
Đeni GOBIĆ-BRAVAR, Luana MILOTIĆ BULIĆ

MOZAIK “KAŽNJAVANJE DIRKE” U PULI, KONZERVATORSKO-RESTAURATORSKI OSVRT “THE PUNISHMENT OF DIRCE” MOSAIC AT PULA, A CONSERVATION-RESTORATION REVIEW

Đeni Gobić-Bravar
Arheološki muzej Istre
Carrarina 3, 52100 Pula
geni.gobic.bravar@gmail.com

Luana Milotić Bulić
Arheološki muzej Istre
Carrarina 3, 52100 Pula
luana.milotic.bulic@gmail.com

Đeni Gobić-Bravar
Archaeological Museum of Istria
Carrarina 3, 52100 Pula
geni.gobic.bravar@gmail.com

Luana Milotić Bulić
Archaeological Museum of Istria
Carrarina 3, 52100 Pula
luana.milotic.bulic@gmail.com

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Nastavljajući projekt Arheološkog muzeja Istre kojim se želi dokumentirati stanje i planirati budućnost pulskih spomenika, obavljena je analiza antičkog mozaika s prikazom kažnjavanja Dirke, zajedno s okolnim zidovima i freskama. Analiza je uključila sakupljanje dokumentacije o mozaiku od vremena njegova otkrića, izradu fotogrametrijskih snimaka, laboratorijske analize te mapiranje prisutnih degradacija. Ovim se člankom želi sažeto prikazati rezultat tih radova, uz osvrt na moguće potrebne konzervatorsko-restauratorske zahvate te one usmjerene na ponovnu valorizaciju lokaliteta.

An analysis of the Roman mosaic showing the punishment of Dirce, together with the surrounding walls and frescoes, was performed, continuing thus the project of the Archaeological Museum of Istria, which aims to document the state and to plan the future of the monuments at Pula. This analysis comprised the collection of all documentation related to this mosaic since the time of its discovery, the making of a photogrammetric survey, laboratory analyses and maps showing the recorded degradations. The aim of this paper is to present in a concise manner the results of the above mentioned works, reviewing in the process the conservation-restoration operations that might be needed, as well as those aimed at the renewed valorization of the site.

KLJUČNE RIJEČI: mozaik, kažnjavanje Dirke, dokumentiranje, degradacija, konzervacija, restauracija

KEY WORDS: mosaic, the punishment of Dirce, documenting, degradation, conservation, restoration

OPIS NALAZIŠTA

U jesen 1958., u tadašnjoj pulskoj Ulici 1. maja br. 16, pristupilo se odstranjivanju ruševina preostalih iz Drugog svjetskog rata, u cilju buduće izgradnje stambene zgrade Državnog osiguravajućeg zavoda. Tom su prilikom ispod tankog sloja betonskog poda nekadašnje kinodvorane pronađeni ostaci starijih zidova. Pod vodstvom Štefana Mlakara otpočelo je arheološko istraživanje koje je otkrilo antičku prostoriju s mozaičnim podom i zidovima ukrašenim freskama (Mlakar 1962, 429). Zbog centralnog motiva mozaika, koji prikazuje mitološku pripovijest o kažnjavanju Dirke, on je danas poznat pod nazivom "Kažnjavanje Dirke".

DESCRIPTION OF THE SITE

The removal of ruins dating from WW II began in autumn of 1958, in what was at the time 1st of May Street no. 16, in order to erect there an edifice that was to house the State Insurance Company. It was on that occasion that the remnants of some older walls were discovered beneath a thin layer of concrete flooring of what used to be a cinema. An archaeological excavation led by Štefan Mlakar was started, which resulted in the discovery of a Roman structure that consisted of a mosaic floor, and walls decorated with frescoes (Mlakar 1962, 429). Nowadays this mosaic is called "The punishment of Dirce", because its central motif depicts a scene from the mythological tale about her punishment.



Sl. 1 Mozaik s prikazom kažnjavanja Dirke.
Fig. 1 The mosaic showing the punishment of Dirce.

Mozaična je ploha obrubljena crnim obrubnim pojasom. Pravilan geometrijski oblik središnjeg ukrašenog polja postignut je na način da se crni obrubni pojas širi od istočne prema zapadnoj stijeni te time poravnava kosi završetak sjevernog kraja prostorije. Na crni se pojas nastavlja bijeli te uzak crni i bijeli, a slijedi široki pojas polikromnog meandarskog ukrasa, bijela bordura te široki pojas ispunjen dvostrukom pletenicom. Meandarski je ukras izrađen oblikovanjem 56 pravilnih kvadratnih

The surface of the mosaic is bound with a black band. The regular geometrical shape of the central decorative field was attained by widening the aforementioned black band from the eastern towards the western wall, the result of which is the alignment of the skewed northern end of the room. The black band is followed by a white one, a narrow black and again a white band, followed by a wide belt with a polychrome meander decoration, another white

polja koja se izmjenjuju s 56 svastika. Motiv dvostrukog pletera izrađen je na bijeloj osnovi crnom, crvenom, ružičastom i žutom bojom, dok središta prepleta čine bijele tesere. Polikromna pletenica dijeli mozaik u mrežu od 40 ukrasnih polja. Na sjevernom dijelu mozaika osam je polja ukrašeno geometrijskim oblicima i stiliziranim biljnim ukrasima. Središnje je polje sjevernog dijela ispunjeno figuralnom kompozicijom s prikazom dva naga muška lika između kojih je bik kojega drže za rogove, dok je na dnu polja prikazan poluležeći ženski lik. Kompozicija prikazuje mitološke blizance Amfiona i Zeta u trenutku vezivanja Dirke za rogove pobješnjelog bika. Južni je dio mozaika podijeljen u 31 polje, osam oblika trokuta, šest trapeza i sedamnaest šesterokutnih polja. U trokutnim su poljima prikazane životinje: ribe, dupini te ptica. Poligonalna su polja ispunjena šesterolisnim rozetama. Središnji je ukras južnog dijela mozaika višelisna rozeta izrađena u kombinaciji crne i crvene boje (Mlakar 1962, 441; Meder 2004, 75-88, Meder 2003, 55). U polikromnom mozaiku zastupljene boje su bijela, crna, crvena, žuta, ružičasta, zelena i plava u brojnim nijansama. Ove su tesere izrađene kako iz lokalnih vapnenaca, tako i iz mramora koji su se u Istru uvozili iz dalekih kamenoloma (Gobić 1998). Nažalost, petrografska analiza obavljena pri Geološkom odsjeku Prirodoslovno-matematičkog fakulteta u Zagrebu nije omogućila prepoznavanje vrsta korištenih stijena u odnosu na njihovo porijeklo. Temeljem poznavanja vrsta kamena i mramora korištenih u antičko doba moguće je pretpostaviti da su crvene tesere antički crveni mramor porijeklom iz Grčke, a žute antički žuti mramor porijeklom iz sjeverne Afrike (Pensabene (ed.) 1998). Bijele i sive tesere su vjerojatno lokalni vapnenci dok je crne i ružičaste nemoguće identificirati bez petrografske analize usmjerene na determinaciju porijekla stijena korištenih u antici. Analizom mozaika utvrđen je jedan zanimljiv podatak – na ograničenom dijelu, detalju užeta kojim je vezan bik, korištene su crvene tesere od staklene paste.

Zidovi prostorije bili su prekriveni freskama, koje međutim nisu nikada posebno obrađene s povijesno-arheološkog stajališta. Dio je fresaka i danas moguće vidjeti *in situ*, na zidovima prostorije. Vizualnim pregledom te temeljem pisanih podataka (Mlakar 1962, 440) i starih fotografija iz razdoblja iskopavanja nalazišta izvedena je idejna rekonstrukcija originalnih boja. Slijedom izvještaja iz 1965. godine poznato je da je tijekom istraživanja nalazišta pronađeno oko 13.000 ulomaka freski koji su u tom periodu selektirani, oprani te pohranjeni u nove sanduke¹. Najprije su smješteni u prostore franjevačkog

band, and a broad belt containing a double plait. The meander decoration was executed by forming 56 square fields that alternate with 56 swastikas. The double plait motif was made on a white background using black, red, rose and yellow colors, while the centers of the plait are marked with white tesserae. The polychrome plait divides this mosaic into a net consisting of 40 decorative fields. Eight of these fields on the northern end of the mosaic are decorated with geometrical patterns and stylized vegetal ornaments. The central field of the northern section of the mosaic is filled with a figural depiction showing two naked male figures, situated amongst whom is a bull that they hold by the horns, while a semi-reclined female figure is at the bottom of the field. The composition depicts the mythological twins, Amphion and Zethus, at the moment when they were tying Dirce to the horns of the enraged bull. The southern section of the mosaic is divided into 31 fields, eight of them are triangular, six trapezoidal, and seventeen hexagonal. Animals are depicted in the triangular fields: fish, dolphins and birds. The polygonal fields are filled with six-petalled rosettes. The central decoration of the southern section of the mosaic is in the form of a multi-petalled rosette executed in a combination of black and red colors (Mlakar 1962, 441; Meder 2004, 75-88, Meder 2003, 55). Numerous nuances of white, black, red, yellow, rose, green and blue colors are represented in this polychrome mosaic. These tesserae were made of local limestone, as well as of marble that was imported to Istria from faraway stone-quarries (Gobić 1998). Unfortunately, the petrographical analysis that was performed at the Faculty of Science, University of Zagreb, did not enable us to recognize the types of stone used in relation to their origin. Based on knowledge of the types of stone and marble employed in the Roman period, we can presume that red tesserae were made of red marble originating in Greece, while those yellow ones were made of yellow marble from Northern Africa (Pensabene (ed.) 1998). White and gray tesserae were probably made of local limestone, whereas those black and rose ones are impossible to identify without performing a petrographical analysis aimed at determining the origins of this rock that was employed in the period of antiquity. The analysis of this mosaic provided an interesting piece of information – on a very limited section of it, i.e. on a detail of the ropes that were used to tie the bull, red tesserae made of glass paste were employed.

