

PLANIMETRIA ARQUEOLÒGICA DE TÀRRACO

Atlas d'arqueologia urbana de Catalunya 2

PLANIMETRIA ARQUEOLÒGICA

DE TÀRRACO

Atlas d'arqueologia
urbana de Catalunya 2

Direcció científica

J. M. Macias Solé
I. Fiz Fernández
Ll. Piñol Masgoret
M. T. Miró i Alaix
J. Guitart i Duran

PLANIMETRIA ARQUEOLÒGICA DE TÀRRACO

PLANIMETRIA ARQUEOLÒGICA DE TÀRRACO

Direcció científica

Josep Maria Macias Solé
Institut Català d'Arqueologia Clàssica

Ignacio Fiz Fernández
Institut Català d'Arqueologia Clàssica

Lluís Piñol Masgoret
Ajuntament de Tarragona - Museu d'Història

Maria Teresa Miró i Alaix
Àrea de Coneixement i Recerca
Direcció General del Patrimoni Cultural

Josep Guitart i Duran
Institut Català d'Arqueologia Clàssica

ATLES D'ARQUEOLOGIA URBANA DE CATALUNYA 2
DEPARTAMENT DE CULTURA I MITJANS DE COMUNICACIÓ DE LA GENERALITAT DE CATALUNYA

TREBALLS D'ARQUEOLOGIA URBANA 1
AJUNTAMENT DE TARRAGONA. CONSELLERIA DE PATRIMONI

SÈRIE DOCUMENTA 5
INSTITUT CATALÀ D'ARQUEOLOGIA CLÀSSICA

Tarragona, 2007

Coedició del Departament de Cultura i Mitjans de Comunicació de la Generalitat de Catalunya, Ajuntament de Tarragona. Conselleria de Patrimoni i l'Institut Català d'Arqueologia Clàssica.

Coordinació editorial

Publicacions de l'Institut Català d'Arqueologia Clàssica

Assessorament lingüístic

Roser Calvet Riera

Traducció a l'anglès

Paul Turner

Disseny de la portada

Elfo Jobs, S.L.

Fotocomposició

Víctor Igual, S.L.

Impressió

Grafos S.A.

- © **De l'edició:** Departament de Cultura i Mitjans de Comunicació, Ajuntament de Tarragona. Conselleria de Patrimoni i Institut Català d'Arqueologia Clàssica.
- © **Del projecte i la infografia arqueològica:** Ajuntament de Tarragona. Conselleria de Patrimoni i Institut Català d'Arqueologia Clàssica.
- © **Dels textos:** els autors.
- © **De les fotografies:** els autors.
- © **De les fotografies de portada:** Institut Cartogràfic de Catalunya (full 267-139, vol 1998) i Unitat de Documentació Gràfica de l'ICAC.

Dipòsit legal: T-387-2007

ISBN: 978-84-934698-4-9

Són rigorosament prohibides, sense l'autorització escrita dels titulars del *copyright*, la reproducció total o parcial d'aquesta obra per qualsevol procediment i suport, incloent-hi la reprografia i el tractament informàtic, la distribució d'exemplars mitjançant lloguer o préstec comercial, la inclusió total o parcial en bases de dades i la consulta a través de xarxa telemàtica o d'Internet. Les infraccions d'aquests drets estan sotmeses a les sancions establertes per les lleis.

Projecte de recerca i documentació de l'Ajuntament de Tarragona i l'Institut Català d'Arqueologia Clàssica.

Comissió institucional del projecte

Ajuntament de Tarragona: M. Mercè Martorell Comas i Lluís Piñol Masgoret.

Institut Català d'Arqueologia Clàssica: Josep Guitart i Duran i Jordi Peiret i Estrada.

Direcció científica

Josep Maria Macias Solé, Ignacio Fiz Fernández, Lluís Piñol Masgoret, Maria Teresa Miró i Alaix i Josep Guitart i Duran.

Coordinació de l'obra

Josep M. Macias Solé i Ignacio Fiz Fernández (Institut Català d'Arqueologia Clàssica).

Documentació

Josep M. Macias Solé i Jordi López Vilar (Institut Català d'Arqueologia Clàssica), amb la col·laboració de Rafael Gabriel Costa (Reial Societat Arqueològica Tarraconense), Sílvia Alcaide González, Judit Ciurana Prast i Mariona Valldepérez Aixendri (Institut Català d'Arqueologia Clàssica).

Tractament SIG i infografia

Ignacio Fiz Fernández, amb la col·laboració de Paloma Aliende García, Ana Garrido Elena, Óscar Martín Vielba i Pau de Soto Cañamares (Institut Català d'Arqueologia Clàssica).

Amb la col·laboració de

Reial Societat Arqueològica Tarraconense, Codex-Arqueologia i Patrimoni, Cota 64 i Nemesis.

Informació i/o textos facilitats per

Susanna Adell Chavarria

Pilar Adiego Eraña

Maria Adserias Sans

Paloma Aliende García

Xavier Aquilué Abadías

Joan-Vianney Maria Arbeloa i Rigau

Roc Arola Arnau

David Bea Castaños

Cristina Benet Arqué

Alejandro Bermúdez Médel

Francesc Bosch Puche

Pilar Bravo Póvez

Lourdes Burés Vilaseca

Iban Cabrelles Albareda

M. del Carme Carbonell Muiños

Ana Carilla Sanz

Elisabet Chimisanas i Mateu Alsina

Montserrat Corominas Vidal

Óscar Curulla Ferré

Rubén Díaz Dalmau

Moisés Díaz García

Jordi Diloli Fons

Montserrat Esteban Nadal

Reis Fabregat i Fibla

Ferran Falomir Forcadell

Ignacio Fiz Fernández

Gabriel Foguet Coll

Montserrat García Noguera

Neus Gasull Casanovas

Pere Gebellí Borràs

Manel Güell Agramunt

Anna Maria León Delclòs

Jèssica Llop Ramos

Jordi López Vilar

Josep Maria Macias Solé

Sagrari Martorell Cubero

Jaume M. Massó Carballido

Joan Josep Menchon Bes

Imma Mesas Torronteras

Héctor Mir Llorente

Maria Teresa Miró i Alaix

Andreu Muñoz Melgar

Pedro Otiña Hermoso

Rosa Palau i Baiges

Rubén Pellejà Villalba

Lluís Piñol Masgoret

César Augusto Pociña López

Josep Maria Puche Fontanilles

Esther Ramon Sariñena

Antoni Rigo Jovells

Josep Francesc Roig Pérez

Jordi Rossell Ardèvol

Joaquín Ruiz de Arbulo Bayona

Cristòfor Salom Garreta

Jacinto Sánchez Gil de Montes

M. Immaculada Teixell Navarro

Esmeralda Terré Vidal

Olga Tobías Jiménez

Mercedes Tubilla Martínez

Enric Vilalta Ribé

Albert Vilaseca Canals

Topografia

Javier Zamarro Martín i Josep Subirà Arbolí.

Base cadastral

Ajuntament de Tarragona.

ARCHAEOLOGICAL PLANIMETRY OF TARRACO

ENGLISH TRANSLATION OF THE STUDY
Chapters 1, 2 and 3

1. PRESENTATION AND CONTENTS OF THE STUDY

Ignacio Fiz and Josep M. Macias

The main aim of this study is the compilation of the archaeological planimetry of the Iberian, Roman and Visigothic remains in the city of Tarragona, taking the present-day cadastral plots as a basic documentation unit. Each of the files we have prepared includes the pictures, description and relevant archaeological documentation or bibliography. Another of the study's objectives is the more or less precise reconstruction of the urban elements that, due to the processes inherent in the historical and topographical evolution of Tarragona during the 19th and 20th centuries, can no longer be verified archaeologically.

In order to publish this paper we first had to create a system to digitalise, process and present all the information following two basic premises: the ability to update the information and the relationship with other documentation systems. The system we have defined is the result of the previous methodological experience developed by one of the authors (Fiz 2003, 2004) and already put into practice in the city of Tarragona. In the last ten years other European cities have undertaken similar programmes and there are yet more in the planning stage.¹ On the other hand, two attempts have been made at creating a database of Tarragona's archaeological heritage that have unfortunately either unsuccessful or have had little dissemination.²

In our case, the established Archaeological Information System (AIS) is a future tool that could be used to update both the content (with the archaeological excavations carried out since 2004) and the subsystems or computer applications that it amalgamates, as these are fully standardised commercial programs that are easy to adapt to our needs. Although this is a documentation system limited to the city of Tarragona, it can be applied or extended to any territorial area. The information generated by the application can be exported to the city's cadastral databases and, at the same time, it is able to import photographic and car-

tographic documentation. It is a reference tool that in the future could be accessible via intranet or Internet, interacting with a specific program such as Autodesk MapGuide or ArcIMS from ESRI, among others. In this way, by clicking on a cadastral plot, additional textual or graphic information may be obtained. Alternatively, by indicating a specific area it would be possible to see the plots that have archaeological information.

1.1. FUNCTIONS AND ORGANIZATION OF THE AIS

The AIS used has three computer applications or combined work subsystems: the CAD subsystem, represented by Autocad 2006, the REA subsystem implemented with Filemaker 6, and the Hipodam subsystem, built on the GIS ArcView application version 3.1 (fig. 1). The CAD subsystem provides Hipodam with the vectorised planimetric information; the REA stores the data needed to process the information, while Hipodam processes the data provided by the other two with its vectorial tools and bit map.

The CAD subsystem creates and processes the plans of each of the archaeological excavations, either by vectorising old planimetry or by modifying the digital plans already created by the technicians who took part in the excavations. We should point out that for this project we have used linear drawings of the archaeological structures, without taking into account the specific details of the building materials, although in certain cases, due to the singularity of the remains, we have included this information (e.g. ashlars or megaliths). The vectorisation system is characterised by the use of polylines or, if appropriate, circumferences, arcs or squares.³ In order to avoid an excessive schematisation of the planimetry, we have taken into account a predetermined description according to the type of archaeological structure, and we differentiated between actual and reconstructed elements. We applied con-

1. In Cordoba (Murillo *et al.* 1999), Barcelona (Manoel/Miró 2006), Lecce (Semeraro 1997), Ravenna (Augenti *et al.* 2003), and Narbonne (Dellong 2006). Another already finished example is Volume One of the urban archaeological atlas of Catalonia referring to the locality of Granollers (Uscatescu 2004).

2. This situation may be explained by the characteristic *instability* that has surrounded the management of Tarragona's archaeological heritage. An initial declaration of intent, pioneering at the time in Spain, can be found in Ted'a 1988. Subsequently the Sicaut (Tarragona Urban Archaeology Cartographic Information System) project was undertaken as part of the Catalan Autonomous Government's Urban Archaeology Programme, which finished in 1993. It was directed by Alejandro Bermúdez and Pedro Pujante and carried out by Maria Adserias, Olga Balart, Rosa Palau and Pedro Pujante. The Tarragona Archaeological Plan was subsequently drawn up. This was intended to be the continuation of the Sicaut project and was extended in terms of the compilation of the archaeological documentation. It was a municipal project with the collaboration of the Department of Culture and the Rovira i Virgili University (Rifa 2000). During this period other planimetric compilation archaeological research projects were undertaken to reconstruct certain areas of the city. One example is the work of Th. Hauschild and X. Dupré (1983 and 1987, respectively) on the reconstruction of the provincial complexes, or the proposals put forward by J. M. Macias (2000a) on the intramural road layout.

3. Given the incompatibility with the Hipodam subsystem, in other words, with the ArcView program, *splines* have not been applied.

ventional symbols to the thousands of documented tombs with the aim of illustrating the typological variety of the funerary repositories used (fig. 4). We have also differentiated between three types of altimetrical levels.

At the same time, in order to anticipate the generation of evolutionary plans for chronological phases, the information has been apportioned to predefined historical periods, according to the historical situation of Tarragona and the existing volume of information. The temporal location of the structures has not been made merely on the basis of their construction date, but also the period they were in use and their urban visualisation. If appropriate, the AIS allows us to modify the following temporal periodisation:

1. The Iberian period up to the arrival of the Scipios (approx. 500-218 BC). This is a lengthy period that has provided us few archaeological remains, all of which are located on the lower part of the hill. They correspond to the ancient *Cesse* and/or *Tarracón* and the chronology of the documented remains is reliable, except for that of the silos, for which we can only ascertain the date they were filled in. Based on pottery finds, some of these receptacles have been placed in the later period, although we are aware of the interpretative problems behind this decision.
2. The Late Republican period up to the beginning of the Principality of Augustus (218-30 BC). The city of *Tarraco* was constituted in this period, with its walls, drainage system, and intramural urban layout. In this period we include the city's *cuniculus* and the main question concerns the construction of the port jetty documented in the historical planimetry. Does it belong to this period or was it built during the time of Augustus?
3. The Augustan Period up to the post-Neronian military crisis (30 BC – 69 AD). This is perhaps the most dynamic historical period in terms of city development. The status of provincial capital, Augustus' sojourn, and the economic activity of the *ager Tarraconensis* can all be seen in the extramural development of the city, the restructuring of the road periphery, the port, the forum and the construction of the theatre. In addition, the Upper Part of the city was almost certainly demilitarised and there began an urban redevelopment that would finish in the subsequent period.
4. The period between the Flavian and Antonine dynasties (69-180 AD). As a result of the previous periods, this was the golden age of *Tarraco*. It was at this time that the construction of the seat of the *Concilium Provinciae Hispaniae Citerioris* and the spectacle venues and ceremonial buildings linked to it (the Circus and the Amphitheatre) were completed. The construction of numerous port warehouses, the epigraphy, statuary, and mosaics are all evidence of the most important and influential period in the history of Tarragona.
5. The period between the reign of L. Verus and the last Western emperor, Romulus Augustulus (180-476 AD). This represents the transition to the Late Antiquity city and illustrates its economic decline - the abandonment of the large port facilities, the spread of large, open-air necropolises, and the falling into disuse of the theatre and the drainage network. A reduction in the size of the residential areas can be seen from the end of the 2nd century and the city was partially destroyed in the year 260. Ideologically it represents the transition from an imperial worship city to one of Christianity, and well as the generalised adoption of inhumation as a funerary rite.
6. The Visigothic period (476-713). From the fall of the Roman Empire to the loss of the urban institutions with the arrival of Islam. This represents a new city shaped around the Visigothic and Christian classes. The disappearance of the venues for spectacles, urban contraction, and a major transformation of structures of the *Concilium* at the beginning of the 6th century.
7. Architectural structures of indeterminate chronology.

