credit Line: Purchase, Louis V. Bell Fund, 2000
- › Accession Number: 2000.503

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-22)



Head of a king

Metropolitan Museum of Art

Technical description:

- › 4th century; Sassanian period; Iran
- › Gilded silver; H. 15 3/4 in. (40 cm)
- › Fletcher Fund, 1965 (65.126)
- › This royal head, hammered from a single sheet of silver, with chased and repouse details, has parallels in imperial portraits made in the Roman West. The king wears simple ovoid earrings and a beaded necklace of Sassanian fashion. His powerful stare and characteristic arched nose seem to suggest that the artist was attempting to convey a sense of majesty rather than an individual likeness. The identity of the subject of such representations, in relief or in the round, can often be determined by comparison of facial features and details of the crown with those of kings portrayed on Sassanian coins of the period. In this case, however, the crescent that decorates the crenellated crown and the striated orb that rises above it have no exact parallel. It does appear, however, on crowns worn by Kushano-Sassanian rulers. No crescent is seen on the official crowns of Shapur II, but a rock relief at Taq-i Bustan depicts Shapur III (r. 383–88) in a similar fashion.

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-21)



Horse's head

Technical description:

- › The Louvre, Sassanian; 6th-7th
- › silver-gilt horse's head

Source: www.flickr.com (by Julianna Lees on Flickr)
(Accessed 2015-06-21)



Vessel

Technical description:

- › Sassanian Dynasty; 4th century
- › Spouted vessel with gazelle protome
- › Silver and gilt

Source: www.pinterest.com (Found on all-things-andy-gavin.com)
(Accessed 2015-06-22)



Chapter 14 Rhyton in the form of a Saiga antelope head

Metropolitan Museum of Art

On view in Gallery 405

Technical description:

- › Period & Date: Sassanian; ca. 5th–6th century A.D.
- › Geography & Culture: Poland, said to be from Volhynia Choniakow; Sassanian
- › Medium: Silver-gilt
- › Dimensions: 11.1 x 7.09 in. (28.19 x 18.01 cm)
- › Credit Line: Rogers Fund, 1947
- › Accession Number: 47.100.82

Source: www.metmuseum.org/ The Collection Online
(Accessed 2015-06-23)



Horse-Shaped Drinking Vessel

The Cleveland Museum of Art

Technical description:

- Iran, Sassanian, 3rd-4th Century
- Silver, partially gilt, Overall
- H:12.00 w:10.80 d:32.70 cm (h:4 11/16 w:4 1/4 d:12 13/16 inches)
- John L. Severance Fund 1964.41
- Location: Gallery 102a

Source: www.clevelandart.org/ The Collection Online
(Accessed 2015-06-27)



Mosaic Work of a woman playing the harp

Louvre Museum

Department of Near Eastern Antiquities: The Middle East after Alexander's Conquest

Technical description:

- Iran Bishapur, "palace" of Shapur I
- Marble Mosaic
- This mosaic panel, made of stone tesserae, shows a harpist. It was part of the decoration of the Iwān of the "palace" of Shapur I at Bishapur, the new capital of the Sassanid Empire, built after the king's victories over Rome. Iranian heritage and Greco-Roman influences are combined in both the technique and the imagery (musician, interlacing, cubes).
- Excavations Ghirshman, about 1939 - 1941

©2005 RMN/Franck Raux

Source: www.louvre.fr/en (Accessed 2015-07-12)



Mosaic Work

Louvre Museum

Department of Near Eastern Antiquities: The Middle East after Alexander's Conquest

Technical description:

- Iran Bishapur, "palace" of Shapur I
- Marble Mosaic
- Excavations Ghirshman, about 1939 - 1941

©2005 RMN/Franck Raux

Source: www.louvre.fr/en (Accessed 2015-07-12)



Mosaic Work (Floor covering panel)