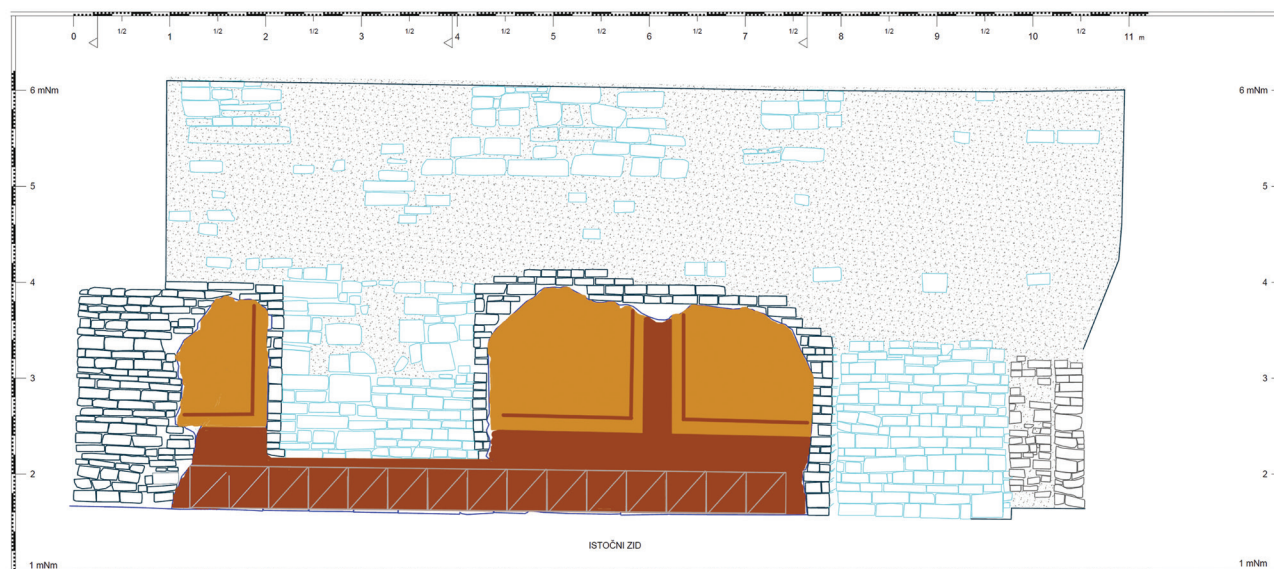
¹ Izvj. AMI-ja br. 407 od 21.07.1965.



Sl. 2 Detalj motiva s Dirkom, desno od lica vidljivi su tragovi biča s ostacima tesera od staklene paste.

Fig. 2 A detail of the motif with Dirce, visible to the right of the face are traces of a whip with remnants of tesserae made of glass paste.

The walls of this room were covered with frescoes that were, however, never appropriately researched from a historical-archaeological viewpoint. Some of these frescoes can still be admired *in situ*, on the walls of the room. A conceptual reconstruction of the original colors was made on the basis of visual examination, written data (Mlakar 1962, 440) and old photographs from the period when the site was explored. In accordance with reports made in 1965, approximately 13,000 fresco fragments were unearthed during the explorations on this site, which were then selected, washed and deposited in new boxes¹. These boxes were then taken to the Franciscan monastery, only to be transferred to an Austrian fortification, Fort Bourguignon, at a later date. Because the project was focused on the discovery of the mosaic, the subsequent study only contained a relatively detailed review of the frescoes that were *in situ*, whereas the fragments stored at the fort were neither inspected nor processed. A study of the frescoes as a separate whole is planned.



Sl. 3 Idejna rekonstrukcija slikanog sloja istočnog zida (izradila L. Milotić Bulić).

Fig. 3 A conceptual reconstruction of the painted layer on the eastern wall (made by L. Milotić Bulić).

samostana, iz kojih su kasnije preseljeni u prostore austrijske utvrde Fort Bourguignon. S obzirom da je predmet projekta bilo nalazište mozaika, elaborat je mogao sadržavati tek detaljniji osvrt na freske koje su se nalazile *in situ*, dok još uvijek nije bilo moguće obaviti uvid i obraditi ulomke pohranjene u utvrđi. U planu je obrada fresaka kao samostalne cjeline.

POVIJESNI ZAHVATI

Danas, kao i u vrijeme otkrivanja mozaika, vidljivi su povijesni zahvati u vidu manjih krpanja kamenim teserama, koje se po veličini i kvaliteti obrade vidno

HISTORICAL INTERVENTIONS

Visible at present, as was also the case at the time when the mosaic was discovered, are traces of historical interventions in the form of small-scale restorations using stone tesserae that differ substantially as far as size and quality of workmanship are concerned, when compared with the original surrounding sections of the mosaic².

¹ Archaeological Museum of Istria Report No. 407, dated July 21, 1965.

² See figure 7 further on in the text, showing a reconstruction that differs from the original as far as size, material type and quality of workmanship are concerned.

razlikuju od okolnih originalnih dijelova². Uobičajeno je pronaći ovakva povijesna "krpanja" mozaika i često su izrađena neprilagođenim teserama (Fiori, Vandini 2002, 91).

Nakon arheoloških istraživanja nalazišta 1958. i 1959. godine poduzete su aktivnosti u cilju njegove zaštite te je odlučeno da će nalazište ostati prezentirano *in situ*. Konzervatorsko-restauratorski radovi iz 60-ih godina prošlog stoljeća provedeni su pod nadzorom Konzervatorskog zavoda iz Rijeke i Saveznog instituta za zaštitu spomenika kulture iz Beograda, pod vodstvom Milorada Medića, konzervatora i restauratora Instituta. Danas nam nije dostupna dokumentacija o izvedenim zahvatima, što stvara značajne poteškoće pri pokušaju interpretacije povijesti i metodologije radova. Svakako je moguće zahvate izdvojiti u dvije grupe - one usmjerene na zaštitu nalazišta i konzervatorsko-restauratorske zahvate na samom mozaiku, zidovima i freskama.

Odmah nakon otkrića nalazišta i tijekom radova pokušalo se nalazište zaštititi od devastacije i nesavjesnog djelovanja građana uz pomoć nadzora i kontrole Komunalnog odbora milicije³. U prosincu 1959. god. Konzervatorski Zavod iz Rijeke šalje Arheološkom muzeju Istre dopis s projektom zaštitne konstrukcije nad mozaikom, koji je upućen i Narodnom općinskom odboru Pule, koji je trebao osigurati financijska sredstva⁴. Projekt je realiziran 1960. godine. Već u roku od nekoliko godina vidljivo je da zaštitna struktura ne služi kvalitetno svojoj svrsi, stakla su loše zabrtvljena i ispucana te voda zajedno s pratećim nečistoćama curi i taloži se na mozaiku. Godine 1966. Konzervatorski zavod iz Rijeke predviđa sredstva za popravke i brtvljenje stakala⁵. U istom razdoblju M. Medić ustvrđuje da treba najprije pristupiti uređenju stakala i brtvljenju, a tek kasnije stavljanju plastičnog krova iznad njega. Tako saznajemo da je nadogradnja iznad staklenoga krova već tada bila u planu. Također je poznato da je već tada riješeno pitanje odvodnje podzemnih voda, koje su od samoga pronalaska konstantno prodirale na površinu mozaika⁶. Tijekom ovih zaštitnih radova mozaični je pod bio zaštićen prešanom trskom.

Konzervatorsko-restauratorski zahvati na mozaiku počinju 1964. godine. Prije toga, 1962. godine, M. Medić traži od muzeja da se provede sistematsko mjerenje nivoa

It is common to find such historical "patchings" of the mosaic, which were often executed with unsuitable tesserae (Fiori, Vandini 2002, 91).

After an archaeological exploration of the site in 1958 and 1959, actions for its protection were undertaken and it was decided that the site will be presented *in situ*. The conservation-restoration works that were carried out during the sixties of the last century were executed under the supervision of the Conservation Institute from Rijeka and the Federal Institute for the Protection of Cultural Monuments from Belgrade, and headed by Milorad Medić, a conservator and restorer from the latter Institute. At present we cannot access the documentation about the interventions that were made at the time, which creates considerable difficulties when trying to interpret the history and methodology of the works. However, it is nevertheless possible to separate these works into two groups - the one aiming to protect the site, and the conservation-restoration interventions on the mosaic itself, as well as on the walls and frescoes.

Immediately after the discovery of the site and during the ensuing works, the need arose to protect it from devastation and from the excesses of the citizens. This was done with the help of the Municipal Committee of Militia³, which organized its supervision and control. In December of 1959, the Conservation Institute from Rijeka sent a letter to the Archaeological Museum of Istria, together with a plan of the protective structure above the mosaic, which was also sent to the People's Municipal Committee of Pula, because it was responsible for providing the necessary financial means⁴. The plan was executed in 1960. Already in a short period of a few years it became apparent that the protective structure does not perform its function satisfactorily; the glass panes were either poorly sealed or broken, which resulted in water pouring in together with the accompanying dirt that was thus deposited on the mosaic. In 1966, the Conservation Institute from Rijeka provided the funds necessary to repair and seal the glass panes⁵. In the same period of time, M. Medić realized that the first job that must be done is to replace and seal the glass panes, and only then should the plastic roofing be placed above the mosaic. We thus learned that already at that time there were plans to erect an additional structure above the glass

² Dalje u tekstu vidjeti sliku 7 gdje je uočljiva rekonstrukcija koja se razlikuje od originala po veličini, vrsti materijala i kvaliteti obrade.

³ Izvj. AMI-ja br. 401/1-59 od 19.11.1959.