Architectural and chronological variety is depicted with a symbology created with Autocad, establishing guidelines to facilitate the subsequent transfer of the information to the Hipodam subsystem (fig. 2 and 3). The information has been centralised in three files: one contains the archaeological information that differentiates the architectural variety and the predefined chronological phases; the second establishes the graphical symbols resulting from the established archaeological interpretation that is also organised into the corresponding temporal periods, and finally, the third file incorporates the information regarding the current or archaeological levels.

The REA subsystem is based on FileMaker Version 6, which allowed us to define a standard database using pre-established fields. The program has taken care to activate the relevant plug-ins to share data between the different applications (ODBC). Each register belongs to a cadastral unit in present-day Tarragona and contains a series of fields with the information compiled in section 4.1.

The Hipodam subsystem processes the documental, vectorial and raster information associated with the documentation. The potential and resources of this program far exceed the needs of this project, in which we have given priority to the graphical representation of the archaeological finds. Each register or cadastral unit is entered into the ArcView GIS with its own

code and is incorporated into the planimetry carried out with CAD, together with the information from the REA subsystem. If necessary, we can add more visual and textual information to each of the records created in this project. This could be photographic information of the excavations or pictures and contents from the corpus of materials, such as collections of epigraphy, statuary, etc. Each cadastral unit entered can be consulted individually by accessing the information from other subsystems. In addition, there is full interrelation between the data and therefore by using the layers of the phases established in CAD it will be possible to make global consultations on the whole city by period or exact chronological date. Thus we can obtain *reconstructive snapshots* adjusted to a predefined year or period. This AIS also allows for themed consultations to obtain specific information on particular archaeological material. There are also functions that permit the incorporation of historical maps and old aerial photos, making it necessary to define a geo-referenced system that allows the superposition of each of these raster images.

1.2. *FORMA TARRACONIS*: DOCUMENTAL BASE AND DEPICTION

The *Colonia Iulia Urbs Triumphalis Tarraco*, capital of *Hispania Tarraconensis*, was one of the largest cities in the Western Mediterranean. It was a prosperous place with a built-up area of between 80 and 90 hectares, spread over an intramural area located on a coastal hill (approx. 60 ha), some *suburbia* on the lower slopes (10-15 ha), an extensive port area (8-10 ha), and an undefined peripheral inhabitation made up of periurban *domus* and artisans' workshops. Although we know the Roman city from its large public buildings (the *Concilium Provinciae*, the circus, the amphitheatre, the theatre, the *forum Coloniae*, the walls, the necropolis, and the monuments of its *territorium*), Tarraco on the whole is an unknown archaeological reality, as there is no overall view of all the information compiled from the beginnings of contemporary archaeology to the present-day professional activity. This is the main objective we are aiming to reach with this project, although we recognise that the planimetries we render do not constitute a study of the archaeological and historical reality, but rather a tool with which the researcher can propose work hypotheses and provide valuable information for the agents charged with the city's management and revitalisation.

The compilation begins with the planimetries produced in the 19th century, mainly by Hernández Sanahuja. Although they are not precise documents, they have been positioned using the cadastral layout

or with the AIS (see section 2). The first conscientiously produced planimetries were those made in relation to the discoveries in the area of the Francolí early-Christian Necropolis (Tulla *et. al.* 1927). These same finds brought Monsignor Serra Vilaró, a true pioneer in the techniques of making archaeological records, to Tarragona. His work on the Necropolis and the Forum is still an essential reference point and the quality of his graphical and photographic documentation would not be surpassed in Tarragona until the arrival of the researchers from the German Archaeological Institute. As far as local researchers are concerned, no one followed Serra Vilaró's example and, except for certain notable exceptions (L. Bonet, A. Nogués, J. Sánchez Real or Ll. Papiol), post-war archaeological documentation has been distinctly lacking. The best example of this situation is the work carried out up to 1982 by the Provincial Archaeological Museum that, with the exception of the amphitheatre, remains largely unpublished. Likewise, the activities of the old Archaeological Service during the 1980s did not generate a large planimetric corpus, except for the work carried out on the head of the circus (Dupré *et al.* 1988).

A new stage began when the Tarragona Archaeology Workshop-School (Ted'a) (1986-1990) was set up. Its life was much too short, but it did have time to undertake the epistemological renovation that defined the methodological bases that are still valid in today's professional practices, notwithstanding the logical changes and evolution brought about by the "digital revolution". Subsequently, the professionalisation of the archaeologist and the legislation promoted by the Catalan Autonomous Government Department of Culture's Archaeological Service has favoured the creation of a planimetric and photographic corpus⁴ of the excavations. This task has been carried out jointly by the archaeologists who have worked in the city and it represents a significant advance, although unfortunately it suffers from varying quality, depth and documentation systems. In this respect we have to lament the lack of unification and serious application of archaeological intervention and documentation criteria among the numerous professionals and firms that work in Tarragona, which, in many instances, has determined the result of this archaeological planimetry. The role of the institutions in this overall context has also, until recently, been unsatisfactory, given their potential and social responsibility. The result of this whole process is well known and has recently been unequivocally illustrated by various authors (Miró 1997 and 1999; Mar/Ruiz de Arbulo 1999; Dupré 2001; Ruiz de Arbulo 2004). It is significant that most of these reflections or evaluations have been made in fo-

4. It will soon be necessary to raise the question of digitalising all the chemically developed photographic material printed on paper, which is very sensitive to the passage of time.

rooms held outside the city and have not had the resonance they deserve.

Apart from specific archaeological publications, the majority of our planimetric information comes from unpublished archaeological actions, the documentation for which is held by the Office of Cultural Heritage, with the excavated material being in the safe-keeping of the National Archaeological Museum of Tarragona (MNAT). The information has been generously ceded by the excavation directors and the periodisations have been prepared exclusively from the administrative reports, not from an exhaustive study of the archaeological excavations. At first this was an impediment, but we have to bear in mind that the AIS structure allows the data to be modified, as well as transferred between the created chronological layers, the names of which can also vary. We insist on the need to carry out intensive studies of some of the rescue excavations undertaken. Only careful analysis will allow us to correctly interpret the *scientific impressions* obtained from the drawing up of administrative reports. By way of example, and from our own experience, it is possible to compare the conclusions drawn from the analysis of the port area public baths from administrative report (Díaz *et al.* 2000a-b) and, subsequently, from an extensive period of revision of the archaeological excavations and the material recovered from it (Macias *et al.* 2004a).

The comparison of planimetric data has highlighted the topographical inaccuracy of past archaeological interventions and projections of large public buildings. This is a consequence of the technical resources available at the time and the fact that the topographical medium used by archaeologists was based on a municipal cadastral planimetry produced with old, not completely accurate means. These inaccuracies can be seen particularly in the large urban complexes of Roman times, the remains of which are still visible in the city today. For this reason, we included a topographer in the project, with the aim of using satellite positioning to reference the city's main monuments.⁵ With this objective in mind we introduced a network of topographical bases for the present-day streets, using GPS and coordinates provided by the Catalan Cartographic Institute. This task has allowed us to correct the topography of the monuments currently visible in the city, which we list below.

1. The Roman Walls. We surveyed the external perimeter of the Late Republican wall of Tarragona from the Portal del Roser to the so-called eastern head of the circus. We tried to reflect the projection existing between the megalithic wall and the *opus quadratum*. We mapped out the topography of the internal perimeter of the wall in the Baixada del Roser and the Plaça de l'Escorxador segments.
2. The Worship Area. We worked in the Tarragona Cathedral cloister, the Diocesan Museum in Tarragona, the Tarragona headquarters of the Catalan Architects Association, and the Tarraconense Biblical Museum.
3. The Plaza of Representation in the *Concilium Provinciae*. We studied the topography of the remains in the Plaça del Pallol, Civaderia Street, the Plaça de Santiago Rusiñol, the Plaça del Forum, Santa Anna Street, and the Praetorium Tower.
4. The Roman Circus. We studied the topography of the plot of the old Casa dels Militars, the eastern head, the Plaça dels Sedassos, and the commercial premises with odd numbers in the Plaça de la Font.
5. The Roman Amphitheatre and Visigothic Basilica.
6. The *Forum Coloniae* of Tarraco.
7. The area of the early-Christian Necropolis: the periurban road, the suburban *domus* and mausoleum located next to the MNAT Central Services building.
8. The Tarragona Theatre.

We also compiled the historiographic precedents, indicating, as far as possible, the location of the finds. Although they have no graphical content, their information is useful for understand the *forma Tarraconis*, as well as for providing elements for the analysis and planning of the city's heritage management. Our study does not aspire to be an exhaustive documental compilation and it is based on earlier compilations (degree and doctoral theses). Worthy of note are those of G. Alföldy⁶ (1975), R. Navarro (1979), E. Koppel (1985a), J. Gimeno (1991) and M. Claveria (2001), despite the fact that we unfortunately do not know the origin of the majority of the objects studied by these researchers. Other archaeological materials remain to be studied. For example, the case of the numismatics is quite flagrant.⁷ We also refer to the best-known local history texts (Ponç d'Icard, Albinyana/Bofarull, Hernández Sanahuja, etc.), the reports sponsored by the RSAT (the work of Sánchez Real is highly praiseworthy), the commendable com-

5. Rather than make a detailed projection of the archaeological remains, we have reoriented and corrected them according to the coordinates used. The result is that all these monuments are interrelated without depending on the current cadastral planimetry.

6. Between 1997 and 2000, this *Tarragoní* prepared a new revision of the epigraphic collection of Tarraco for volume II of the *Corpus Inscriptionum Latinarum*. He was assisted in the revision by Heike Niquet in the area of Christian and Jewish inscriptions. The author mentions that the initial figure of 1,080 epigraphs has been increased to some 1,400 texts, thanks to the revisions carried out and items obtained in new excavations (Alföldy 2004).

7. We have at our disposal various partial studies, but our knowledge of this material does not do justice to its potential. We refer to the works of L. Villaronga (1983, 1992, 1993), J. Benaiges (1994), J. M. Carreté (1994), and a recent synthesis by T. Marot (1999). Other specific contributions (L. Avellà, I. Teixell, À. Rifà) are mentioned in the bibliography referring to the descriptive records.

CARTOGRAPHIC COMPILATION OF THE BRIEFCASE	
Numbering	Legend
•	General plan of the archaeological remains and the current urban layout E: 1:6000
	<i>Situation and contextualisation plans E: 1:5000¹⁰</i>
•	I Iberian period up to the arrival of the Scipios (approx. 500-218 BC)
•	II Late Republican period up to the beginning of the Principality of Augustus (218-30 BC)
•	III Augustan period up to the post-Neronian military crisis (30 BC-69 AD)
•	IV Period between entre les dinasties flàvia i antonina (69-180 AD)
•	V Period between L. Verus and Romulus Augustulus (180-476 AD)
•	VI Visigothic period (476-713/714)
	<i>Situation and contextualisation plans E: 1:1250</i>
•	Page plan guide E: 1:1250
•	A Upper Part: worship area and <i>Concilium Provinciae</i> plaza plus the circus
•	A' Upper Part: structures built during the Julian-Claudian and Flavian period
•	B Residential area affected by the 19 th century quarrying
•	C Residential and port area around the Forum and the theatre
•	D Western suburb
•	E Francolí western outskirts
•	F Northern suburban area
•	G North-western outskirts
•	H L'Oliva northern outskirts
•	I Eastern suburb and amphitheatre
•	J Eastern outskirts
	<i>Situation plans of the sectors with no archaeological remains E: 1:1500</i>
•	K Western outskirts
•	L Eastern outskirts
	<i>Detailed plans on a scale of E: 1500</i>
•	Page plan guide E: 1:500
•	1-24 Detailed cadastral plans E: 1:500

pilation by Rafael Gabriel and Rodolfo Cortés (1985⁸), and the documentation collected by the Sicaut project. In addition to these sources, we consulted the Valentines Archive⁹ held by the RSAT (Hernández/López 2001).