Louvre Museum

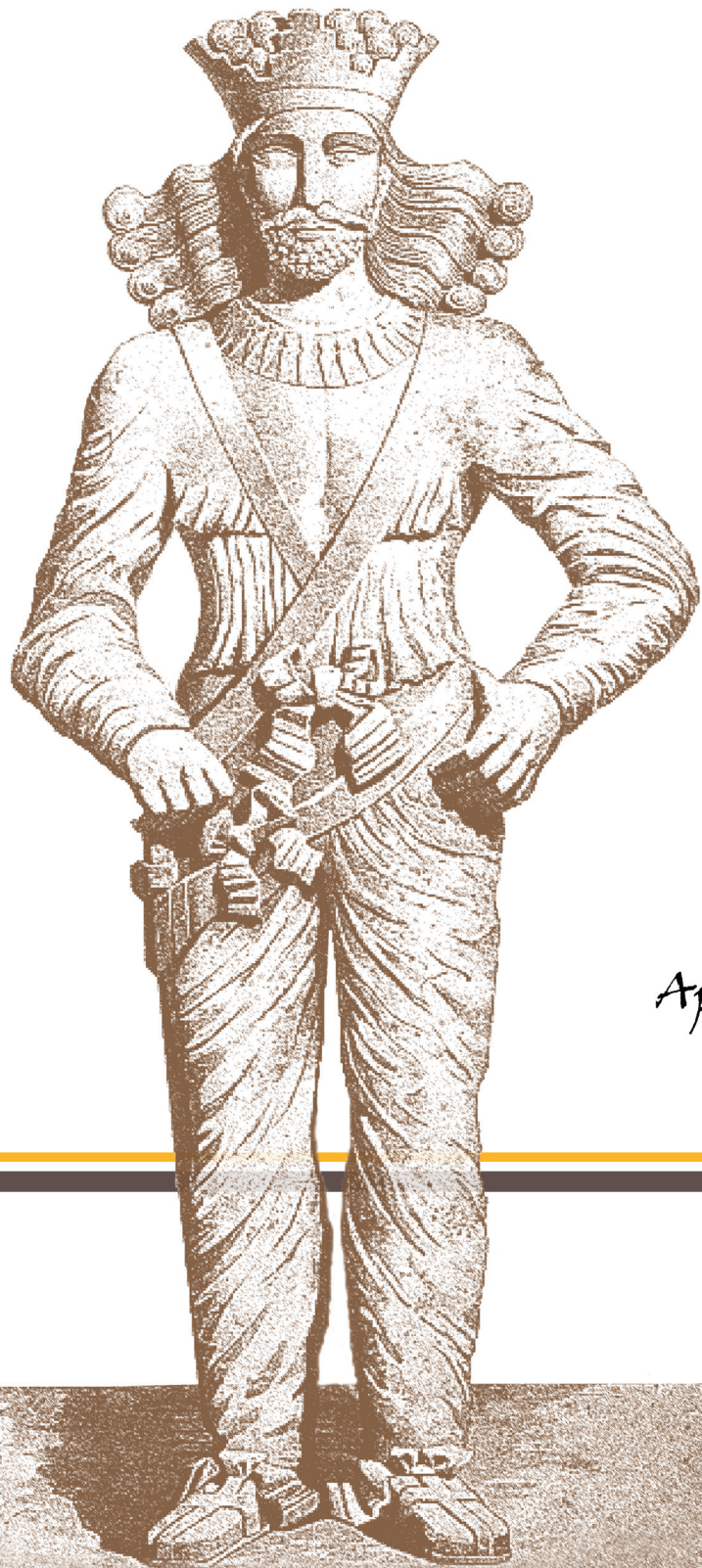
Department of Near Eastern Antiquities: The Middle East after Alexander's Conquest

Technical description:

- Iran Bishapur, "palace" of Shapur I, ground of "Iwan"
- Marble Mosaic
- H. 6.4 cm; W. 8.5 cm
- Excavations Ghirshman, about 1939 - 1941

©2005 RMN/Franck Raux

Source: www.louvre.fr/en (Accessed 2015-07-12)



Appendix VIII

Slides



(1)



(2)



(3)



(4)



(5)



(6)



(7)



(8)



(9)



(10)



(11)



(12)



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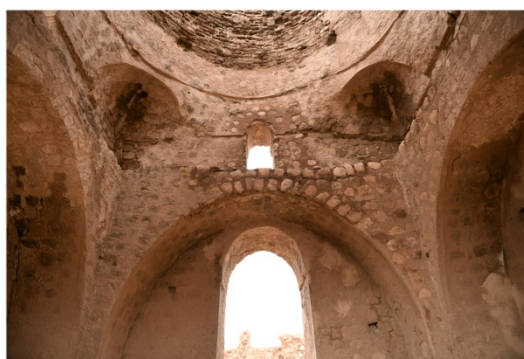
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(1)



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(5)



(6)



(7)

Aerial View



(01-Qal'eh Dokhtar)



(02-Qal'eh Dokhtar)



(03-Qal'eh Dokhtar)



(04-Qal'eh Dokhtar)



(05-Qal'eh Dokhtar)



(06-Ardashir khurreh/gur)



(07-Ardashir khurreh/gur)



(08-Ardashir khurreh/gur)



(09-Ardashir khurreh/gur)



(10-Ardashir Palace)



(11-Ardashir Palace)



(12-Ardashir Palace)



(13-Ardashir Palace)



(14-Ardashir Palace)



(15-Bishapur)



(16-Bishapur)



(17-Bishapur)



(18-Bishapur)



(19-Bishapur)



(20-Bishapur)



(21-Bishapur)



(22-Bishapur)



(23-Sarvestan Monument)



(24-Sarvestan Monument)



(25-Sarvestan Monument)