⁴ Izvj. AMI-ja br. 460/1-59 od 31.12.1959.; uz dopis nije pohranjen i primjerak projekta. Primjerak projekta, koji međutim ne odgovara realiziranoj konstrukciji, čuva se u Državnom arhivu u Rijeci.

⁵ Izvj. AMI-ja br. 445 od 07.10.1966.

⁶ Glas Istre br. 47 od 18.11.1966.

³ Archaeological Museum of Istria Report No. 401/1-59, dated November 19, 1959.

⁴ Archaeological Museum of Istria Report No. 460/1-59, dated December 31, 1959; the project itself was not saved. A copy of the project that, however, is not in accordance with the structure as it was built, is kept in the State Archives at Rijeka.

⁵ Archaeological Museum of Istria Report No. 445, dated October 7, 1966.

podzemne vode na području antičko-rimskog mozaika. Po rezultatima mjerenja Medić bi izradio elaborat za konzervaciju mozaika⁷. Nisu nam poznati podaci dobiveni mjerenjima, kao ni je li voda bila slatka, slana ili boćata. U svakom slučaju, izveden je kanal na južnoj strani mozaika, kojim je riješen problem odvodnje vode (sl. 5).



Sl. 4 Pripreme za novu podlogu, vidljiva je linija do koje se podiže razina vode (Fototeka AMI-ja, fotonegativ 25866).

Fig. 4 The preparations for a new substrate, visible is a line that marks the level to where the water rises (Photo archives of the Archaeological Museum of Istria, photo-negative no. 25866).

Godine 1964. mozaik je odvojen od originalne podloge koja je zamijenjena novom, vjerojatno od armiranog cementnog morta. Glavni razlog podizanja mozaika bila je činjenica da je često poplavljivao zbog prodora podzemnih voda na njegovu površinu. Prilikom podizanja, a vjerojatno i prije toga, mozaik je oštećen⁸.

Tijekom 1965. retuširana su oštećenja i nedostajući dijelovi. Rekonstrukcija dijelova mozaika koja je tom prilikom napravljena nije istaknuta u odnosu na originalni mozaik te je danas većim dijelom teško definirati dopune mozaika iz 60-ih godina 20. stoljeća. Osim podataka o podizanju koje prenosi Glas Istre, potvrdu pružaju tragovi tkanine primijećeni na cementnim zakrpama tijekom bilježenja degradacija (sl. 6). Po vidljivim tragovima cementnih nadopuna u jugoistočnom dijelu mozaične površine sa šesterokutnim poljima, kao i po linijama novih

roof. It is also known that all problems associated with the drainage of subterranean waters that were constantly penetrating to the surface of the mosaic since the time it was discovered, were likewise solved⁶. The mosaic was protected with compressed cane in the course of these rescue operations.

The conservation-restoration interventions on the mosaic began in 1964. Before this, in 1962, M. Medić requested the Museum to perform a systematic measurement of the subterranean water level in the area of the Roman mosaic. In accordance with the results of this measurement, M. Medić would then make a study for the conservation of the mosaic⁷. We are not aware of any data that came from these measurements, nor do we know if the water was fresh, salty or brackish. In any case, a drainage channel was erected on the southern side of the mosaic, which resolved the problem associated with water (Fig. 5).

In 1964, the mosaic was separated from its original substrate that was exchanged with a new one probably made of reinforced cement mortar. The main reason for the raising of the mosaic was the fact that it was frequently inundated with subterranean waters. During this process, and probably even before that, the mosaic was damaged⁸.



Sl. 5 Nova cementna podloga i odvodi vode za budući mozaik (Fototeka AMI-ja, fotonegativ 25873).

Fig. 5 The new cement substrate together with the drainage channels of the future mosaic (Photo archives of the Archaeological Museum of Istria, photo-negative no. 25873).

⁶ Glas Istre, no. 47, dated November 18, 1966.

⁷ Archaeological Museum of Istria Report No. 499, dated September 21, 1962.

⁸ Archaeological Museum of Istria Report No. 401/1-59, dated November 19, 1959, note no. 12.

⁷ Izvj. AMI-ja br. 499 od 21.09.1962.

⁸ Izvj. AMI-ja br. 401/1-59 od 19.11.1959., bilješka br. 12.

tesera u sjeverozapadnom dijelu mozaika s četverokutnim poljima, napravljena je rekonstrukcija načina podizanja mozaika, odnosno definirana su područja rezanja mozaične površine koja su zatim odvojena (T. I).



Sl. 6 Mozaik sa žbukom na kojoj su vidljivi tragovi tkanine korištene pri podizanju.

Fig. 6 The mosaic together with mortar that bears visible traces of a textile fabric that was used to raise the mosaic.

S obzirom na nedostatak dokumentacije o izvedenim konzervatorsko-restauratorskim zahvatima, osim direktnim uvidom u postojeće stanje, kao i na poznavanje povijesnih metodologija restauracije mozaika (Lavagne 1988; Nardi 2002, Fiori, Vandini 2002, 91), članci iz lokalnih novina pomogli su u dobivanju kompletnije slike o događajima koji se uz mozaik vezuju. Iz tog ih razloga ovdje navodimo.

Glas Istre pruža podatke o početku restauratorskih radova u proljeće 1960., koje će tijekom ljeta obaviti stručnjaci Saveznog instituta za zaštitu historijskih spomenika. U proljeće je postavljan zaštitni stakleni krov ne bi li se spriječilo štetno djelovanje atmosferilija, "a u ljeto će doći ekipa Saveznog instituta za zaštitu historijskih spomenika iz Beograda da pristupi restauriranju i konzervaciji mozaika i freski. Materijalna sredstva osigurao je Institut"⁹.

O konzervatorskim radovima na mozaiku 1964. i 1965. piše u članku, također iz Glasa Istre: "...provizorno konzerviran nakon otkrića, mozaik je bio zaštićen tek od padalina, ali ne i podzemnih voda, budući da se nalazi u depresiji ispod razine mora. Iz republičkih i saveznih fondova za kulturu pristigla su prošle godine znatna sredstva za saniranje i rekonstrukciju mozaika, tako da se odmah prišlo obimnoj konzervaciji i rekonstrukciji. Mozaik je odvojen od poda i u fragmentima površinski konzerviran, a zatim ponovno vraćen u prvobitno ležište.

The damages and the missing parts were retouched during 1965. The reconstruction of sections of the mosaic, performed at the time, was not emphasized in relation to the original mosaic, which means that nowadays it is hard to define these additions made in the sixties of the 20th century. Except for information related to the raising of the mosaic, as reported by Glas Istre, this is likewise corroborated by remnants of textile fabric, which were noticed on the cement patches when the degradations were recorded (Fig. 6). In accordance with visible traces of cement fillings in the southeastern section of the mosaic surface with hexagonal fields, as well as along the lines of new tesserae in the northwestern section of the mosaic with quadrangular fields, we reconstructed the manner in which the mosaic was raised, i.e., we defined the areas where the mosaic surface that was subsequently separated was cut (T. I).

With respect to the shortage of relevant documentation regarding the executed conservation-restoration interventions, except through a direct inspection of its current state and coupled with knowledge related to historical methodologies of mosaic restoration (Lavagne 1988; Nardi 2002, Fiori, Vandini 2002, 91), the articles published in local newspapers also proved to be helpful in obtaining a more complete picture of events connected with this mosaic. That is the reason we mention them here.

Glas Istre offers us information regarding the start of restoration works in the spring of 1960, which were going to be executed during the summer season by experts from the Federal Institute for the Protection of Historical Monuments. During the spring, a protective glass roof was erected in order to prevent the adverse effects of atmosphere-related factors. "A team of the Federal Institute for the Protection of Historical Monuments is expected to arrive from Belgrade in the summertime, to begin with restoration and conservation works on the mosaic and frescoes. The material means for this were provided by the Institute"⁹.

Another article, likewise from Glas Istre, talks about the conservation works performed on the mosaic in 1964 and 1965: "...conserved on a provisional basis after its discovery, the mosaic was only protected from rainfall but not from subterranean waters, as it is located in a depression below sea level. Last year saw the arrival of substantial financial means from culture-related state and federal funds in order to finance the repair and reconstruction of the mosaic, which allowed the start of extensive conservation and reconstruction

⁹ Glas Istre br. 16 od 15.04.1960.

⁹ Glas Istre, no. 16, dated April 15, 1960.

Ove godine prišlo se posljednjoj fazi radova na tom objektu – rekonstrukciji. Svaki najmanji oštećeni dio izmjenjuje se i mozaik se u likovnom smislu potpuno obnavlja. Ove visokostručne i precizne radove već duže vrijeme obavljaju studenti beogradske likovne Akademije uz asistenciju stručnjaka Konzervatorskog zavoda iz Rijeke. Rimski podni mozaik će uskoro biti otvoren za javnost¹⁰.

Mjesec dana nakon susreta Š. Mlakara i M. Medića 1966. godine izlazi članak u Glasu Istre u kojem se prenosi Mlakarova izjava: “Rimski mozaik je ljetos jedno vrijeme bio pristupačan javnosti i tada ga je, u roku od šest mjeseci, razgledalo oko pet tisuća ljudi, uglavnom inozemnih turista. Mozaik se nalazi otkako je pronađen na istom mjestu, u današnjem dvorištu zgrade OZ. Da bi postao stalno pristupačan javnosti, što bi se moglo ostvariti još do kraja ove godine, treba retuširati neke njegove oštećene dijelove, dopuniti sadašnju krovnu zaštitu i tako spriječiti utjecaj atmosferilija na površinu mozaika. Također treba provesti ventilaciju prostora u kome se nalazi mozaik. Na tim radovima, posebno onim stručne obrade površine mozaika, angažirana je visokostručna ekipa riječkog Konzervatorskog zavoda, ista ona koja je radila na sistematizaciji poznatog mozaika u Eufrazijevoj bazilici u Poreču. Dosad je već spriječeno prodiranje vode na površinu mozaika i riješeno pitanje njenog stalnog odvođenja. Sredstva za završetak radova na rimskom mozaiku uglavnom su osigurana¹¹.”