All the information we collected was used to generate the 46-page DIN A2 cartography included in the second volume of this study, although some parts have been reproduced in this first volume. Six evolutionary plans of Tarraco are depicted on a scale of 1:5000, according to the established chronological periods, as well as the project's guide plans (Scale 1:6000). The

aim of the evolutionary illustrations is to reflect the historical periodisation and the urban transformation of the classical city during its nine centuries of existence (fig. 5 and 6). We are aware that the current state of research has not allowed us to achieve this objective satisfactorily. Many of the archaeological structures exhumed in the last one hundred years do not have a precise dating and have therefore not been included in these plans. On the other hand, we hope that further studies will allow us to determine with greater accuracy the chronological questions that are currently the subject of various doubts as to their interpretation.

8. The *compilation of archaeological data* has the honour of being the first attempt at what we understand today as an Archaeological Map. It is the compilation of a large amount of data (unpublished at the time) from documental research and the contributions of RSAT members. It draws up the first planimetry of the known imperial structures in the Upper Part with some quite accurate measurements. Unfortunately, this document has been ignored in the recent urban transformations.

9. This study can be considered, semiofficially, to be the first archaeological planimetry of Tarragona, even though it was carried out on a voluntary basis with meagre resources, which hindered in many cases the positioning of the remains and their drawing to scale. Wherever possible, this information has been included using the methodology described in section 2.1.

The scale of 1:1250 was chosen in order to provide a more intelligible view with a greater perspective. It is not the normal proportion used in cartography, but has been chosen as it fits in with the format of the paper chosen for publication and allows us to show representative areas of Roman Tarraco on a single sheet. For example, on a single page we were able to depict the present-day Upper Part, the ancient seat of the *Concilium Provinciae* and the circus; on another we have included the monumental area of the colonial forum and the theatre, and there are other similar cases. On the other hand, a scale of 1:500, a more common standard used in urban documents, permits a more detailed view of the architectural structures, the levels, the graphical symbols used, etc. With this scale we can appreciate the archaeological reality of each plot studied, as well as evaluating the potential of the surrounding area. We also created evolutionary or historical phase plans based on specific cadastral units that are included in this first volume, together with the corresponding textual information.

In both the E. 1:1250 and the 1:500 plans we delimited the urban plots with archaeological interventions or information, and on their perimeter we incorporated the number identifying the file or register, which we compiled in chapter 4 of this volume. Geographical north does not coincide with the vertical axis of the paper in either type of plan. This was done in order to adapt the orientation of the archaeological remains to that of the paper, with the aim of giving priority to the visual aspect of the remains and making optimum use of the available space.

1.3. ACKNOWLEDGEMENTS

A project of these characteristics cannot be undertaken without the help and support of many professionals who, in one way or another, have been part of the processes derived from the documentation and research of the archaeological heritage. The compilation of the archaeological information has been an onerous task, made lighter by the faculties of the colleagues who have overseen the excavations in the city; some on an individual basis and others as part of the archaeology firms working in Tarragona up until the

year 2004 (Codex, Cota 64 and Nemesis). They all allowed us to consult their studies, many of which are unpublished. In part, merit for this study goes to a group of professionals who often work under more limitations than would normally be considered desirable. Everybody who has cooperated with us is listed in the study credits and in section 4 under their initials.

We also have to mention the considerable assistance in the task of documentation given to us by Dr Jordi López Vilar, Sílvia Alcaide, Judit Ciurana and Mariona Valldepérez. We should emphasize the work of Paloma Aliende, Ana Garrido, Óscar Martín and Pau de Soto in entering the data into the computer. The study has also benefited from the extensive support in scientific guidance given by Dr Josep Guitart, Dr M. Teresa Miró and Lluís Piñol, who, throughout the preparation of this study, have taken part in monitoring and improving the results. We are grateful to the Royal Archaeological Society of Tarragona for their support and collaboration in the documentation phase and for allowing us access to the Valentines Archive. We should also like to thank the Port of Tarragona Central Archive, which offered us part of the digitalised historical cartography, the Tarragonès County Council for providing us with the topographical bases of the city, and the topographers of the firm of J. Zamarro for their involvement. Various institutions allowed us to access the areas in their custody in order to carry out topographical studies of the archaeological remains: the National Archaeological Museum of Tarragona, the Tarragona Museum of History, the Tarragona Diocesan Museum, the Tarraconense Biblical Museum, and Tarragona branch of the Architects Association of Catalonia. We were also allowed access to the premises of the Caixa Tarragona bank in Merceria Street.

Finally, we would like to acknowledge the help and guidance of all those people who, through their generous support, have contributed to the positive outcome of this study: Xavier Aquilué, Francesc d'Assís Barriach, Coia Escoda, Rafael Gabriel, Josep Granell, Josep Lluís Gras, Jaume Massó, Joan J. Menchon, Andreu Muñoz, Josep M. Puche, Joaquín Ruiz de Arbulo, M. Immaculada Teixell and Elena Virgili.

10. These plans include an illustration of the theoretical contour lines of Tarragona in 1800 according to R. Gabriel (2001).

2. HISTORICAL CARTOGRAPHY, AIS AND ARCHAEOLOGICAL RESEARCH

Ignacio Fiz and Josep M. Macias

2.1. OBJECTIVES AND METHODOLOGY

It is obvious that the compilation of an archaeological planimetry is the best way to reconstruct the Roman city. However, it is also true that the technological and methodological developments that allow an AIS to be used make it possible to take advantage of the historical cartography to support our research. The compilation and comparison of maps that show the situation of the city in different periods, and can also be linked to the current cadastre, is a productive line of research. Moreover, the results obtained from this comparison and superposition allow us to see the evolution of the urban landscape and to evaluate *a posteriori* the impact of the most important historical events. All in all, the archaeological planimetry and the historical cartography are basic tools for the recovery of the *urban memory*, on the basis that they explain the processes that are the origin of a city's historical development, while at the same time they add to the sense of identity of the municipality's inhabitants.

Tarragona, like any other modern city superimposed on an ancient one, has transformed its subsoil, and as a consequence has caused irreversible changes to its past. These destructive processes have gone on throughout the city's history, although the greatest impact was during the urban expansion of the 19th century. This phenomenon was favoured by a sustained demographic and economic growth, caused in part by the foundation and growth of the modern port. In addition, the quarrying of rock over an area of approximately seven hectares inside the city itself had a negative effect on the preservation of the archaeological substratum (see a description of the urban process in Ferrer *et al.* 1994).

The use of historical cartography, combined with the archaeological planimetry and the current cadastre, is seen as the only resource available to fill the "information gaps" in the topography of ancient *Tarraco* caused by the expansion and destruction processes in Tarragona. This methodology was used in studying the urban evolution of the area of the imperial baths in the *Tarraco* port district (Fiz/Macias 2004), and it allowed us to improve our understanding of the processes by which the Roman water installations were reused from the mediaeval period on. We also have the interpretative experience of restoring the walled perimeter

of the city, as well as the intramural urban layout. In that case we compared the archaeological evidence with that of the historical cartography (Macias 2000a; Fiz/Macias in the press). The results we present here are a continuation of that research and they complement, at least theoretically, the reconstruction of the *forma Tarraconis* produced in this study.

Scanning the historical cartography generates raster images that can be geo-referenced and entered into the Hipodam subsystem. The register of each of these images becomes a geometric transformation that relates the coordinates intrinsic in the plans or recorded to the coordinates of the reference system. This system of transforming, adapting, and geo-referencing old plans is based on the geometric correction techniques used in aerial photographs. An aerial picture contains a series of errors caused by the distortion of the sensor (e.g. the photographic lens), the inclination of the instruments or the medium in relation to the geometric vertical, the speed of the platform or its height, etc. The most common geometrical correction method consists of using a polynomial in a determined order that minimises the errors produced when the original picture was taken and creates another modified one. The transformation is achieved by building polynomials and taking a series of checkpoints entered by the operator as coefficients. When the most appropriate degree of transformation, and that closest to reality, is defined, it is applied to each pixel of the photograph or raster from the historical cartography that is to be transformed. This transformation can be represented by using a polynomial¹¹ of the order of *m* such as:

$$x' = \sum_{j=0}^m \sum_{k=0}^{m-j} a_{jk} x^j y^k$$

$$y' = \sum_{j=0}^m \sum_{k=0}^{m-j} b_{jk} x^j y^k$$

The use of polynomial transformations is very common in recording pictures, as it establishes a link between the coordinates of the original picture and those of the reference system with *checkpoints* established by means of a specific methodology (Fiz/Macias 2004). For our purposes, these checkpoints are the

11. Here, X and Y represent the original coordinates of the picture in question, while X' and Y' are the coordinates resulting from the final transformation.

recognisable topographical elements in the picture and in reality, which is the reason they were previously included in the archaeological planimetry. We are referring to crossroads, preserved stretches of walls, unique buildings, etc. The parameters of the selected polynomial transformation are determined by means of a system of equations that requires knowing the coordinates of the checkpoints of both the picture and the reference system.¹²

It has to be recognised, however, that processing old plans is much less accurate than rectifying aerial photographs. The system does not adapt well to the deficiencies inherent in historical cartography, in other words, when the cartographer made disperse, non-proportional errors. In such situations we have to raise the degree of polynomial transformation and it is therefore advisable to increase the number of checkpoints. However, this modification means that the rest of the picture will suffer considerable distortion, which can only be corrected if the checkpoints are uniformly distributed. In the processing of early cartography, it is difficult to achieve either condition since the older the maps, the less reliable points of reference they have in common. An example of this can be found in the walls or the amphitheatre. For this reason, we need to combine the historical cartography with the new archaeological remains that are being discovered. This helps to increase the reliability of the geo-referencing.

2.2. CARTOGRAPHY AND RECONSTRUCTION OF THE URBAN TOPOGRAPHY

Luckily for our purposes the Roman city of Tarragona, particularly the intramural area, is located on a coastal hill that rises gradually from 15 metres to a height of 80 metres above sea level (in the area of the Minerva Tower). This conditioned the layout of large containment structures built on the slopes of the hill; the orientation of the *cardines* and *cloacae* adhered to the relief of the hill and the sun's trajectory, and also took into account the flow of sewage towards the port bay. These atemporal principles have endured to the present day, despite the deurbanisation of the Late Antiquity and the continuous process of agricultural transformation carried out from the mediaeval period on.

Therefore, despite the stratigraphic sedimentation caused by both the wind and the rain that always occurs after any building has been demolished or has

collapsed, some of the architectural structures remain visible in spite of the passing of the centuries. In the case of *Tarraco*, the abandonment of certain residential areas began at the end of the 2nd century AD, and increased in intensity between the second half of the 3rd century and the first half of the 4th. Archaeology is not always able to identify the use of a residential area once it has been abandoned. In some cases we can verify the pillaging of building materials and a funerary occupation of the buildings that were already abandoned and presumably roofless. These circumstances can be observed in the suburban areas of *Tarraco*, but what happened in the intramural area abandoned in the 3rd and 4th centuries? Why was the road network defined by the Roman city maintained until the urban expansion of the 19th century? Although we need more evidence, it appears that there was pillaging, dumping in certain places, and no intramural funerary occupation (Adserias *et al.* 2000b; Gurt/Macias 2002).

One hypothesis is that there were rustic areas within the walls from the 4th century on, presuming an activity that would cause the ancient urban *viae* to be used and maintained as tracks separating the agricultural plots or to connect the area with the port. This theory explains why the urban structure was maintained throughout the Late Antiquity, as well as during the institutional abandonment of the city from the 8th to the 11th century. A similar situation occurred in the Middle Ages when the ancient *viae* became rural tracks and the façades of the *insulae* were used as agricultural plot borders and embankments. Later, the mediaeval agricultural plots would condition the layout of the 19th century urban expansion. Therefore, despite the number of centuries that have passed, we can still identify the Roman urban layout from the historical cartography. The clearest example can be seen in the 19th century streets, such as Unió, Fortuny, Soler, etc., that maintain the same orientation (35° E of geomagnetic north) as the *cardines* laid out between the 2nd and 1st centuries BC. The same is true of the transversal streets – Governador González, Reding, etc - that have the same orientation as the ancient *decumani*.

The conversion of the ancient intramural residential area into a rural landscape allows us to use the study and interpretation techniques from other disciplines that apply them to the analysis of seemingly different areas. We are referring to archaeomorphology based on, among other factors, the interpretation of maps and photographs. This is traditionally used to study

12. The picture coordinates (line, column) are obtained by clicking on one of the selected topographical points, then looking for its parallel in the picture of reference and, in turn, marking that. In this way the program saves a mass of points that help it to make the necessary polynomial transformations. The main advantage is that this avoids the difficulties associated with converting the various local measurements, such as the *vara* (approx. one yard), used before the generalisation of the international metric scale.

territories and reconstruct cadastral networks and can likewise be applied methodologically to urban contexts, particularly when the territorial layouts reflect the urban layouts. This was the case of Tarragona, where the bygone societies built, integrated and restructured the Roman urban layout, transforming it into a Late Antiquity agricultural landscape, which then conditioned the urban landscape from the medieval period on. Research has identified and positioned the 18th century agrarian morphology elements as rustic plots, tracks or margins, while looking for predominant and constant orientations, as well as metrological rates that provide evidence of earlier urban modules (González 2002, 74-78).