Zadnjih godina Arheološki muzej Istre pokušava revalorizirati “Kažnjavanje Dirke” na način da se mozaik s okolnim zidovima i freskama restaurira i konzervira, da mu se izradi prikladnija zaštitna struktura te da ga se prezentira javnosti u skladu s njegovom vrijednosti primjerenim info-pločama i eventualnim dodatnim sadržajima koji bi ga prikazali kao dio cjeline kojoj je pripadao. Međutim, ne bi li se taj projekt upotpunio nužno je obaviti dodatna arheološka istraživanja bez kojih nije moguće planirati ni početak konzervatorsko-restauratorskih radova. Prije samoga planiranja radova obavljeno je fotogrametrijsko snimanje, kojim su dobiveni nacrti mozaika te pogledi na okolne zidove s freskama, što je bitno s obzirom da dotad mozaik nije nikako bio dokumentiran kroz kvalitetne fotografije ili nacрте.

Početak 2013. godine obavljen je tek najnužniji zahvat, a to je zamjena dotrajalog gornjeg krovišta od plastičnih valovitki. Naime, praćenjem stanja mozaika utvrđeno je da na mnogo mjesta voda curi kroz dva pokrova, s valovitki i ostakljene čelične konstrukcije, te osim što stvara lokvice uzrokuje i širenje smeđih

works on it. The mosaic was raised from the ground, its surface was conserved in fragments, and subsequently it was returned to its primary bed. This year saw the beginning of the last phase of works on this structure – its reconstruction. Even its smallest damaged parts are replaced, the result being a thorough renovation in the artistic sense. These highly skilled and precise works are carried out by students from the Art Academy in Belgrade, assisted by professionals from the Conservation Institute in Rijeka. The Roman floor mosaic will soon be put on display to the public¹⁰.

A month after the meeting between Š. Mlakar and M. Medić in 1966, Glas Istre brought an article that quotes Mlakar: “This summer, the Roman mosaic was for a period of time accessible to the public, when, in a period of six months, it was visited by approximately five thousand people, mostly foreign tourists. Since its discovery the mosaic has been located in the same spot, in the courtyard of the edifice housing the Insurance Company. In order to make it accessible to the public on a permanent basis, which could be realized before the end of this year, some of the damaged sections of the mosaic have to be retouched, and alterations have to be made to the roof that currently stands over it, in order to prevent any negative effects coming from the atmosphere. Ventilation of the area covered by the mosaic must likewise be assured. A highly skilled team from the Conservation Institute at Rijeka is engaged in these works, especially in those dealing with the professional treatment of the mosaic surface, the same team that worked on the systematization of the famous mosaic in the Euphrasian basilica at Poreč. To date, the penetration of water to the surface of the mosaic has been stopped and the problems associated with its permanent drainage have likewise been solved. The financial means necessary to conclude the works on the Roman mosaic have, for the most part, been assured¹¹.”

The Archaeological Museum of Istria has in recent years tried to re-evaluate the “Punishment of Dirce” by restoration and conservation works that were made not only on the mosaic but also on the surrounding walls and frescoes. A more appropriate protective structure should also be built. The mosaic itself should be presented to the public at large by means of information panels that are designed in accordance with the value of this monument, and eventual additional contents should present it as part of a whole to which it once belonged. However, in order to complete this project, additional archaeological explorations are

¹⁰ Glas Istre br. 38 od 17.09.1965.

¹¹ Glas Istre br. 47 od 18.11.1966.

¹⁰ Glas Istre, no. 38, dated September 17, 1965.

¹¹ Glas Istre, no. 47, dated November 18, 1966.

mrnja od hrđe na površini mozaika. Uvidom u stanje krovništva primijećeno je da problem leži u dotrajalim valovtkama, u samoj koncepciji krovništva koje kroz dva sliva svu oborinsku vodu vodi u centralni kanal koji se proteže preko centra duže osi mozaika, a koji je bio u potpunosti začepljen zbog desetljećima neočišćenog otpalog lišća i smokava sa susjednog stabla, kao i raznog otpada. Struktura s valovtkama odstranjena je, kanal i površine staklenih ploča očišćeni od velike količine otpada i humusnog materijala plodova i lišća, očišćena je i odvodna cijev koja oborinske vode odvodi kroz zid u dvorište prema prilaznoj cesti te je izrađena nova zaštitna struktura od metala i polikarbonatnih ploča. Ta je nova struktura poslužila svojoj svrsi – zaštititi mozaika, jer nije više primijećeno prodiranje vode, a također je malo poboljšala njegovu prezentaciju s obzirom da su osvijetljenost i time vidljivost puno bolji. Ipak, ovaj je zahvat tek pomoćni ne bi li se mozaik zaštitio, u iščekivanju trenutka kada će biti kvalitetnije zaštićen (posebno od ljudi koji i dalje na njega bacaju otpad) i prezentiran.

Završno se naglašava da Arheološki muzej Istre, iako nije službeni skrbnik mozaiku, koji je još uvijek u privatnom vlasništvu, redovito ga u više navrata godišnje čisti od nabacanog smeća, pere ga te u hladnim zimskim razdobljima pokriva strukturom od geotekstila, stiropora i dasaka.

DEGRADACIJE MOZAIKA

Već prvim pregledom površine mozaika vidljivo je da se na nj konstantno odlaže/baca razno smeće. Također se na njemu sakuplja lišće smokve koja raste u susjednom vrtu.

Na mozaiku su uočene razne degradacije:

- a) cementne nadopune oštećenja i rekonstrukcije
- b) vegetacija, odnosno alge
- c) mrlje
- d) degradacija samih tesera

a) Cementne nadopune oštećenja i rekonstrukcije (T. II)

Mozaik je danas vrlo čvrst, nigdje se ne zamjećuje odvajanje od podnice. I u vrijeme pronalaska bio je u vrlo dobrom stanju, imao je neznatnih pomanjkanja – *lacuna*, koje nisu remetile sveukupnu vizuru površine (Brandt 1977, 21). Usporedivši tadašnje fotografije iskopa i današnje stanje površine mozaika primjećuje se znatno više *lacuna*. Poznato je da je mozaik tijekom 60-ih godina podignut i položen na novu cementnu podlogu *in situ*. Godine 1959. djeca, kao i neosvijesteni građani, spuštali su se na samu površinu mozaika i tako oštećivali

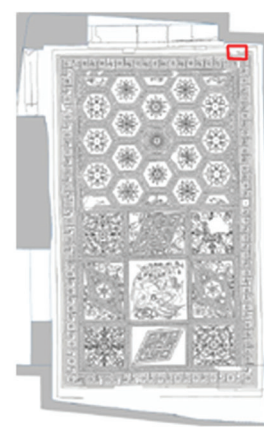
required, without which it is not even possible to plan the beginning of conservation–restoration works. A photogrammetric survey was performed even before the planning stage for the works was reached. This resulted in a number of plans of the mosaic, together with many views of the surrounding walls with frescoes, which is really important because the mosaic has never been documented with the help of high-quality photographs or plans up to that period in time.

At the beginning of 2013, the most urgent works were carried out, i.e. the renewal of the plastic roof made of corrugated panels. In other words, by monitoring the status of the mosaic we were able to determine that on several spots the water leaks through the two roof systems that cover it, the corrugated panels and the glass-covered steel structure. This results not only in small pools of water on the surface of the mosaic, but also in the spread of brown stains coming from rust. By inspecting the roof it was possible to determine that the old corrugated panels were at the root of the problem, while the whole concept of the roof was likewise inadequate because all the rainwater was channeled through two troughs into a central channel that extends itself across the center of the longer axis of the mosaic, and this channel was completely blocked with old leaves and figs from a neighboring tree, as well as with other garbage. The structure with corrugated panels was removed, the channel and the glass panes were cleaned, large amounts of waste and humus material from figs and leaves were removed, the outflow tube that channels the rainwater through a wall and into a courtyard located on the approach road was cleaned, and finally, a new structure made of metal and polycarbonate panels was erected. This new structure served its purpose – the protection of the mosaic, as we no longer noticed any water on it, and the manner in which the mosaic is presented was likewise slightly improved because of the increased quantity of light, resulting in much better visibility. This intervention is nevertheless only an auxiliary measure until such time when this mosaic finally gets high-quality protection (especially from people who keep throwing garbage on it) and is properly presented.

To conclude, we should stress that the Archaeological Museum of Istria, although it is not formally in charge of the mosaic that is still privately owned, regularly takes care of it by cleaning and washing it several times per year, and in the cold winter months it covers it with a protective structure made of geotextile fabric, styrofoam and wooden boards.

i njega i freske, kako doznajemo iz dopisa upućenom Komunalnom odboru milicije¹². Također, nije moguće isključiti oštećenja nastala tijekom samog podizanja mozaika.

Moguće je s velikom sigurnošću konstatirati da su lakune nadopunjene cementnim mortom jer su se 60-ih godina 20. stoljeća koristili takvom vrstom vezivnog materijala (Nardi 2004., Carta del restauro 1931. čl. 5, Carta della conservazione e del restauro degli oggetti d'arte e cultura 1987, čl.7d). Nadopune u lakunama su vrlo kompaktne, čvrste i sivkasto-bijele boje. Danas je opće prihvaćeno mišljenje da uporaba cementa nije najbolji izbor za kulturno dobro zbog nekompatibilnosti dvaju vezivnih materijala (Malinar 1996, 37-40). Neka od oštećenja nakon podizanja zakrpana su popunjavanjem neutralnim cementnim mortom, dok su druga rekonstruirana novim teserama, a postoje i rekonstrukcije izrađene originalnim teserama, koje je teško uočiti (Brandi 1977, 26; Fiori, Vandini 2002, 87). Kriterije koji su doveli do izbora različitih metoda pri popunjavanju nedostajućih dijelova danas nije moguće razumjeti.