A list of the historical cartography used in the GIS

1. *Planta de la ciudad de Taragona con sus nuevas fortificaciones* (1641, preserved in the Archivo General in Simancas). Gabriel/Hernández 1981 (see fig. 8)
2. *Plan de la Ville, Fort et Molle de Taragone* (prior to 1717, Bonet 1991)
3. *Plano de la Parte Baja de la Población* (1854, Ángel Camón)
4. *Plano del ensanche parcial de la ciudad de Tarragona* (7/5/1857)
5. *Plano de la porción de terreno que media entre el Recinto alto de la plaza de Tarragona y su Puerto* (published in 1800 by Antonio López Sopena) (fig. 9 and 11)
6. *Plan de la Ville et du nouveuau Port de Tarragone* published by Laborde around 1806 (fig. 10)
7. *Plano del Puerto de Tarragona, su Raya, Arrabal, Bateria, Muralla arruinada, la proyectada* (1780, Juan de Santa Cruz) (fig. 13)
8. *Acròpolis primitiva de Tarragona* de B. Hernández Sanahuja (fig. 15, taken from Remesal *et al.* 2000)

We have applied the polynomial transformations to various city plans; those that best depict the intramural residential grid are numbers 5 and 6.¹³ Other aspects to which we can apply this methodology are the theoretical definition of the walled perimeter, the periurban road network, and the water facilities.

The Roman wall is an archaeological reality of which a length of some 1,330 metres is still preserved on the upper perimeter of the city. This is the section that today borders the Upper Part or historical centre and which has already been the subject of numerous studies (compiled in Menchon/Massó 1999). On the other hand, the entire central and southern section has gone forever; the descriptions of Lluís Ponç d'Icard (1572) and the sketches of Anton Van den Wyngaerde (Kagan 1986) are the most reliable testimonies we have to part of its route. The Renaissance scholar describes the route of the unpreserved section of the wall and his text has been widely studied and reconstructed (see Aquilué/Dupré 1986; Remolà 2004; Fiz/Macias 2004; Díaz *et al.* 2005). As far as the western enclosure is concerned, we can establish a hypothetical route from the Simancas plan (1641), Ponç's boundaries that have been identified today, the current division into plots, and certain specific finds (files 441,¹⁴ 463 and 466). This stretch of wall was the longest straight section on the whole perimeter (in theory some 634 m) and was an arbitrary enclosure of the southwestern slope of the hill, the flattest and most vulnerable area. The combination of the planimetric data obtained in the area of Lleida Street with that from the Via de l'Imperi Romà poses a problem when it comes to reconstructing this rectilinear stretch as it has traditionally been depicted in the topographical reconstructions of Hernández Sanahuja, Th. Hauschild, Dupré/Aquilué, etc., or in the historical cartography from the fortification project preserved at Simancas (1641). We believe that this segment of more than half a kilometre had a slight angle or change of direction at some point, as we have found it impossible to make a rectilinear reconstruction.¹⁵

The described route mentions several towers, as well as the "portal de Sagunto". It does not, however, mention the access ramps to the patrol path that are still preserved in the Upper Part. All these elements have been positioned in accordance with the measurements set out by Ponç d'Icard and take as a reference the church of Sant Fructuós, located on the AIS on the basis of the 1641 Simancas plan. According to the proposal put forward by Jordi López (2006, 229-234), the road that passed through this Roman gateway flanked by two towers was the Via Augusta, which has been partially documented on different plots and from which a milestone has been found (files 560, 569 and 634). On the other hand, the *decumanus* that connects the gateway to the external road has a series of features that have led

13. Both plans were drawn before the events that had the greatest effect on Tarragona's historical heritage – the large urban quarries and the urban expansion in the second half of the 19th century. Plan number 5 is a reliable document that has recently been analysed from a topographical perspective and that of the historical evolution of the city (Gabriel 2001). Number 6 was drawn at the end of the 18th century.

14. The references file xxx correspond to the registers on the database, equivalent to the cadastral units, included in Chapter 4 of this volume.

15. We have placed this slight inflection in the area of the forum (file 410, plates C and 10, second volume), although it could also be elsewhere. Another less likely possibility is that the change in orientation of the wall at the present-day Via de l'Imperi Romà number 19 (plates A and 5) came about before that which is traditionally depicted.

to it being interpreted as a *decumanus maximus* (fig. 11-12; file 469; *Díaz et al.* 2005).

The route of the wall as it skirts around the southern cliffs is unknown, although it appears clear from historical comparisons and its relationship with the Sant Miquel Street public baths and the theatre that the port area was in a suburban location. Ponç d'Icard's description states that the walls reached as far as the Port tower built in the 16th century on the site of the present-day Plaça dels Carros (Fiz/Macias 2004, fig. 6). This fact, together with R. Gabriel's topographical reconstruction (2001), leads us to believe that the wall followed the line of the two coastal promontories that ended at the hill. Our problem now is to define the section between the two elevations. To date there has only been one (purely hypothetical) proposal for reconstructing this section (Remolà 2004, fig. 8), and it poses numerous problems when it comes to fitting in the large known buildings in the port area - the theatre (file 470), the square located in front of the northern façade of the theatre (file 457) and the Apodaca Street public baths (files 355 and 359). Moreover, R. Gabriel's proposal for the reconstruction of the southeastern hill makes the hypothetical reconstruction of the defensive enclosure presented in 2004 even more problematical. On the other hand, we also find that the density of the known archaeological remains here make it possible to theorise that the Republican wall was demolished at the time of the Early Roman monumentalisation of the area. However, in that case what were the remains seen by Ponç d'Icard in the mid-16th century? Ponç d'Icard only saw the foundations of two sections of wall, at the beginning and the end of the stretch he describes for us (Duran 1984, 104).

From the southeastern promontory the wall climbed along the line of the eastern cliffs until it joined up with the section still preserved at the eastern head of the circus. The easternmost stretch is the least known and does not appear in the Modern-period planimetry. Moreover, some of Ponç d'Icard's boundaries were lost in the extensive 19th century quarrying. All that remains of this section is the find made in 1852 of a section of wall at an angle and with evidence of a *posterula* (fig. 11-12, file 333). This fragment has been included in the planimetry based on a drawing by Hernández Sanahuja (fig. 15).

We also propose that on this corner of the wall there may have been a *porta* for wheeled traffic at a point where one of the branches of the Via Augusta arrived. This road followed the eastern cliffs of the hill, giving rise to a small funerary area, which was subsequently abandoned when the amphitheatre was built over it (Ted'a 1990). The road can be identified in the 18th and 19th century planimetry, in which we can see that contemporary-period road enters the city via a trans-

versal street that is continuously depicted in the historical cartography and which, as a result of the digital correction, can be clearly seen to coincide with one of the city's *decumanus*. The Roman road has recently been identified below the theatre (Macias 2004c; Fiz/Macias in the press). The fact that it can still be seen in the modern cartography can be attributed to its proximity to the southwestern promontory, for which it possibly acted as containment (fig. 9 and 11).

Another reconstructed element is the projection of the wall in the centre of the eastern part of its perimeter. This is inferred from Ponç d'Icard's descriptions and from the direction of the preserved section of wall behind the head of the circus. This angular shape can be intuited from the known planimetry from the year 1641 on and its purpose was to encircle small hill later occupied by the convent of Santa Clara (Gabriel 2001). This is not the first time this proposal has been put forward; Hernández Sanahuja also suggested it in the second half of the 19th century, thus demonstrating a considerable knowledge of the ancient Roman city and its topography (fig. 15). Although this polygon is not frequent in the Roman poliorcetica, we have reconstructed it on the basis of the walls reflected in the Modern-period cartography, and also the diagonal road that connected the former Cervantes bastion with the Camí dels Caputxins road.

As far as the intramural urban planning is concerned, the objectives of this line of research focus on the ratification or modification of the theoretical model created: *insulae* of 35 x 70 m and *viae* of approximately 5.90 m (Macias 2000a). We know that a process of intramural deurbanisation took place in the 3rd and 4th centuries, although it recovered the urban duality of the Late Republican period and it is also reproduced from the mediaeval repopulation to the first half of the 19th century. On the other hand, modern and contemporary cartography reproduced the traces of the orientations of the *cardines* and *decumanus* and it is necessary to show that, despite the passing of the centuries, the agricultural activity that began in this area in the Late Antiquity was not able to hide or destroy all the evidence of the urban layout - *viae* and *insulae* - the most important of which were used to divide the land into agricultural plots or as part of the road network that connected the Upper Part of the city to the port area. This continuity leads us to reflect on another theory, which here we will only open up to debate: if the basic axes of the intramural residential area were maintained between the Late Antiquity and the Middle Ages, was the city really unoccupied between the 8th and the 12th centuries? Or was the Roman imprint so strong that despite four centuries of complete abandonment, these lines were still visible?

With the deliberation merited by the precision of the historical cartography and the polynomial transfor-

mations, we can determine that around the year 1800 the city was linked to its port quarter by three main roads named in López Sopena's plan as La Piràmide, El Mig and Els Caputxins. These roads can be sensed in Anton Van den Wyngaerde's engravings (Kagan 1986) and the easternmost of the three is depicted in the 1641 Simancas plan, while the other two are documented graphically from 1769 on (cf. Flórez 1769; Aresté 1982). Using the AIS, we can determine that the three roads coincide with the three of the city *cardines*, laid out around 100 BC (fig. 9, 11 and 12).

The Camí de la Piràmide is a reflection of the *cardo maximus* (CM) and was a basic communications route between the Upper Part of the city and the port quarter during the Modern and Contemporary periods. It used to be called the Camí Nou del Port (New Port Road) and is now known as Unió Street, a reference to its function of uniting to port and the upper city. Beneath it there was a 7-metre-wide Roman road (file 351) and, according to M. Aleu's planimetry (1983), the city's main drain on the final part of its route to the sea. The Camí del Mig¹⁶ is the extramural continuation of the Camí Vell del Port (Old Port Road) that connected to the gate in the 14th century wall, or the present-day Sant Agustí and Adrià Streets (de Palma 1958, 449). The Camí dels Caputxins was subsequently fossilised in Girona and Roger de Llúria Streets.

As far as the cross streets are concerned, the historical cartography also shows us the coincidences with the layout of the Roman *decumani*, which is very useful when it comes to reconstructing the *forma Tarraconis* in the areas affected by the 19th century quarry. The most obvious case is the Republican *decumanus* identified beneath the city's Early Roman theatre (Macias 2004c), which, if we take into account the 1800 cartography, continued as far as the eastern wall of the city, coinciding with the presumed gateway we mentioned earlier. It is significant that the Camí del Mig and the Camí dels Caputxins end at this cross street. The eastern end of this *decumanus* is a constant in the historical cartography, possibly because it served as containment for the southeastern promontory in which the hill of Tarragona ended (Gabriel 2001). In both López Sopena and Laborde's plans we can make out a segment of *decumanus*, located to the east of the CM, that coincides with a segment of road documented by I. Valentines (file 344). Two other roads branch off perpendicularly from this road and go in the direction of the port. They could also be *kardines*.

Where the cartography does not show any roads, we can see numerous traces of agricultural divisions –

tracks and margins – that are also a reflection of the Roman road layout. Moreover, some of the margins or agricultural banks depicted coincide approximately with the transversal axes of the *insulae* that were 70 metres in length. A theoretical reconstruction of the slope of the intramural residential city from the preserved remains on the present-day Rambla Vella to the area of Caputxins Street, shows a steep incline (an approximate average gradient of 7%), so that between two *decumani* separated by an *insula* there would theoretically have been a height difference of about 5.3 m. Evidence of this slope has been noted in some archaeological excavations. At 12-14 Fortuny Street (file 401) we identify a twenty-metre-long segment of *decumanus* with an average gradient of 6.5%. At number 32 Gasòmetre Street (file 469) archaeologists found twenty-three metres of a drain that ran below a large square in the same direction as the *decumani*. This had an average gradient of 7.5%. Based on these indications, we believe that the slope of the city would have meant in some cases that the southern half of an *insula* would have been built at a lower level than the *decumanus* that bordered it to the north. This would no doubt have required the construction of containment and embankment walls inside the *insulae* that, taking into account the data provided by the AIS, would have subsequently been used as margins for agricultural plots (fig. 11).

Although less convincingly, the ancient cartography allows us to glimpse traces of an urban layout in the port area that follows the orthogonal model of the intramural city. This is a previously noted observation (Macias 2004c) that is based on the possible presence of a street below the theatre (file 470) and on the orientation of the port buildings at number 33 Sant Miquel Street and number 10 Sant Josep Street (497 and 502 respectively). A late 18th century plan, which it has not been possible to geo-reference (fig. 14), shows a division of agricultural plots inherited from the layout of the Republican urban streets, beyond the possible southern enclosure of the wall. It is also possible, and the present-day urban layout does not rule it out (plate 14, vol. II), that there was a *porticus post scaenam* between the theatre and the docks.

On the other hand, the urban drains identified at number 1 Castaños Street (file 503) and in Apodaca Street (files 359 and 363) must be considered as elements that remained in use, either totally or partially, during the Modern period. This highlights the coincidence of the layout of the archaeological remains of "Rec dels Molins" and that of another with an unknown name in the Modern period planimetry (see fig. 13; Fiz/Macias 2004).

16. This road appears under the name of Camí dels Caputxins 30 years before (Flórez 1769).

3. *FORMA TARRACONIS*: A DISCOVERY IN PROGRESS

3.1. URBAN PLANNING

Ignacio Fiz and Josep M. Macias

Although not the main objective of this study, the preparation and chronological separation undertaken in the compilation oblige us to raise a series of questions about the scientific and methodological problems that have arisen during this process. They are aspects that cannot be avoided, as they complement and justify the numerous decisions taken in the course of the project that also make the plans comprehensible. The documental compilation, the unification of the planimetries, and the GPS geo-referencing applied to certain sites resolve numerous questions, although they also raise others that, unfortunately, cannot always be answered due to the historical and urban development of contemporary Tarragona.