1958.-59. Dokumentacija AMI-ja. Fn. 9332 03.01.2013.

Sl. 7 Usporedba degradacija pri pronalasku mozaika i nakon zahvata 60-ih godina.

Fig. 7 Comparison of degradations at the time of discovery of the mosaic, and after the intervention in the sixties.

b) Vegetacija (T. III)

Na mozaiku, freskama i zidovima taloži se prašina i zemlja te se, uz nazočnost vode, ondje razvija vegetacija (Gobić-Bravar 2011, 184). Na mozaiku postoji aktivna biološka patina koju je moguće identificirati kao algu (Malinar 2001, 38-42). Ona ne samo da narušava njegov izgled, već prodi i širi se u ranije oštećenu površinu tesera. Do oštećenja površine dolazi kad obični mikroorganizmi metabolizmom izlučuju sumpornu kiselinu ($2\text{SO}_2 + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{H}_2\text{SO}_4$) koja se u kontaktu s kalcijevim karbonatom pretvara u kalcijev sulfat ($\text{H}_2\text{SO}_4 + \text{CaCO}_3 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$) (Fiorentini Roncuizi,

¹² Izvj. AMI-ja br. 401/1-59 od 19.11.1959.

MOSAIC DEGRADATIONS

Already at first glance it is apparent that there is a lot of waste on the surface of the mosaic, which comes there either naturally in the form of falling leaves and figs from the neighboring garden, or else it is thrown there.

Various degradations were detected on the mosaic:

- a) cement fillings of lacunae, reconstructions;
- b) vegetation and algae;
- c) stains;
- d) degradation of tesserae.

a) Cement fillings of lacunae, reconstructions (P. II)

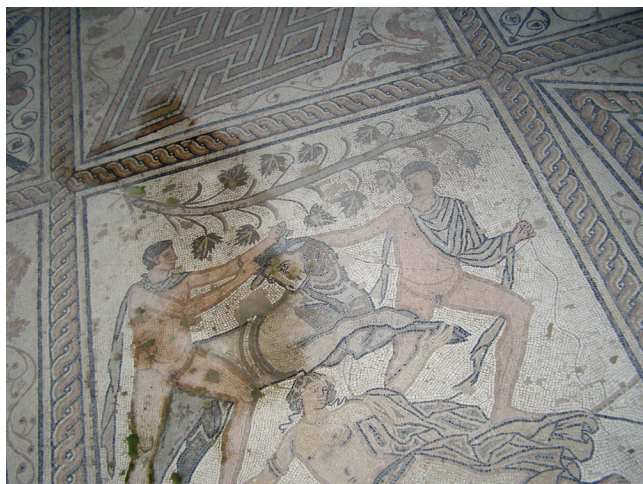
The mosaic is very compact nowadays because it adheres to its substrate in its entirety. When it was discovered it was likewise in an excellent state, it only had some minor flaws – *lacunae* that, however, did not disturb the overall image of its surface (Brandi 1977, 21). If we compare the photographs taken at the time of its discovery, and compare them with the surface of the mosaic as it is today, we can detect a much larger number

of *lacunae*. We know that the mosaic was raised in the sixties of the last century, only to be returned onto a new substrate *in situ*. In 1959, children as well as irresponsible adults used to walk on the mosaic, damaging it and the surrounding frescoes, as is known from a report written to the Municipal Committee of the Militia¹². We likewise cannot exclude possible damages that occurred while raising the mosaic.

What we can be sure of, though, is that the lacunae were repaired with cement mortar, because it was common to use such a binder in the sixties of the 20th

¹² Archaeological Museum of Istria Report No. 401/1-59, dated November 19, 1959.

Fiorentini 2001, 191), sol koja se otapa u vodi, i potom tesere izgledaju kariozno i lomljeno. Primjećuje se da uglavnom zahvaćaju cementne nadopune na mozaiku; tek na dva mjesta je uočeno da se one šire i na površinu samih tesera.



Sl. 8. Centralni motiv mozaika - vidljive su mrlje vlage i zelene cementne površine prekrivene kolonijama algi.

Fig. 8 The central motif of the mosaic - visible are stains caused by humidity, as well as the green cement surfaces covered by colonies of algae.

c) Mrlje (T. IV)

Grafički prikaz mrlja na pločama donosi njihove različite vrste, nastale tijekom godina na površini mozaika. Neke od nastalih mrlja bit će vrlo teško, možda i nemoguće odstraniti jer je znatno oštećena površina tesera. Za padalina krov propušta na više mjesta pa na površini mozaika uočavamo vlažne mrlje, na kojima su svakako prije toga bile lokvice. Mjestimično padaline otapaju i željezni oksid s nosive konstrukcije krova, koji kapa na površinu mozaka i prodire u tesere. Takve je mrlje najteže odstraniti, jer nastaju djelovanjem vode kroz dugi period i bez destruktivnih analiza nije moguće utvrditi do koje je dubine tesera oksid prisutan (Lazzarini, Laurenzi Tabasso 1986, 154). Mjestimično su primijećene tamnije mrlje, patina, u vidu kompaktnih, gustih kora ispod kojih se nalaze oštećenja tesera uzrokovana sulfatizacijom (Lazzarini, Laurenzi Tabasso 1986, 60). Prisutna je jedna mrlja koja je zapravo površinska degradacija tesera uzrokovana paljenjem. Oko ugrađenog odvoda moguće je primijetiti sloj kalcifikacije nastao zbog taloženja vode na površini mozaika, ispred samog otvora. Na površini mozaika postoje tragovi plavih mrlja nepravilnog oblika, koje bi mogle biti posljedica razlijevanja tinte, a prisutne su i mrlje nedefiniranog podrijetla.

century (Nardi 2004, Carta del restauro 1931, Article 5, Carta della conservazione e del restauro degli oggetti d'arte e cultura 1987, Article 7d). The fillings in lacunae are very compact and solid, and have a grayish-white color. There is a widely accepted opinion today, in accordance with which cement does not represent a good choice for repairing cultural monuments, because of the inherent incompatibility of two binding materials (Malinar 1996, 37-40). After the mosaic was raised, some damaged areas were repaired using a neutral cement mortar, while others were reconstructed using new tesserae, but there are also reconstructions that were executed with original tesserae, which are very hard to detect (Brandi 1977, 26 Fiori, Vandini 2002, 87). Nowadays it is not possible to understand the criteria used in the selection of the different methods employed to fill the missing parts.

b) Vegetation (P. III)

Dust and earth are deposited on the mosaic, frescoes and walls, and with the presence of water, vegetation develops there (Gobić-Bravar 2011, 184). There is an active biological patina on the mosaic, which can be identified as algae (Malinar 2001, 38-42). Not only does it negatively affect its appearance, but it also penetrates and expands into the already damaged surface of tesserae. Their surface is damaged when common microorganisms through metabolism secrete sulfuric acid ($2\text{SO}_2 + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{H}_2\text{SO}_4$) that when in contact with calcium carbonate transforms into calcium sulfate ($\text{H}_2\text{SO}_4 + \text{CaCO}_3 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$) (Fiorentini Roncuzzi, Fiorentini 2001, 191), salt that is dissolved in water, which affects tesserae with cavities and flakiness. The presence of algae has been noticed mainly on the cement fillings of the mosaic. There are only two areas of the mosaic, where algae are also spreading onto the surface of tesserae.

c) Stains (P. IV)

The graphical presentation of stains on the panels shows the different varieties that were created on the surface of the mosaic over the years. Some of these stains will be very difficult to remove, perhaps even impossible, as the surface of the tesserae is damaged. The roof leaks on several spots during rainfall and that creates humid stains on the surface of the mosaic, which were small puddles of water before that. The rain, in places, also dissolves iron oxide from the supporting structure of the roof, which then falls on the surface of the mosaic and penetrates into tesserae. These stains are the most difficult to remove because they were created together with water



Sl. 9 Mrlja od hrđe.

Fig. 9 A stain caused by rust.

d) Degradacija tesera (T.V)

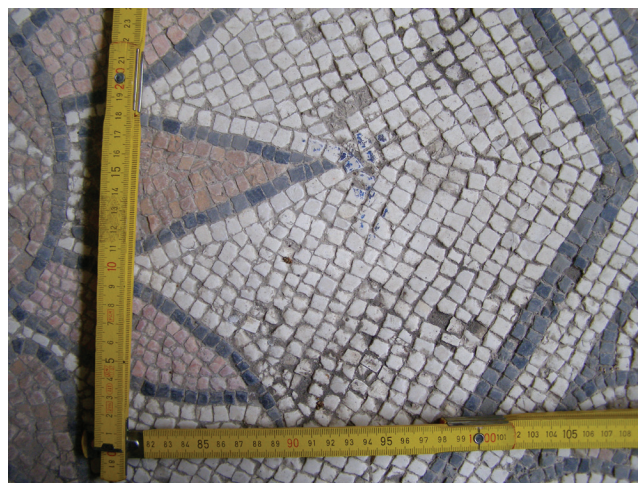
Degradacija tesera predstavlja najznačajniju vrstu oštećenja jer je njome narušena sama struktura mozaika. Najviše se primjećuje na tesserama bijelog i crvenog vapnenca. Tijekom vremena u tanke je pore tesera mozaika sedimentne strukture prodirala voda, a s njom i soli. Potonje su putem kristalizacije odvajale strukturu stijene u tankim slojevima. Na bijelim tesserama dolazi do mrvljenja, tesere su u nekim slučajevima u potpunosti usitnjene. Kod crvenih tesera na nekim se dijelovima materijal lista, nastaje jedna ili više stanjenih paralelnih porcija, koje otpadaju u slojevima. Na mozaiku se nalaze i crvene tesere od staklene paste, koje formiraju uže kojim je vezan bik. Danas ih je teže uočiti jer su potpuno prekrivene kalcifikacijom. U većem dijelu su otpale jer su vrlo tanke i plitke. Njihova je površina također korodirana (Fiori, Vandini 2002, 58- 61).

Moguće je da uzrok degradacije tesera leži i u solima koje su laboratorijskim analizama dokazane na površini mozaika. Iako soli nisu prisutne u opasnim količinama, mogu uzrokovati manje štete. Osim natrijeva klorida, čija se prisutnost vezuje uz blizinu vode, prisutni su i sulfati koji mogu do mozaika doći kako iz atmosfere i okolnog zemljišta, tako i iz samog cementa korištenog pri zahvatima (Malinar 1996, 37-40).

Mjestimično tesere nisu zaštićene opšavom, što bi moglo uzrokovati njihov gubitak tijekom zahvata čišćenja i(li) hodanja. Na jednome mjestu, uz prag koji odvaja prostoriju 3 i 4¹³, zbog vegetacije došlo je do odvajanja dijela tesera od podloge.

¹³ Vidi Mlakar 1962, 441.

over a long period of time. Without destructive analyses it is not possible to determine how deep the oxide penetrated the tesserae (Lazzarini, Laurenzi Tabasso 1986, 154). There are spots where darker stains were noticed, a patina in the shape of compact, dense crusts underneath which are the damages that are visible on tesserae, which were caused by sulfatization (Lazzarini, Laurenzi Tabasso 1986, 60). There is also a stain that was created as a result of burning - this is a surface degradation. A layer of calcification can be seen around the built-in outflow, which was created due to water sedimentation on the surface of the mosaic in front of the opening. There are also traces of blue stains on the surface of the mosaic. These could have been created by spilling writing ink, but there are also stains whose origins we were not able to identify.



Sl. 10 Plava mrlja, vjerojatno od tinte.

Fig. 10 A blue stain, probably spilled ink.

d) Degradation of tesserae (P.V)

The degradation of tesserae is the most important type of damage because it undermines the very structure of the mosaic. It is easiest to see on tesserae of white and red limestone. Over time, water and with it salt penetrated the thin tesserae pores. The latter, through crystallization, caused the rock structure to flake. White tesserae began to crumble and some of them were utterly fragmented as a result of this. In some parts, red tesserae also began to flake, creating thus one or more thin, parallel portions that fall off in layers. The mosaic also includes red tesserae made of glass paste, which were used to portray the ropes with which the bull is tied. They are harder to perceive nowadays as they are completely covered by the effects of calcification. For the most part they have fallen off



Sl. 11 Primjer nedostajućih tesera i površine bez opšava.
Fig. 11 An example of missing tesserae, and an area devoid of bordering.



Sl. 12 Detalj biča s nedostajućim teserama od staklene paste.
Fig. 12 Detail of the whip with the missing tesserae made of glass paste.

KONZERVATORSKO-RESTAURATORSKI OSVRT I SMJERNICE MOGUĆIH ZAHVATA

S obzirom na povijesne konzervatorsko-restauratorske zahvate obavljene na mozaiku s prikazom kažnjavanja Dirke, uključujući i njegovo podizanje te polaganje na novu podlogu, ne postoje strukturalne problematike zbog kojih bi bilo potrebno provesti zahtjevne konzervatorsko-restauratorske zahvate. Vidno je da se degradacije nastale nakon zahvata iz 60-ih godina prošlog stoljeća uglavnom vezuju uz neprikladnu strukturu namijenjenu zaštitu mozaika.

Degradacije koje su na mozaiku primijećene nisu opasne za njegov opstanak. Ipak, bitno ih je sanirati ne bi li se spriječilo njihovo širenje.

because they are very thin and shallow. Their surface is likewise corroded (Fiori, Vandini 2002, 58-61).

One of the causes of degradation may also be the salts that were proven to exist on the surface of the mosaic after some laboratory analyses were performed. Even though these salts are not present in larger quantities, they can nevertheless cause smaller damages. Besides sodium chloride, whose presence is associated with proximity to water, there are also sulfates that can access the mosaic by means of the atmosphere and the surrounding land, or from the cement that was used during the various interventions (Malinar 1996, 37-40).

Some tesserae are not protected with a bordering and that could result in their loss when cleaning and/or walking over them. On a certain spot alongside the threshold that separates rooms 3 and 4¹³, vegetation caused some tesserae to separate from the substrate.

A CONSERVATION-RESTORATION REVIEW AND GUIDELINES FOR POSSIBLE INTERVENTIONS

Given the historical conservation- restoration works carried out on the mosaic depicting the punishment of Dirce, including its raising and laying onto a new substrate, there are no structural problems that would require any complex conservation-restoration works. It is obvious that the degradations that occurred after the intervention carried out in the sixties of the last century, resulted mainly from the inappropriate structure that was erected to protect the mosaic.

The degradations observed on the mosaic are not threatening its existence. However, it is important to act in order to prevent their further spreading.

The areas lacking a bordering should be grouted. Although cement was used for the interventions carried out on the mosaic to date, a responsible conservator-restorer cannot recommend a cement mortar for this kind of intervention. Irrespective of the fact that this means the introduction of yet another material, the fillings should be made with a lime mortar. This mortar can be removed without damaging the mosaic if such a move is ever required, and that is not the case with a cement mortar.

Some of the stains on the mosaic cannot be removed, but an attempt should be made to remove at least those that were created after the discovery of the mosaic - stains made with rust particles and ink, as well as scale.

¹³ See Mlakar 1962, 441.

Mjesta na kojima nedostaju opšavi trebalo bi ispuniti. Iako je materijal korišten pri zahvatima na mozaiku cement, odgovorni konzervator-restaurator ne može preporučiti cementni mort za ovakvu vrstu zahvata. Bez obzira na činjenicu da se uvodi drugačiji materijal, ispune bi trebalo izraditi mortom na bazi vapna. U bilo kakvoj situaciji u kojoj bi se za time pokazala potreba ovaj se mort, za razliku od cementnog, može odstraniti bez oštećivanja mozaika.

Neke od prisutnih mrlja nije moguće ukloniti, no svakako je potrebno pokušati odstraniti one nastale nakon samog otkrivanja mozaika – mrlje od hrđe i tinte te naslage kamenca.

Iako su kolonije algi uglavnom zabilježene na cementu, a tek sporadično na kockicama mozaika, površinu valja tretirati prikladnim algicidom ne bi li se zaustavilo njihovo širenje.

Završno, treba konsolidirati, odnosno učvrstiti, degradirane kockice. S obzirom da se problemi na mozaiku često vezuju uz vodu, poželjno je odabrati konsolidans koji je ujedno i zaštitno sredstvo za hidrofobizaciju površine mozaika (naravno, uz paropropusne karakteristike). Na taj bi se način mozaičnoj površini vratila čvrstoća te bi istovremeno bila zaštićena od nepovoljnih uvjeta koji se vezuju uz kontakt s vodom.

ZAKLJUČAK

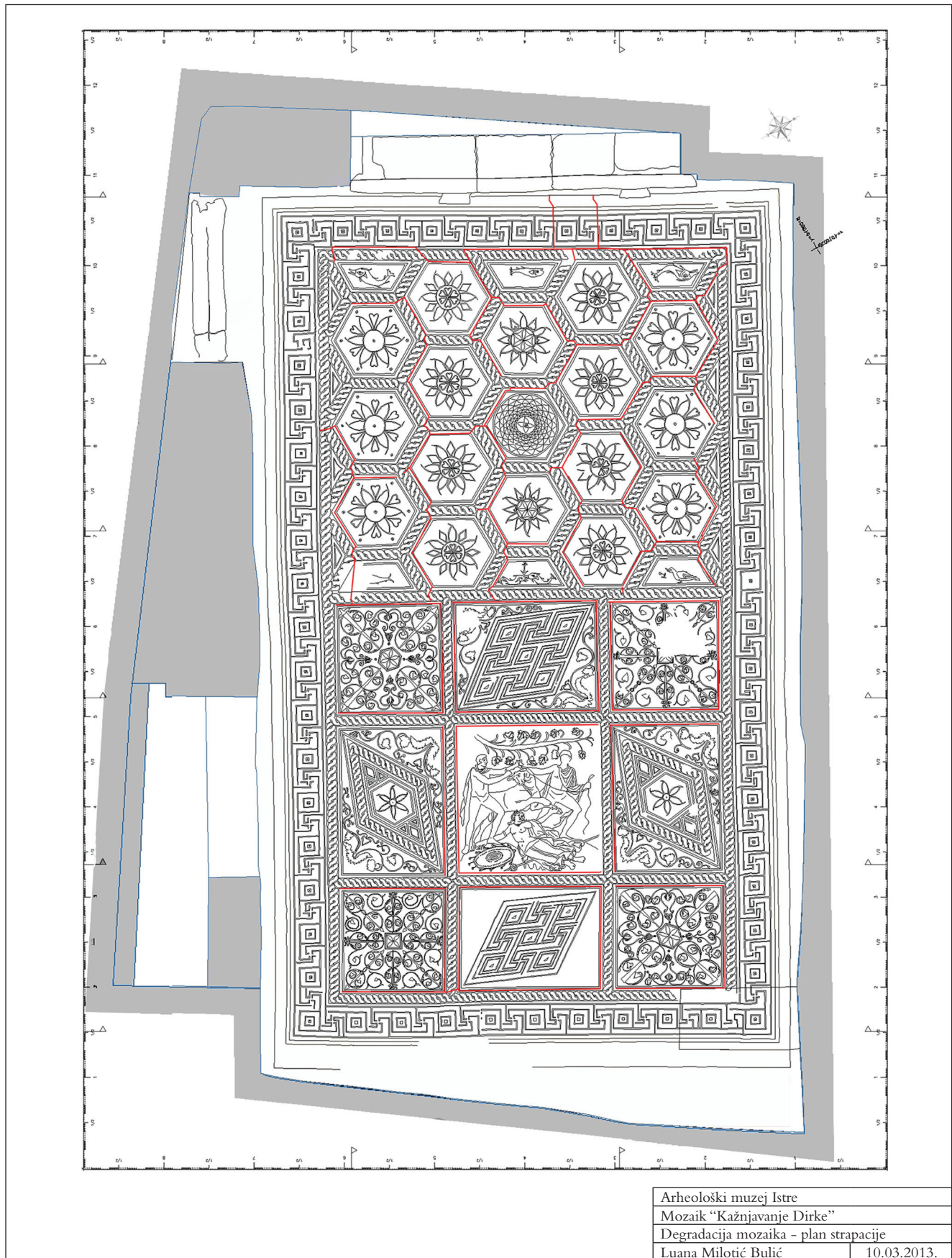
Projektom Arheološkog muzeja Istre želi se dokumentirati stanje svih pulskih spomenika. Mozaik s prikazom kažnjavanja Dirke obrađen je tijekom 2012. i 2013. godine. Počeli smo izradom grafičke podloge odnosno fotogrametrijskim snimanjem, kojim su dobiveni nacrti samog nalazišta te pogledi na četiri zidne plohe s freskama. Po dobivanju grafičkih podloga bilo je moguće pristupiti izradi elaborata stanja mozaika s mapaturom degradacija. Obavljena je i povijesna analiza događaja koji se vezuju uz ovaj mozaik od njegova otkrića sve do danas. Laboratorijskim su analizama utvrđene soli prisutne na površini mozaika, a provedena je i analiza kockica te žbuka korištenih pri restauraciji nalazišta. Uz pomoć svih dobivenih podataka bilo je moguće zaključiti da sam mozaik nije zahvaćen takvim degradacijama da bi mu bio ugrožen opstanak. Ipak, jasno je da nije prikladno zaštićen, prezentiran ni valoriziran. Osvrtom na potrebne zahvate moguće je planirati buduće radove na nalazištu, kako konzervatorsko-restauratorske, tako i one usmjerene na njegovu povijesno-estetsku valorizaciju i prezentaciju, na način da postane stalna etapa u ruti obilaska poznatih pulskih spomenika.