Our desire to break down the planimetric evidence as much as possible intrinsically defines an interpretative proposal conditioned, in many cases, by the lack of data in terms of both the physical conservation and the stratigraphic contextualisation and analysis of the materials. For this reason, we have taken a series of decisions that are at present questionable, but thanks to the malleability of the AIS, can be easily modified as part of future updates of the database.

One of the areas in which the lack of definition is currently most acute is the interpretation and perception of the pre-Roman Iberian settlement dating from the 6th century BC (cf. Adserias *et al.* 1993; Asensio *et al.* 2001; Otiña/Ruiz de Arbulo 2002). Such is the current uncertainty that there is no absolute consensus as to its name. On the other hand, the geopolitical role that has been attributed to this human population is very important in the context of Cessetània. Perhaps it has been overemphasised, given that there is a clear imbalance between the weight attributed to it in the territory and the existence of archaeological remains. We are aware that the expansion of imperial *Tarraco* led to the destruction of the Iberian settlement, but we also believe that the geopolitical weight of Late Republican Tarraco – including its Late Republican coinage – has influenced the historical evaluation of the earlier Iberian village. On the other hand, an extensive Iberian site is currently being excavated at Sella Point (Cape Salou), some 8 km from Tarraco. Despite the effects of contemporary quarrying, this site is of considerable size (Fabregat 2006), and its location close to Salou is very interesting if we bear in mind the

toponym *Salauris* mentioned by Avenius in his *Orae Maritimae*.

To date archaeology has only recorded the unconnected presence of isolated structures over an area at the top and on the southwestern slope of the western cliffs that bordered the natural bay of *Tarraco*. The structures have been interpreted as residential zones, but there is insufficient area to give an exact definition (files 476, 479, 488, 567, 568, 570, 573 and 593). In any case, the current data indicates that the majority of the settlement was at the foot of the coastal hill, clearly related to the agricultural plains of the Francolí, the roads leading inland, the bay where Greek and Phoenician trading ships anchored, and, obviously, the proximity of the rich water resources of the Francolí basin and the springs from the large subterranean lake below the hill (fig. 16).

With regard to Iberian silos, we were only able to confirm the depositories documented in Caputxins (file 488) and Pere Martell Streets (file 568). The rest of the storage deposits have been dated to the Late Republican period. They are located outside the preferential area of the Iberian settlement and some have pottery contexts. We refer to the data obtained from Sevilla Street (file 475; Díaz *et al.* 2005), Unió Street, 14 (file 322; Díaz/Otiña 2003), and other more distant cases, such as the early-Christian Necropolis (file 645) and Sant Francesc Street (file 278). A high concentration of silos has also been recorded in the area occupied by the forum and its surroundings (files 385, 404, 418, 419, 422, 423, 424, 427, 429 and 434), although a small amount of known pottery evidence could equally represent a Late Republican chronology (Serra 1932). For all these reasons, we believe that cereal storage in *Tarraco* was a more a Late Republican than an Iberian phenomenon. We have more experience of this situation in the neighbouring town of Empúries, which is associated with the centralising role of the Roman town within a new trade and consumer dynamic (Aquilué *et al.* 2002).

As far as Late Republican urban planning is concerned, it was not until 1999 that a proposal was first made to reconstruct the road layout that was limited to the intramural residential area. This raised many questions that have yet to be answered (Macias 2000). This theory was devised using a not entirely suitable program, in which the archaeological finds in the city are inserted into the present-day topography with a

ratio of 1 per 2 *actus* and the *cardines* at 31° E of GN (geographic north). It is, on the other hand, a rectangular module of *insula* common in that period and which, in the case of Tarragona, complies with an urban development programme planned and executed, at a pace that is unknown to us, around the year 100 BC. The latest archaeological studies show that the extension of the walls, the building of the *Forum Coloniae*, and the section of the main urban sewage pipe that crosses the middle of the hill were other significant elements that made up this new city (cf. Aquilué *et al.* 1998; Puche/Díaz 1999; Díaz *et al.* 2005; Arbulo *et al.* 2006). On the other hand, the identification of the possible *auguraculum* belonging to this transformation (file 427) indicates that the urban modulation and orientation was able to be planned topographically from the area of the forum. We can see that its position coincides with the western façade of an alignment of *insulae* and with the transversal axis of a row of urban housing blocks. Subsequently, the forum basilica *aedes augusti* (file 439) and the exedra added later to the containment cryptoportico (file 469) were aligned along this axis.

New archaeological interventions and the undertaking of this project have made this street layout theory necessary, although everything seems to indicate that it was restricted to a rectangular intramural strip that excluded the two promontories in which the hill of Tarragona ended (fig. 17). We have identified this grid in the southern half of the walled area, although some traces in the port zone lead us to believe that these geographical axes were prolonged. We are referring to the street below the theatre and the known port areas (files 470, 497, 502 and 503). Moreover, the prolongation of the main sewage pipe below Rebolledo Street indicates, theoretically at least, that the *cardo maximus* continued outside the walled enclosure (file 832). On the other hand, we can also see that the width of the theatre coincides approximately with that of two *insulae* with *viae*, and that the exedra in the adjoining monumental area coincides with the longitudinal axis of one of these blocks.

Given all this data we believe that this urban layout can be applied to some five horizontal rows of *insulae*, with approximately 55-60 topographically planned urban blocks. Obviously, the irregularity of the hill and the urban pre-eminence of the forum, the area of the *auguraculum*, as well as other unidentified buildings, modified the application of the planned grid.

With regard to the southwestern end of the intramural area (the area between Sevilla, Caputxins, Zamen-

hoff and Soler Streets), the lack of more exhaustive information on the port area and the extramural slopes that ended at the Francolí River means that at present we can only determine that it is one of the oldest sites of Roman occupation. The studies carried out at numbers 12-14 Sevilla Street and 23 and 24 Caputxins Street (files 475, 476 and 488, respectively) indicate a different urban layout and orientation to that of 1 per 2 *actus*. This difference in the street layout shows that it has been adapted to the pre-existing orography and also allows us to identify the route of the possible *decumanus maximus* (DM) (file 469) that separated each urban model. Moreover, the traces of the DM help us to pinpoint the emplacement of the Roman gateway flanked by two towers described by Ponç d'Icard in the 16th century (file 466; Duran 1984, 103). We are not able to confirm whether there was an urban modulation in this small sector, possibly prior to the plan dated around 100 BC and built directly over the earlier Iberian structures.

As far as the southeastern end is concerned, the effects of the 19th century quarrying make it impossible to theorise on its urban planning. We assume, however, that part of it must have been a continuation of the Republican orthogonal layout, as the analysis carried out in the previous chapter appears to indicate, while the southernmost part was strongly conditioned by the relief, which made it necessary to plan for the containment and stability of the terraces. This would explain the divergent urban orientation on the plots at number 9 Apodaca Street (file 363), number 5 Sant Miquel Street (file 369) and in Nou de Sant Pau Street (files 371 and 373). All these plots are located to the east of the underground drain and the few structures that have been identified appear to be laid out perpendicularly to the slope of the hill.

The comparison of various planimetries (files 296, 311 and 313) and particularly the *cardo* documented during the construction of an underground car park on the Rambla Nova (file 297), shows the break with the Late Republican scheme and the existence of a new model that we have been unable to satisfactorily reconstruct. The sparse archaeological data and the serious effects on the area caused during the Modern period¹⁷ mean that today we are unable to put forward a reliable proposal. Nevertheless, we believe that this new model defined a network of *decumani* with the same equidistance (70 m or 2 *actus*) and the same geographical direction as the earlier pattern. The identified structures can be made to fit in with these dimensions and orientations and they indicate a new intramural residential area subsequent to the Republi-

17. This third urban development pattern coincided approximately with the area between the Rambla Vella and the Rambla Nova. It was developed following the walled expansion in the 16th century. This has caused the area to be seriously affected since that time, particularly during the 19th century expansion when the irregularities of the relief in this part of the city were levelled out.

can expansion, but conditioned by the same urban planning axes: the intramural *viae* and the walls of the second half of the 2nd century BC. Moreover, it is highly significant that the southern façade of the Flavian circus and the *figlina* discovered below its *arena* (file 238) adapt to the geographical axis defined by the route of the Via Augusta, which, in turn, was a consequence of the orientation of the Republican city. We should point out that the work on the road of the Rambla Vella (file 267) documented a wide containment wall that we have interpreted as the separation between the *via* and the urban housing blocks. This structure coincided with the development of an urban module of 2 *actus* in length.

Theoretically, this third urban area had three horizontal rows of *insulae*. Its chronology is doubtful: the most significant data was obtained in the excavation of the Rambla Nova (file 297), where the archaeologists were able to document a segment of *cardo* some 6 metres wide and with a foundational chronology of the end of the 1st century BC. The break with the Late Republican street model, plus the chronology of this road, are the elements that allow us to work on the hypothesis that this evidence does not belong to a specific action, but shows an urban area that came about later than the development of around 100 BC. This theoretical model does not imply that that part of the city remained deurbanised, rather that the streets and residential buildings were not built until a later date. Thus, we have Late Republican evidence in the Upper Part of the city, near or below the circus (files 264, 275 and 284) in the area of the Rambla Nova (files 296, 299 and 313). Another action shows an Augustan-period chronology (file 293). We also recognise that all these actions are specific plots in the Roman city and that they cannot be interrelated. Moreover, there have been no in-depth studies of the pottery that would provide a more accurate chronology.

The reason for this new urban expansion is uncertain, although the building of this road at the end of the 1st century BC allows us to propose a hypothetical link with the presumed *deductio* carried out in the city during the time of Caesar (Ruiz de Arbulo 2002) and/or the economic and demographic development of the Augustan period (Macias/Puche 1997; Macias 2004c). Current research also shows a possible relationship between this urban model and the establishment of a cadastre in the *ager Tarraconensis*. This relationship has to be confirmed by new studies of the territorial morphology using new digital cartographic resources to draw up maps that are closer to the 1:500 scale we are using in the urban studies (cf. Palet 2003; Macias 2005b).

Finally, we have to take into account that the structures identified in the area of Hernández Sanahuja

Street (files 659 and 661) have a geographical orientation that coincides with the Late Republican urban layout. We have to bear in mind the Early Roman dating for these areas, although we cannot tell whether they are one-off actions or whether they were part of an expansion phase in the city.

As far as the walls are concerned, we have already noted the link between the second phase and the urban expansion at the end of the 2nd century BC. We deal with other questions about the defensive structure in section 2.2 and here we only note that this project has been unable to resolve the doubts raised by the supposed and well-known “megalithic walls” identified as coinciding with the transversal axes of the Rambla Vella (file 266) or Merceria Street (files 112-114). These walls can be interpreted in various ways, although none of them is very convincing. The most significant would be to identify these finds with possible transversal divisions of the Republican city and thus link the archaeological evidence to the judicial problem resulting from the exile in *Tarraco* of the ex-consul P. Cato in 108 BC and a possible urban duality (Otiña/Ruiz de Arbulo 2002, 113). However, the Rambla Vella wall, only the middle section of which has been documented to date, could also have been merely a containment structure linked to the route of the sewage pipe that flowed into a deep watercourse located in the subsoil of nearby Portella Street. This “sewage pipe-containment structures” relationship, with large, irregular dimensions bonded with clay from the Late Republican era was also discovered during excavations at numbers 7 and 9 Apodaca Street. The structures in Merceria Street could also be part of terraces built before the Early Roman buildings.

The ancient chronology of the intramural residential area has no archaeological reflection in the definition of the extramural road network. Only the presence of the Portal dels Socors (file 2) is clear evidence of a Late Republican road that, in this case, can be intuited if we accept the continuance of the present-day Camí de la Cuixa as a reminiscence of an earlier Roman road. The present-day plot division denotes, for the upper section of the Camí de la Cuixa, a line that can be presumed to be the fossilisation of the *Via Domitia*. Nevertheless, it should be pointed out that the follow-up excavations on the adjoining plots (files 734 and 720) have failed to contribute any clarifying data. On the other hand, the presence of gates integrated into the second phase of the walls gives theoretical credit to the peripheral roads entering and leaving the city. A greater problem is the *porta* that existed in the area of the Plaça de Ponent (file 463), which was approximately 11.88 metres wide and, if we believe a brief Renaissance-period description, we can match its construction technique to that used on the walls that formed part of the Late Republican extension of the

defences.¹⁸ This implies the presence of an ancient road that connected the city to its hinterland and which has not been documented, except for sparse evidence discovered on plot 581. The proximity of the Republican forum (file 434) and the possible *decumanus maximus* (file 469) are elements that point to the existence of a pre-eminent access during that period in that area of the city. Another theoretical access has been placed in the present-day Plaça de la Pedrera (file 361), based on the geo-referencing of the historical cartography and linking it to a *decumanus* identified below the city's theatre and the reconstruction of the intramural road layout (fig. 17).