Although algae colonies were recorded mainly on cement, and only sporadically on tesserae, the surface of the mosaic should be treated with an appropriate algicide in order to inhibit their further growth.

To conclude, the degraded tesserae should be consolidated, uniting them into a single whole. Given that the problems facing the mosaic are often associated with water, it is preferable to choose a consolidating agent that at the same time protects the surface of the mosaic from water (hydrophobic but breathable characteristics). The mosaic surface would in this manner become more compact, and at the same time it would be protected from the negative consequences associated with water.

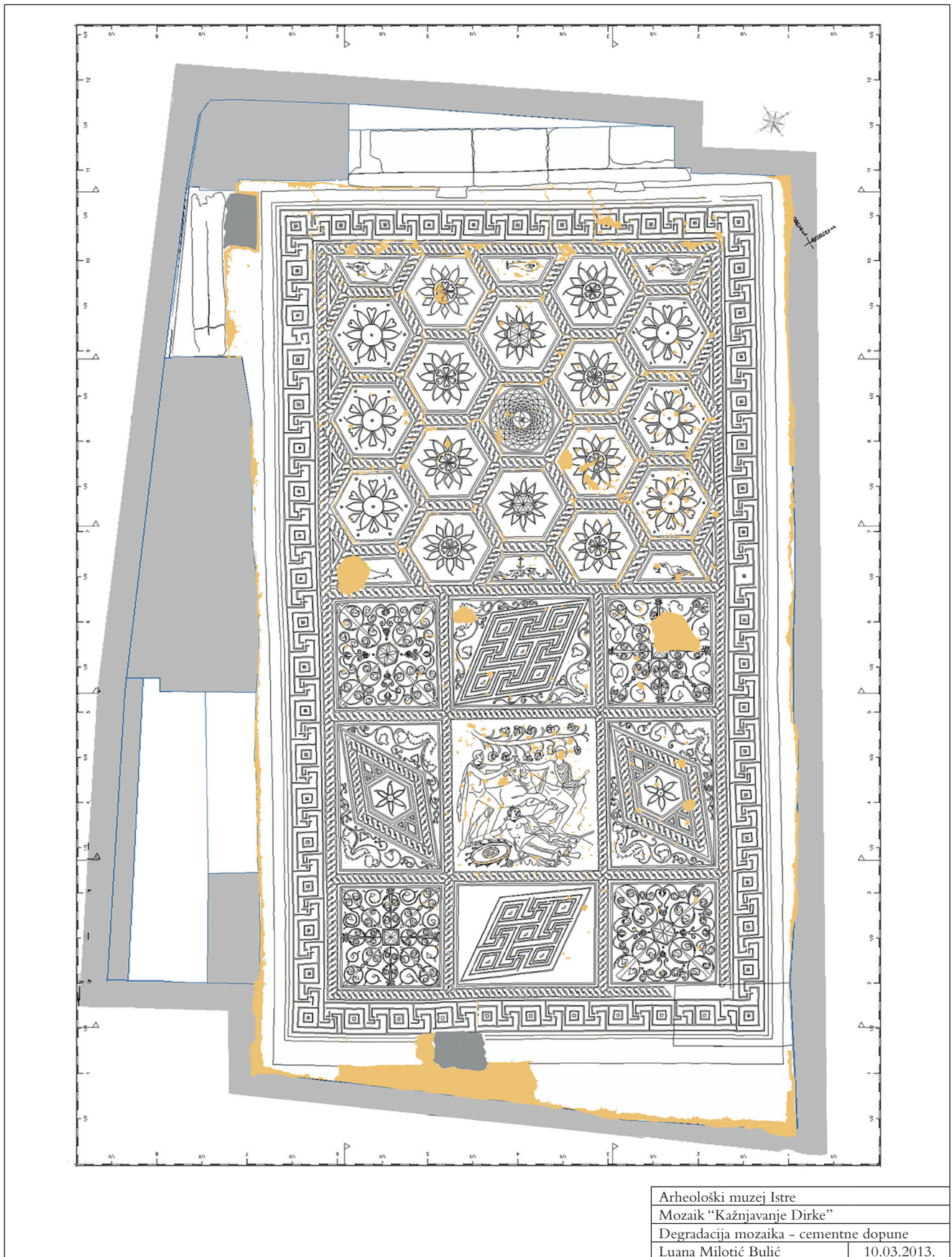
CONCLUSION

The Archaeological Museum of Istria is engaged in a project to document the state of all monuments at Pula. The mosaic showing the punishment of Dirce was processed in the course of 2012 and 2013. We began by creating a graphical base and made a photogrammetric survey, with the help of which we obtained the plans of the site, and the views of the four wall surfaces containing frescoes. Once the graphical base was made, it was possible to start with the feasibility study of the state of the mosaic, with plans showing the degradations. We also made a historical analysis of events associated with this mosaic, from the time of its discovery to the present day. The laboratory analyses that were performed, determined the salts that are present on the surface of the mosaic. An analysis of tesserae and mortars that were employed for the restoration of the site was likewise made. With the help of all the data obtained it was possible to conclude that the degradations plaguing the mosaic are not of the sort that would endanger its existence. However, it is also apparent that it is neither appropriately protected nor presented or valorized. With a review of the necessary interventions it is possible to plan all future works on this site, those dealing with conservation-restoration as well as those aimed at its historical and aesthetical valorization and presentation, which would help this site to become an obligatory stop on the sightseeing route of the monuments at Pula.

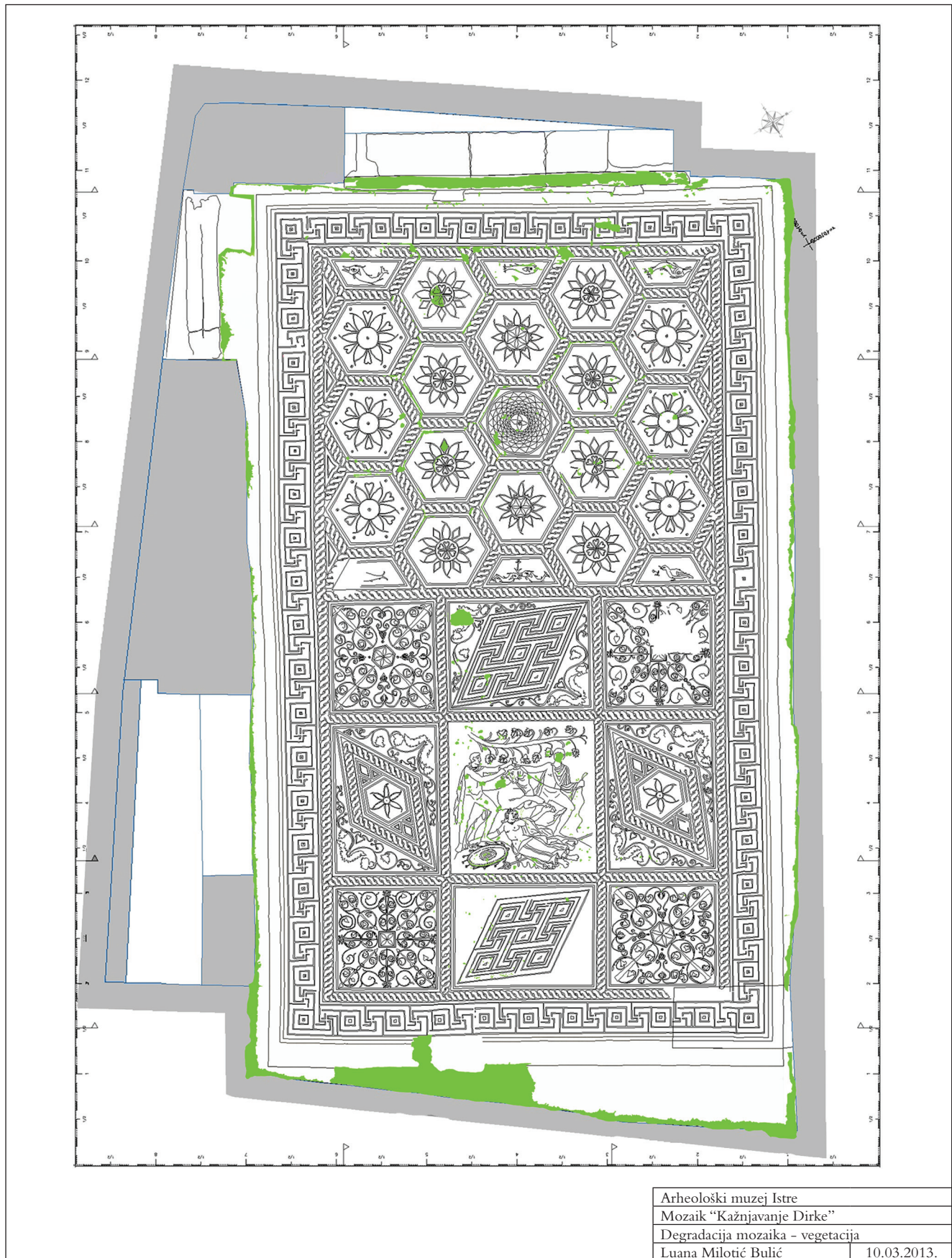


T. I Grafički prikaz idejnog plana podizanja mozaika.

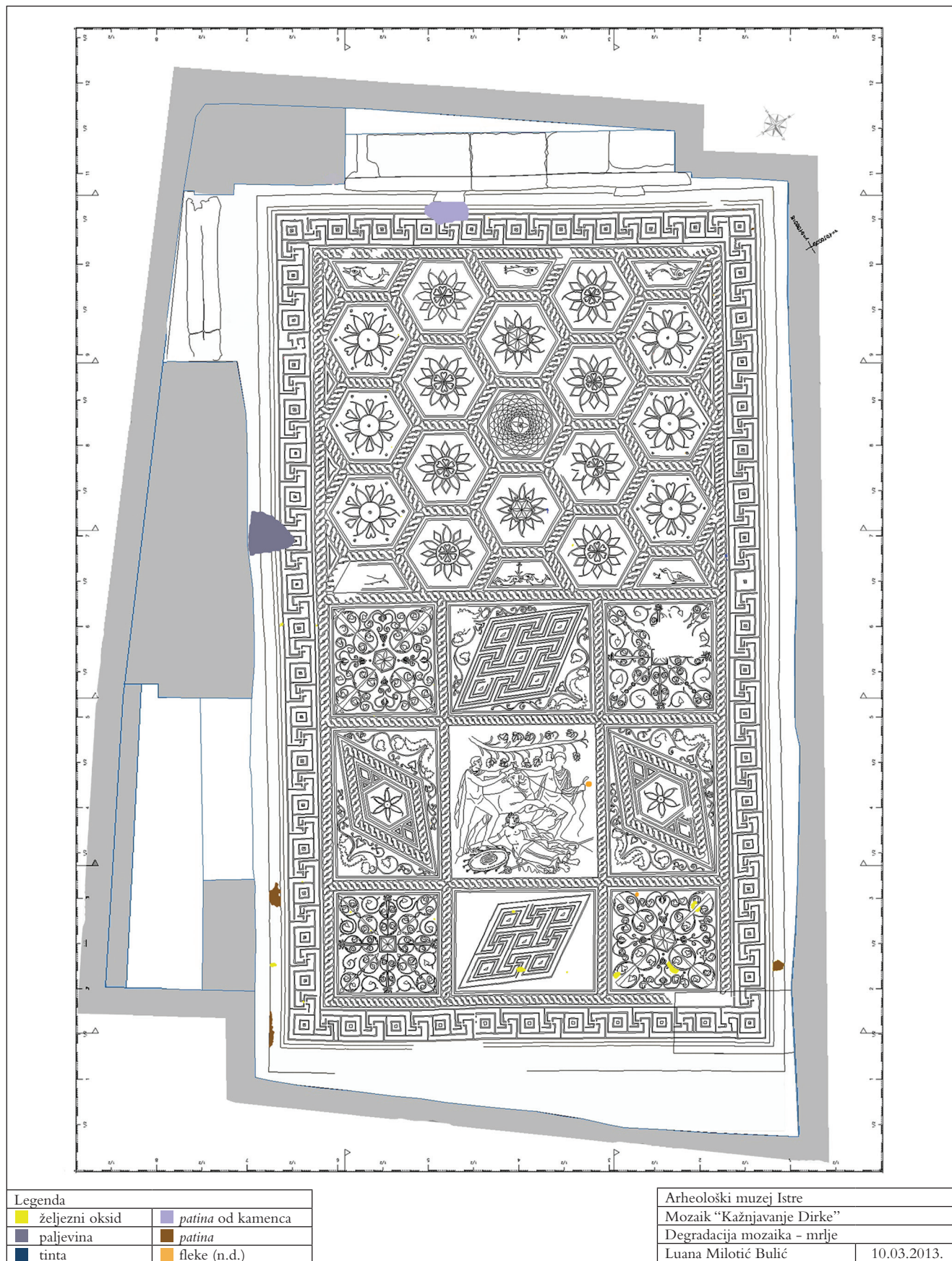
P. I Graphic display of the preliminary plan to raise the mosaic.



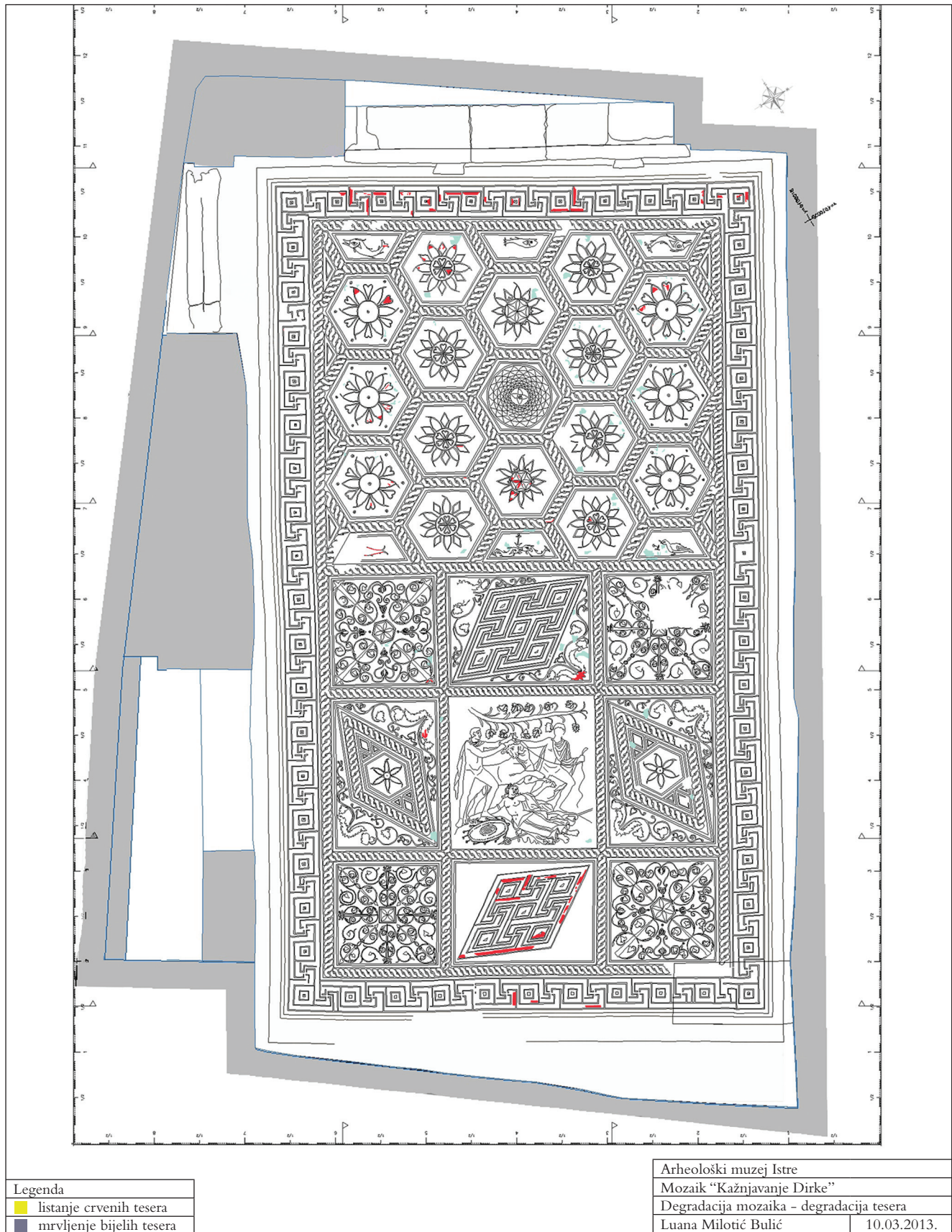
T. II Grafički prikaz cementnih nadopuna.
 P. II Graphic display of cement fillings.



T. III Grafički prikaz vegetacije.
 P. III Graphic display of vegetation.



T. IV Grafički prikaz mrlja.
P. IV Graphic display of stains.



T.V Grafički prikaz degradacije tesera.

P.V Graphic display of degradations on tesserae.

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