More disputed has been the identification of a major reorganisation of the roads in the Augustan period, although the current state of research does not allow us to establish an irrefutable historical periodisation, as the latest archaeological interventions and on-going studies are progressively updating the results.¹⁹ We have one piece of epigraphical evidence (RIT 934, file 569) and numerous excavations that show the layout of periurban roads. The Via Augusta arrived at the city from *Barcino* via a recently documented road (files 776, 777 and 781) that explains the concentration of finds in Robert d'Aguiló Street, and which leads to the gate on the present-day Rambla Vella (file 262). There is no specific evidence, but the majority opinion places this new road in the time of Augustus. On the other hand, cartographic analysis indicates a hypothetical connection between the two eastern roads – the Republican and the Augustan (fig.), although it has to be recognised that the recent urban development of the Vall de l'Arrabassada area or the UA 27 has not allowed us to corroborate this archaeologically. This is in part because of the changes that have taken place over the centuries, and in part because no thorough archaeological excavations, delimitations or prospecting have been carried out.

On the western slope, recent excavations have allowed Jordi López to propose a new section of the Via Augusta on the western slope of the hill, as well as placing the bridge over the Francolí farther inland than had been thought up until now (files 560, 634 and 827). The material evidence points to this stretch of road having been built in the Augustan period. It is also hypothesised that there was a road parallel to the western walls of the city (file 455) that connected the road from *Barcino* (that crossed the present-day Rambla Vella) to those leading to the port area (López Vilar 2006, fig. 274). An Augustan chronology has also been attributed to a second road that follows the route

of present-day Eivissa Street (the old Camí de la Fonteta, files 586, 595, 596 and 646), although it should be pointed out that in a recent excavation evidence was found of a Republican precedent to the road, a fact that would fit in perfectly with the evolution of the city (file 581). Based on the work of Serra Vilaró we know of a third road parallel to the river that has been the subject of new discoveries that also point to an Augustan chronology (files 638, 642 and 645). This road joined up with the Camí de la Fonteta and, if it followed the river course, with a fourth road that presumably ran parallel to the western end of the port bay (files 609, 620 and 621).

The maritime *porticus* nature of the structures associated with this fourth road have been emphasised, taking into account the width (some 10 metres), the proximity to the sea, and the functional nature of the *horrea*. However, we have to take into account the presence of buildings in various excavations (files 614, 616, 618 and 620) located to the south of its route and which have yet to be subjected to an exhaustive study. Some of these buildings are from a period subsequent to the urban redevelopment; others could be contemporary with the warehouses located on the other side of the road. This raises the question as to whether this part of the city really faced the coastline directly. The chronology of these remains could also be later, presumably in the Flavian period (Adserias *et al.* 2000b; Pociña/Remolà 2001a). While this road may have connected to the west with that documented by Serra Vilaró, what happened to the other end is more difficult to ascertain with the data we currently have. The excavations carried out in UA 15 (files 590, 591 and 593) interrupt its route through the port area and we believe that the road climbed the slope of the hill until it joined up somewhere near the city gate with the road documented below Eivissa Street.

All this data allows us to divide the southern and western extramural area into four zones, based on the four large roads that ran approximately from west to east and that probably converged in front of the gate in the present-day Plaça de Ponent area, which was the entrance nearest to the Colonial Forum. These extramural streets were originally some ten metres wide, although over time they became considerably smaller.

The sector located to the north of the section of road identified as the Via Augusta appears to be an area of low building density. There are noteworthy residential structures near the walls (files 398, 403, 426, 535, 551, 554 and 547), as well as two segments of road

18. "...I found that some quarrymen had just ruined it to use its large rocks or stones (megaliths of the base?) like barbarians or enemies of such antiquity..." (Durán 1984, 103).

19. You can see how our knowledge of the road and urban layout of the city has evolved in the following publications: Ted'á 1987 and 1990e; Adserias *et al.* 2000b; Macias/Menchon 2002; Macias/Remolà 2004; Remolà 2004a; López Vilar 2006, 229-234.

that are difficult to interpret (files 403 and 446). The area between the road identified as the Via Augusta and the one that runs below Eivissa Street (the old Camí de la Fonteta) has a high archaeological density between the present-day Pere Martell Street and the walls. Proof of this can be seen in the excavations corresponding to files 560, 567, 568, 570, 573 and 577. The road network in this area is unknown to us and we can only refer to the courtyard or plaza documented on plot 577. Likewise, on plot 568 there is evidence of a large plaza or portico of uncertain features or use. To the west of Pere Martell Street the archaeological documentation diminishes considerably and we only have plot 572. The building density in this area no doubt decreased the farther away it was from the walls, although we also believe that the context of the period in which the present-day buildings were built in these blocks did not allow for a correct archaeological documentation. Consequently, the planimetric perception we have today is unreal. Moreover, we have to bear in mind how these periurban roads would have attracted buildings and, subsequently, the Francolí Christian suburb during the Late Antiquity. Proof of this can be found in the archaeological findings from plots 549, 581, 640 642 and 645.

The area between the so-called contiguous road to the port *horrea* and the Camí de la Fonteta road is a high urban density zone built on land progressively reclaimed from the original marshes with landfill. The Late Republican public fountain on plot 588 is noteworthy, as are the port warehouses detected around Felip Pedrell Street, although this was mainly a residential area during most of the Classical Period city. The numerous excavations of recent years allow us to intuit the presence of an urban grid that, unlike the intramural area, had an irregular layout, due, we suppose, to the adaptation to the relief and the intrinsic urban evolution. There are three non-parallel roads with an NW-SE orientation that may have a slight turn (Macias/Remolà 2004). They are narrower than the main roads, and the western road was identified in the excavations on plot 615, the central road on 612 and the eastern road on 609. Finally, on plot 588 there is partial evidence of another road located in front of the southern façade of the public fountain and another, narrower one (*angiportus?*) located on the eastern corner.

The last suburban sector was delimited by the road located in the area of Felip Pedrell Street and the Plaça dels Carros and includes the area occupied by the natural port bay that existed at the foot of the hill (fig. 15).²⁰ The original relief has been greatly altered by the quarrying within the city and the continual advance of the coastline or docks in contemporary Tarragona, in such a way that the coastal elevations in which the hill finished go almost unnoticed today (fig. 25).²¹ This transformation did not only happen in the modern city; in fact the changes began during the Classical Antiquity, when building land was reclaimed from the marshes by dumping landfill or by cutting the coastal cliffs (the best indication of this is evidence found in plots 493 and 497).

As far as the Iberian period is concerned, the pottery evidence indicates trading activity that would have needed a mooring for vessels and a place for the exchange of goods. We have no direct evidence of this activity and the southernmost vestiges obtained up to 2004 are awaiting careful analysis (files 590-593). We should also mention the fact that we do not know of any Iberian buildings on the natural bay, although it also has to be recognised that there have been very few intensive archaeological interventions in that area (basically on plots 359, 363, 369, 470, 497 and 503). However, despite the lack of data, we consider this absence logical, given the relief and preferred sites of Iberian occupation - a sector at the top of the coastal cliffs (in the area of Caputxins Street) and another on a gentle slope approximately equidistant between the riverbed and the coast.

The Republican data here is limited to the subsoil of the theatre (*decumanus?* plot 470) and the line of the sewer (files 355, 359 and 363). Other possible remains include a fountain fed by the *cuniculus* (file 469), which was later monumentalised with the nymphaeum built next to the theatre (Macias/Puche 2004), and a small altar dedicated to the *lares compitales*. Finally, there was a first road between the port and the summit of the hill taking advantage of the natural gully, coinciding with the route of the sewer, that was later buried (file 359; Puche 1997a; Macias 2004c). There is further data that indicates, in theory, a progressive urban development starting in the Au-

20. "If we stand at the foot of the walls of the Fuerte Real (Royal Fort), facing south [between Caputxins and Dr. Zamenhoff Streets], with one glance we can see the natural position of all those lands, due to their height, and we will see that this hill is the continuation of the same one on which the Tarragona is built and which gently descends from the Cyclopean tower of St Maginus [or Minerva] to the point where we are standing, suddenly cutting off perpendicularly at our feet [this refers to the slope between Caputxins and Dr. Zamenhoff Streets with respect to Sant Miquel or Cartagena Street]. We can also see that the hill continues to the left until it enters the sea at a long cove [this refers to the promontory that extended as far as the Plaça dels Carros and which disappeared during the 19th century quarrying]; and it has to be supposed that the silt brought down by the current of the Francolí to the right formed another headland into the sea, with which there remained an inlet in the shape of a half moon, that constituted a natural port sheltered from the winds of the first, third and fourth quadrants" (Hernández Sanahuja/Torres 1867, 135).

21. We can see these geographical features in the sketches of Anton van der Wyngaerde or in Hernández Sanahuja's reconstructions (Macias 2004a, 11-13; Remolà 2004b). The excavations and observations carried out on plots 496, 497, 499, 503, 511, 514, 590 and 593 help to delimit the western promontory of the bay, whereas the effects of the quarrying make it difficult to reconstruct the eastern one. We have the information collected by M. Aleu, in which he mentions that an urban sewer that crosses the Plaça dels Carros is partially dug out of the rock (files 377 and 834), and the reconstruction made by R. Gabriel of the topography at the beginning of the 19th century (2001).

gustan period, in an east-west direction. The dwellings documented beneath the theatre and the possible warehouses or port buildings at number 5 Sant Miquel Street (file 369) and number 10 Sant Josep Street (file 502) are dated to the Augustan period, while the buildings on Castaños and Sant Miquel Streets (files 503 and 497) show evidence of an earlier chronology, possibly contemporary with the urban transformations in the area of Felip Pedrell Street.

The documents we have compiled allow us to understand the level of urban infrastructure in a Roman city – basically the management of the water supply and the sewage removal systems. Their development was a reflection of the level of comfort and hygiene attained by classical society. Meeting their needs tested the abilities of the municipal elite, or those who had the true responsibility for ensuring the functioning and maintenance of the city infrastructure. We do not propose to go into detail²² here about the city's urban services and their evolution from the Republican to the Visigothic period, but rather to organise and summarise the most significant elements we compiled, while waiting for a sorely needed initiative to carry out a monographic analysis.

The ease of finding water (the Francolí hydrographic basin and karstic subsoil) was no doubt a decisive factor in the establishment of the Iberian settlement in the 6th century BC, while the later development and demographic growth of the Roman city required various solutions to meet its large demand for water. The technical evolution is reflected in the archaeological data we have at our disposal today – wells, cisterns, a *cuniculus*, and two *specus* from the Francolí and Gaià rivers, plus a probable third one.

A large number of wells have been detected (on 21 plots), most of them concentrated in the lower part of the city, for the logical reason that it is nearer the water table. However, the geological characteristics of the Tarragona hill (cf. Blay 2004) mean that there are some natural springs at the top of the hill that are fed by the underground lake (file 15). The chronology of most of these wells is unknown, a situation that is repeated in the 41 reports or finds referring to cisterns or reservoirs. In certain cases we can establish a relative chronology, as the cisterns are affected by later, better-known, constructions. Of particular note are the reservoirs obliterated by the expansion of the forum area (files 425 and 439), where we know of one Hellenistic-style elliptical-shape well of a type common in the neighbouring *neapolis* of Empúries. In the majority of cases we cannot tell the difference be-

tween reservoirs for industrial use and those for domestic needs, although it has to be pointed out that most of the documented cisterns were used for water for human consumption. It is also unclear, due to the natural relief, whether the water brought by the *specus* from the Francolí and Gaià Rivers reached the whole city. In the Late Antiquity we can already see the presence of large cisterns in the Upper Part, possibly related to civil or religious establishments, indicating that the supply of river water was insufficient or that it was no longer available (files 25, 27, 60, 86 and 107). Finally, we have to highlight the large 26 x 3.5 m reservoir documented on plots 573 and 577, which is part of a structural complex that has unfortunately not received the necessary support for it to be interpreted.

With regard to the aqueducts, we refer to the already known presence of a system of *cuniculi* that theoretically originates on plot 464 and which had three possible branches (files 469, 498 and 511). It has been dated to the Republican period of the city. The planimetry allows us to reconstruct two sections of *specus* that come from L'Oliva hill, the presumed location of a *castellum aquae* that received and distributed the water from the Gaià. One of the sections can be recognised from the foundations of a theoretical, very long siphon that overcame the difference in height between L'Oliva hill and the upper part of Tarraco (files 69, 86 and 719). It is highly likely that from this branch there was another that we have documented in the Via de l'Imperi Romà, adjoining the walls (files 166 and 181). The second section from L'Oliva is the best preserved, although it is also the most degraded due to the recent urban growth (files 721, 726, 728, 729 and 733). Of the *specus* originating at the Francolí we have the data from plots 697 and 699. Other reports (files 11, 24, 648, 658 and 810) indicate more finds that are difficult to conceptualise. Hypothetically, it is believed that there was another *specus* coming from the Francolí that ran at a lower level and can be related to the course of the Rec Major irrigation channel of mediaeval times. It is likely that this conduit reached the port area, where structures that could be related to it have been identified (file 497).

We also have some sixty-seven references to sewers in which we can see a technical evolution that has been barely touched upon by current archaeological research. With regard to the building materials used, we have evidence of Late Republican conduits made with pieces of amphora (files 430 and 609), as well as simple ditches in the geological subsoil and structures built of stones bonded with clay (mainly files 238,

22. On these questions we can consult Cortés 1993; Massó 1999; Adserias *et al.* 1997c; DA 1998; Dupré/Remolà 2000; García Noguera/Macias 2003; Díaz/Puche 2003, as well as the specific references in the files related to this subject.

270, 363, 401, 403, 447, 457, 469, 475 and 476). Starting in the Augustan period, we can see a generalisation of sewers made with brick channels lined with lime mortar (mainly files 270, 401, 447, 457, 469, 475, 573 or 577).

Nevertheless, a more contextualised analysis of this technological evolution is necessary in order to ascertain whether it is representative of a general trend. A similar evolution, and one that is equally undefined scientifically, can be detected in the domestic architecture – the evolution from stone and clay structures to *opus caementicium* or *incertum* walls. An analysis of all these parameters would allow us to evaluate the technical level of Roman architecture. With the immense volume of archaeological excavations carried out, this is a task that could be undertaken quite satisfactorily, particularly in the area between Mallorca, Francesc Bastos, Jaume I and Smith Streets.

On the other hand, the public sewage system was abandoned during the Late Antiquity. Beginning in the 3rd and 4th centuries, we have evidence of the obliteration or filling in of the drains we know of (mainly files 359, 363, 401 and 469) and a predominance of conduits made with irregular stones bonded with clay and with no covering. From this period we even have evidence of a large, open ditch possibly constructed to remove sewage from the ancient *Concilium* plaza (file 158). Another element to take into account is the presence of cesspits as a sewage elimination system. Despite this data, our knowledge is as deficient as that of earlier periods.

Urban sewage and rainwater drains are worthy of special attention. This was one of the fundamental aspects in the planning of a city, and it was even more necessary in a settlement located on a hill, in order to channel the sudden flows caused by the deluges common in a Mediterranean climate. To date, two sewage pipes have been documented and there are two more hypothetical ones. The first hypothetical drain has been determined from the evidence found on plots 551, 553 and 555. If this possibility were true, then this would be an urban sewer running down to the Francolí River basin. It would be in keeping with the needs of the suburban growth on the western slopes of the city. We place the other hypothetical drain as coming from the city's theatre (file 470), where there is evidence of a large conduit below the *scaena* that presumably channelled rainwater from the funnel formed by the stands and the surrounding area. The chronology, levels and distance make it difficult to link this conduit to either of the two drains we currently know of in the port area. As a consequence we have to assume that there was a conduit that led to the port.

A drain has been documented in the middle of the port area for the water coming from the adjacent warehouses, as well as from the coastal cliffs located to the southwest of the Tarragona hill (file 503). The second documented drain dates from the Late Republican period and has been studied by archaeologists in Apodaca Street. It is a fine example of the Roman water management engineering that became a basic element in the urban formation of Tarraco around the year 100 BC. The work was of such good quality that it was still in use until the middle of the 20th century, and we even believe that some parts of it are still being used today. It is a curious fact that the first person to recognise its origin and define its route was the head of Tarragona's municipal services (Aleu 1983 and in numerous manuscripts listed in the bibliography). The structure follows the route of the natural torrent on the hill and has been dated from pottery found in sections of it on Apodaca Street (files 359 and 363). M. Aleu documents the route of the drain as far as the coast, where, after going under the *cardo maximus*, it turns sharply towards the east in order to empty into the sea outside the port bay. This change in direction leads us to hypothesise that this was an extension of the lower section linked to the construction of the port jetty, built so that the sewage did not drain into the waters of the port. This idea, however, is in conflict with the construction technique detected in the available documentation (files 377 and 834), which appears to be the same as that of the segments dated around 100 BC. Despite this uncertainty, the existing documentation is important as it indicates that archaeological remains have been preserved in this part of the city despite the 19th century quarrying and the construction of the railway line.

Already in this *pomerium*, the drain runs in a very straight line until it reaches the area of the present-day Rambla Nova, just where the hypothetical reconstruction of the Republican orthogonal layout of 1 per 2 *actus* ceases to be valid (information in files 323, 338 and 337). At this point, according to M. Aleu's theory, the drain turns to the east to face, approximately, the symmetrical axis of the structures related to the seat of the *Concilium Provinciae*. According to R. Gabriel's reconstruction (2001), this route coincides with course of the torrent that runs down the hill. The conduit splits into two below the Circus and presumably continues, with a smaller pipe, to the imperial worship area, where it collected the water from the upper part of the hill (files 216, 221, 223 and 234). This change in direction and its relation to the structures in the Upper Part are the reasons for suggesting that this segment of drain, between the Rambla Nova and the *Concilium Provinciae*, is an upper prolongation related to the Early Roman monumentalisation (file 83).

3.2. URBAN PLANNING PROJECTIONS

Josep M. Puche, Josep M. Macias and Ignacio Fiz

Our improved knowledge of the *forma Tarraconis* means that we can now be more confident in recognising the topographical patterns that governed the actions of the *agrimensors* during the planning of the city. In the previous section, we specified and confirmed the archaeological features and data used to identify the orthogonal model defined during the Late Republican expansion. Based on the pottery evidence from its *cloaca maxima* and the Capitolium, this expansion took place around the end of the 2nd century BC. This modulation of 1 per 2 *actus* can also be intuited from the geo-referencing of the roads marked on the historical cartography. All this demonstrates a specific process of urban development that has to be placed in the historical context of the reorganisation of the new Roman provinces. Thus, *Tarraco* can be seen as part of a widespread programme that included the founding of *Valentia*, *Narbo*, *Emporiae*, *Aeso*, *Iesso* and, with a later chronology, *Gerunda*, *Iluro*, *Pollentia*, and *Palma*. In this period we can also see increased urban development in *Carteia*, *Carthago Nova*, and *Ilerda* (bibliography in Díaz *et al.* 2005). As far as the area between the present-day Rambla Vella and the Rambla Nova is concerned, we do not believe that there is any firm possibility of reconstructing the existing layout with the archaeological data we have at our disposal.

The monumental structures in the Upper Part are worthy of special attention. This is the so-called seat of the *Concilium Provinciae Hispaniae Citerioris* (CPHC). The possibility of positioning these remains using GPS technology has allowed us to obtain a more accurate planimetry, without having to refer to the current cadastral plans (fig. 22). This is not the first attempt at a metrological study of the *Concilium Provinciae* based on the known remains, either focusing on general aspects or more or less specific details. Worthy of note is the study carried out by R. Gabriel and R. Cortés (1985), which is admirable in terms of the accuracy achieved, particularly if we take into account that it depended on inadequate and partially erroneous cartography. Moreover, archaeological thinking at the time was based on a unitary conception for the genesis and formation of the three areas of the *Concilium Provinciae* – the worship area, the Plaza of Representation, and the Circus (see Ted'a 1989b; Aquilué 2004). These three places, that covered almost 12 hectares, have traditionally been interpreted as a single urban development project completed in the time of Domitian.

Fortunately, new finds and excavations have added to our archaeological knowledge. Paradoxically, however, this does not mean that we have an improved percep-

tion and understanding of the *Concilium Provinciae*, but rather an awareness that the identification of an urban transformation of such magnitude is much more difficult and complex than the scientific discourse of the late 20th century would have us believe. It is fortunate that the Capitolium in the *forum Coloniae* has been identified and its entire urban surroundings have been reconstructed, as this has allowed us to reject the theory that locates the Temple of Augustus in the lower part of the city (see files 434, 439, 457 and 469; Macias 2000a; Ruiz de Arbulo *et al.* 2006). Now, the new find of an architectural frieze (file 61) has been used as a further reason for defending the old idea of locating the Temple of Augustus below the central nave of the Cathedral (Pensabene/Mar 2004). This temple had a peribolos, which may or may not have been finished, prior to the imperial worship area structures that are preserved today. The trenches cut into the rock documented in the Cathedral area are evidence of this building (files 19, 23 and 30; Sánchez Real 1969; Hauschild 1993a; Dupré 1995).

This interpretation is supported by a recent contribution that conceives the construction of the Temple of Augustus, and its first sacred area, as part of an extensive Julian-Claudian urban development programme prior to the project we now know as the *Concilium Provinciae* (Macias *et al.* in the press). Therefore, it has been suggested that there was an initial unfinished or modified project consisting of the site of the Augustan cult, a lower plaza on the site that later became what we know today as the Plaza of Representation, and one or two *horrea* organised around containment cryptoporticos. The perception of two urban planning projects anticipated, *a priori*, the existence of two topographical modulations, without being able to determine whether the oldest conditioned the application of the later one. On the other hand, projects of this size, distributed on different scenographic levels and conditioned by preceding urban development (the walls and the *Via Augusta*), present a complexity of infrastructure and construction that is archaeologically imperceptible.

Based on these premises, and with the new planimetry, we aim to propose a model for the topographic or metric projection of this monumental area, as well as for the possible changes that came about during its construction. We are aware that we are working on a rough architectural complex that we only know partially, and that there are major gaps in our knowledge and many aspects and details that still have to be studied. Despite these limitations, we believe that, given the current condition, we can draw up a hypothetical modulation for this monumental area, while accepting that future studies and excavations could modify and qualify the proposals we present here. On the other hand, the question of the chronology is difficult to

resolve, given that in a short period of time²³ we have to fit in the design and realisation of two monumental urban development projects and the substitution of one for the other. The pottery, numismatic, and epigraphic data and the architectural decorative elements define a situation that we still have to recompose (cf. Koppel 1990; Aquilué 1993, 2004; Pensabene 1993; Koppel/Rodà 1996). Moreover, everything seems to indicate that some areas were in use before the whole project was finished, as indeed happens with modern developments.

There is still no quantification of the time needed for the design and drawing up of the project, the preparation of the land, and the construction that took place in the Upper Part of *Tarraco*. Nor do we know what human and economic resources were needed. It seems obvious that a project of this magnitude would not have been completed quickly, as there was no reason why it could not have been carried out over a long period of time – years, or even decades. The history of Roman architecture is full of buildings that took a long time to complete. The Theatre in Pompeii took six years to build, the *Iulia* basilica eight, the Flavian amphitheatre between eight and ten, the Fucino Gallery eleven, the *Porticus Aemilius* twenty, the *Emilius* bridge thirty, and the Augustan Forum took forty years to finish (Giuliani 2006; Coarelli 1995). As yet we have no elements that would allow us to venture a hypothesis as to the time taken. We only have indirect data with regard to the Circus area, where the abandonment of the earlier *figlina* and the levelling of the terrain, dated to around 60 AD, could indicate the beginning of the work. At the same time, the sparse pottery evidence shows that the construction must have finished around the end of the 1st century AD (Dupré *et al.* 1988). Armed with this data, we can work on the hypothesis that the Circus took some thirty years to build.

For the worship area, planimetric analysis determines the following measurements²⁴ (fig. 22). In the CPHC sacred area plaza there is a foundation trench cut into the rock. It was discovered by T. Hauschild and it delimits an initial peribolos associated with the Temple of Augustus. The upper side of this trench is 90.7 m long (306, 45 *pes*²⁵ –*p*-) and 3.07 m wide (10,38 *p*). We do not know the dimensions of the wall the trench was dug for but we assume it was about 6 or 9 *p* wide (1.77 or 2.66 m). Nevertheless, if we take the first measurement, we would have an 88.8 m long wall – a

distance equal to 300 *p* or 2.5 *actus*. The odd thing about this trench is that it has an orientation of 123° 28' 4" E – 56° 31' 56" W, and it deviates little more than 1° from the walls that border the *temenos* of the CPHC.

However, we do know more about the sacred area associated with the CPHC. At the upper end there is the axial hall with a known width (27.6 m / 93.26 *p*) and an uncertain depth. On the corners of the same side there are two semicircular exedras 7.6 m wide (25.7 *p*) and 3.8 m in radius (12.97 *p*). Two further exedras have been discovered on the sides of the plaza with a determined internal width (7.59 m / 25.7 *p*) and an unknown depth (files 25, 35 and 43; Macias *et al.* in the press). The interior of the plaza measured 132.98 m / 449.02 *p* in width and 156.04 m / 527 *p* in length. We also have another measurement of width determined from a perimeter cut in the rock (file 25) and the cryptoportico wall in Sant Llorenç Street (file 45). This distance coincides with the equivalent to that existing between the possible staircases that have recently been identified (files 64 and 65; Peña/Díaz 1996).

As far as the so-called CPHC Plaza of Representation is concerned, the longer sides have an orientation of 124° 14' 34" E – 55° 45' 26" W, the same as the northern stands of the Circus. The eastern side of the plaza is orthogonal with respect to the other two. However, the orientation of the western side varies by a little more than one degree. This difference appears to be minimal, but it creates a displacement of more than 2.25 m from the theoretical model. As a consequence, the internal measurements of the plaza, taken from the wall decorated with pilasters, and not from the podium of the portico, do not fully coincide. The northern side is 295.74 m (999.1 *p*), the eastern side 159.86 m (540.1 *p* or 4.5 *actus*), the southern side 293.57 m (991.8 *p*), and the western side 159.43 m (538.6 *p*). On the lower corners adjoining the Circus we have the Praetorium and Antiga Audiència towers, for which we have theoretical planimetric reconstructions. The eastern tower is 29.45 m long (99.5 *p*) by 13.91 m wide (47 *p*). The western tower on the other hand is more difficult to define in terms of its dimensions, although it appears to have measured 13.4 m (45.4 *p*) by 27.93 m (94.4 *p*). The cryptoportico that surrounds the plaza is approximately 11.2 m (37.87 *p*) wide on the northern side and 11.76 m (39.73 *p*) on the shorter sides. Therefore, we can calculate that the

23. The first process began in the year 15 AD with the desire of the citizens to erect a temple to Augustus (Tacitus, *Ann* I, 78, *templum ut in colonia Tarraconensi strueretur Augusto petentibus Hispanis permissum, datumque in omnis provincias exemplum*) and the second must have ended at the end of the 1st century with the building of the Circus. In between, epigraphy tells us that the imperial cult was already functioning in the year 70 AD.

24. Obviously, we have to recognise the lack of absolute precision in the measurements, given the effect of factors that are difficult to calibrate: natural errors in the execution of the Roman projects, changes caused by the passage of time (cutting down, movements, etc.), and deficiencies in the archaeological documentation.

25. When we refer to the Roman foot, we are using the *pes porrectus* of 0.296 m, 0.29581 m to be exact (Giuliani 2006). For the metric problem of the foot in Roman times see Livy 2003.

perimeter structures of the Plaza of Representation measured, on the outside, 319.46 m in length (1079.30 *p*) and some 174.73 m in width (589 *p*).²⁶

With regard to the area of the Circus, there is evidence of earlier buildings identified as *horreum* and below the Praetorium Tower, the corner of a very large area delimited by an ashlar wall prior to the CPHC Plaza of Representation (file 204; Dupré/Subías 19993; Piñol 2000j; Macias *et al.* in the press). The warehouse is backed by a cryptoportico of some 93 m in length that also acts as containment for the first of the upper plazas. The orientation of this gallery is 123° 28' 4" E – 56° 31' 56" W and, according to the planimetry we have at our disposal today, it is perpendicular to an ashlar wall built prior to the Praetorium Tower.

Three of the sides of the Circus have been defined, while a hypothetical reconstruction has been made of the *carceres* end (Piñol 2000g) and the curve of Les Salines Street). We should also point out that the topography carried out on various plots in Trinquet Nou Street and On the odd-numbered buildings in the Plaça de la Font shows that the line of the podium is straight and therefore does not change direction, as other planimetric reconstructions have suggested. It is a trapezoidal-shaped structure in which the *arena*, on its axis, was 318.5 m / 1.076 *p* long and had a width of between 66.48 m / 224.6 *p* to the west and 81.34 m / 274.8 *p* to the east. We can see that the distortion acts as a hinge between the Late Republican urban development and the geographical layout of the monumental structures (Macias 2000a; Macias *et al.* in the press). The proposed hypothetical reconstruction for the western end of the Circus indicates that the northern stands, which back onto the Plaza of Representation, were 294.19 m. 993.9 *p* long.

With this data we can observe three different orientations with respect to GN:

- 120° 7' 46" E – 59° 52' 14" W and orthogonal 30° 7' 46" E – 149° 52' 14" W. This documents the northern façade of the Circus, the *figlina* hidden below the *arena* and it is heir to the Late Republican urban development laid out at the end of the 2nd century BC.
- 123° 28' 4" E – 56° 31' 56" W and orthogonal de 33° 28' 4" E – 146° 31' 56" W. Located in the trench documented in the cloister and the old cemetery of the Cathedral, in the long vault of the *horreum* built prior to the Circus, and at the ashlar

- wall built prior to the Praetorium and the cryptoportico of the CPHC plaza.
- 124° 14' 34" E – 55° 45' 26" W and orthogonal 34° 14' 34" E – 145° 45' 26" W. Belongs to the complex identified as the CPHC.

Although the difference between the second and third geographical orientation is minimal, we believe this to be a further argument in favour of the proposal that defends the existence of two urban transformation projects on the city's acropolis. The difference between alignments 2 and 3 can already be seen in Th. Hauschild's planimetry (Hauschild 1993a), and the first of these is always identified in the structures built prior to what we now call the CPHC, while the second is more in keeping with the CPHC phase.

With regard to the upper area, the trench cut into the rock was for a wall of 300 *p* or 2.5 *actus* in length. The application of the golden ratio²⁷ to this measurement defines a 2.5 by 4 *actus* rectangle roughly bordered on the southern side by the structures of Civaderia and Merceria Streets. The building materials and entrances of these segments of cryptoportico raise doubts as to whether they are contemporary with other segments of cryptoportico built with *opus caementicium* and linked to the CPHC (77, 78 and 79; Macias *et al.* in the press). It is true that they do not coincide exactly, although this could be a consequence of later modifications or that they are architectural structures that have not been positioned with GPS.

In all, we believe that an *actus* modulation using the golden ratio was applied (fig. 26). This scheme also appears to be present in the few structures defining a monumental plaza that previously occupied the site of what we now call the CPHC Plaza of Representation. The distance between the hypothetical enclosure of the first worship area and the transversal axis that defines the *horreum* that preceded the Circus is, also approximately,²⁸ 4.5 *actus*. Based on the principle of similitude (that the area was structured with the same criteria as the upper area) we can draw a golden triangle based on this latter measure, with which we obtain a theoretical figure of 337.5 *p* by 540 *p* and which, multiplied by three, covers the whole area of the middle terrace. If this three-triangle grid is connected axially to that of the sacred area, we can see that it does not coincide exactly with the archaeological remains and the theoretical modulation, as, even though the western end would be consistent (plots 168 and

26. The longitude could equal almost exactly 9 *actus* (9 *actus* = 1.080 *pes* = 319.68 m) and we know that the measurement of the width is highly uncertain in archaeological terms.

27. Much has been said about the golden ratio in architecture and town planning in the Antiquity (see Livy 2003). It has to be pointed out, however, that this is a natural ratio that appeared with the development of the square, and it can come about intuitively and automatically. See, for example, Vitruvius (6, 4), where he describes the building of an atrium using the golden ratio, without being aware that it is precisely this type of ratio that is being created.

28. The distance is 159.86 m or 540.1 *p*, i.e. 4.5 *actus* (540 *p*).

193²⁹), the same is not true of the ashlar wall below the Praetorium Tower. However, it does coincide with the alignment that marks the gateway between the *horrea* and this wall. This leads us to believe that on the eastern side of the square there may have been, or there may have been planned, other structures that we have so far been unable to document.

As far as the structures of the CPHC are concerned, there are other elements that allow us to be more precise about the modular structure (fig. 27). The first fact we have to highlight is the repetition of the measurements that come very close to base multiples of 5 of the *pes*. The north side of the Plaza of Representation and the theoretical measurement of the northern stands of the Circus are similar distances, close to 1,000 *p* (999.1 / 993.9 *p*, respectively). The theoretical measurements of the exterior of the axial hall, the width of the main stairs that lead to the *temenos* and the width of the *pulvinar* come close to 100 *p* (98.8 / 99.7 / 102.4 *p*, respectively). Furthermore, the Praetorium Tower is 99.5 *p* long, the lateral exedras of the *temenos*, 25.70 *p*, and the interior of the Plaza of Representation cryptoportico, 26.30 *p*.

These measurements indicate a constant figure – a multiple of 5- that is detected in the internal distances and smaller buildings. The same is true of the external distances and large spatial axes.

The distance between the external walls or the cuts in the rock of the *temenos* is 539.5 *p*, almost the 4.5 *actus* that becomes a reference in the earlier phase. There is a similar distance between the apses and *quadratum* vaults of the southern wall of the *temenos* (538.2 *p*). This indicates that the upper plaza was a square with 4.5 *actus* sides. The axial hall was probably an added body with its own logic, in the same way as the *temenos* is independent of the Plaza of Representation.

We can find this module of 4.5 by 4.5 *actus* times two in the Plaza of Representation, coinciding with the most important architectural remains, with the exception of the western enclosing wall, which, as we have seen, follows the earlier alignment and was possibly part of the first project. In the northern enclosing wall of the plaza the modulation does not coincide. For the time being we are unable to resolve this aspect and we believe the explanation must be related to the northern perimeter with the exterior of the seat of the CPHC.³⁰ Thus, the northwestern cryptoportico does not exist because the rock would have had to have been cut, and it was unnecessary in building terms.

We do have evidence of it on the northeastern corner (files 85, 98, 106...), but its construction could also be related to the connection between the Plaza of Representation and a hypothetical area/enclosure located to the north and outside the seat of the *Concilium*. For this reason this gallery is not taken into account in the geometry of the plaza.

We have been able to verify another modular constant (90 *p*) theoretically used in the initial geometric plan. We can observe that the width of the podium and the cryptoportico is 26.66 m / 90.1 *p*. The measurement is a whole divisor of the square of 4.5 *actus* (90 *p* x 6 = 540 *p* = 4.5 *actus*). If we project a grid based on a module of 90 *p* onto the structures of the *Concilium*, we can see numerous perfectly defined composite structures (fig. 27). In addition, half of this module coincides with the layout of various buildings that make up the complex. For this reason we propose that the module of 90 feet serve as a basis for defining the main internal elements of the two plazas.

As far as the module of two squares of 4.5 *actus* is concerned, we come across it again in the Circus, specifically in the dimensions of the arena axis, 1,076 *p*. We do not have, or we have been unable to find, any justification, either in this module or in any smaller one, that would serve to define the width of this building. What is obvious, however, is that the Circus is displaced towards the west, obviously conditioned by the layout of the walls and due to their already mentioned function as the façade of the city's urban layout.

In summary, the metric and modular study of the Upper Part has allowed us to confirm the existence of two differentiated construction projects that were built consecutively. The first, which was probably never finished, could have been modulated by golden rectangles: a first peribolos with the Temple of Augustus (2,5 by 4 *actus*) and a grand lower area project about which we know very little. At its feet there is a possible *horreum* that adopts the new geographical orientation, coinciding with a nearby *figlina* built between 10 and 20 AD, but with Late Republican urban planning parameters.

Everything appears to indicate that the remodelling of the CPHC maintained the measure of 4.5 *actus* with the adoption of square, as opposed to rectangular, proportions. We have also verified a deviation of a little more than one degree, the reason for which we are unable to explain. Thus, it defines an upper area of 4.5 by 4.5 *actus*, forming the setting for the ancient Temple of

29. This wall was incorporated into the later Plaza of Representation, which is why the CPHC plaza is not exactly rectangular. We have to take into account that it was founded after the year 40 and that there are stratigraphic differences between the pottery in the fills and the building embankments.

30. On this aspect it has been suggested, based on the architectural elements that are being identified, that there may have been a *forum adiectum* (Pensabene 2005; Macias *et al.* in the press). This possibility is difficult to entertain, but we have to take into account that the favourable orographic conditions existing on the northeastern corner formed by the worship area and the Plaza of Representation would have allowed it.

Augustus. The lower plaza, and perhaps also the Circus, took into account conceptually the sum of the square used in the worship area (9 by 4.5 *actus*). At the same time, we propose that the organisation of the interior of the worship area and the Plaza of Representation was based on a square sub-module of 90 *p* each side.

Our proposal is based on a series of fundamental premises. Any urban transformation project, and particularly one of the size we are dealing with, begins by schematically defining a space based on simple geometric formulas. The shape, layout, and organisation of these elements depends on the will and economic resources of the developer, as well as the physical determinants and the technical-organisational skills of the time. Throughout this study, we place the archi-

tectural components, which also often follow patterns based on geometrical bases, over the initial geometry. In this way we establish a guideline that goes from the original idea to construct the building to its completion, taking in the schematisation, planning, and execution processes. This guideline can be identified, at least theoretically, in two ways. The finished building can be gleaned from the plan, as can its formative scheme, and, in the final instance, the idea with which the construction was defined. On the other hand, the identification of the geometric schemes of a construction makes it possible, based on an improved knowledge of the building, to hypothetically reconstruct sections that no longer exist or are hidden, and as such, understand and be able to correctly situate the known elements.

Atles d'arqueologia urbana de Catalunya

- 1 Atles d'arqueologia urbana de Granollers
Alexandra Úrcasaco (coord.)
- 2 Planimetria arqueològica de Tàrraco
Direcció científica: J. M. Macias Solé, I. Fdz Fernández, U. Pídel Masgoret, M. T. Miró i Alaix,
J. Guixart i Duran

TAU
LVR
VALÈNCIA
I INVESTIGACIÓ
LLEIDA

- 1 Planimetria arqueològica de Tàrraco
Direcció científica: J. M. Macias Solé, I. Fdz Fernández, U. Pídel Masgoret, M. T. Miró i
Alaix, J. Guixart i Duran
- 2 Troballes arqueològics al litoral tarragoní. Dotze anys d'arqueologia
subaquàtica (1960-1980)
Walfida Pérez Martín

DOCUMENTA

- 1 La corona immarcescible.
Pintures de l'antiquitat tardana de la Necròpolis Alta d'Ouiric (Mina, Egipte)
Eva Sobias Pascual
- 2 Les termes públiques de l'Àrea portuària de Tàrraco.
Carner de Sant Miquel de Tàrragona, Josep M. Macias i Solé (ed.)
- 3 El Palati.
La formació dels palaus imperials a Roma, Ricardo Mar
- 4 Les basíliques paleocristianes del suburbi occidental de Torroco.
El temple representatiu i el complex martírial de Sant Fruós, Jordi López Vilar
- 5 Planimetria arqueològica de Tàrraco
Direcció científica: J. M. Macias Solé, I. Fdz Fernández, U. Pídel Masgoret, M. T. Miró i Alaix,
J. Guixart i Duran
- 6 Les imitacions de vaixel·la fina importada a la Hispania Citerior
(segles I aC - I dC), Merò Roca Roumens i Jordi Principal (ed.)

Edició a càrrec de:



Ajuntament de
TARRAGONA



Generalitat de Catalunya
Departament de Cultura
i Mitjans de Comunicació



Amb la col·laboració de:



CODEX
ARQUEOLOGIA I INFORMACIÓ



PATRIM
WORLD HERITAGE
PATRIM

