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Frontier Territory between the Sasanian and Byzantine Empires. Excavations at Pānkān in Iraqi Kurdistan

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Declaration

This thesis was submitted towards the fulfilment of the requirements for the award of a PhD degree in history and archaeology from Pázmány Péter Catholic University. It is the product of my own original work, unless otherwise mentioned through references, notes, or other statements.



Signature

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1. Introduction

This doctoral dissertation investigates the multi-phase architectural complex at Pānkān in the foothills of the Zagros Mountains within the territory of the Kurdistan Regional Government of Iraq (KRG), based on field research conducted under the Kurdish–Hungarian Archaeological Mission (KHAM), an international collaboration between the Institute of Archaeological Sciences at Pázmány Péter Catholic University (PPCU-IAS), the Department of Archaeology at Salahaddin University–Erbil and regional partner institutions. The study aims to document and interpret the standing and excavated remains of the building complex through an integrated archaeological and digital spatial workflow, and to use Pānkān as a case study of the changing dynamics of the late Sasanian and early Islamic periods in northern Mesopotamia. In late Antiquity and the early medieval centuries, the Byzantine and Sasanian empires recognised one another's sovereignty while competing for influence across a broad

interaction zone, rather than a fixed line. That zone, articulated by fortified corridors, waystations, and nodes of exchange, framed the movement of people, goods, and ideas. Pānkān lies near a river gorge in the transition zone between the Erbil plain and the rising hill country leading toward Amida and Hakkari, a setting well suited to monitoring traffic descending from the mountains as well as movement along the plain. The site therefore offers an unusually clear vantage point from which to reassess how military, economic, and religious currents intersected in the region over several centuries.

Pānkān has been under investigation by KHAM since 2014. The programme is supported by the Directorate of Antiquities in Erbil, the General Directorate of Antiquities of the Kurdistan Region of Iraq, the Erbil Civilisation Museum, the MOL Hungarian Oil Company and the Pázmány Péter Catholic University. During a 2014 survey centred on the nearby Ottoman period castle of Dwīn, attention was drawn to a second locality on the outskirts of the village of Pānkān that preserved substantial architectural remains. The field surveys of the KHAM yielded Byzantine, Sasanian, and early Islamic artefacts. Ceramic analysis, together with radiocarbon measurement of charcoal recovered from the mortar of the wall cores, indicates that occupation plausibly began in the late fifth or early sixth century AD. The principal enclosure covers an area of roughly 70 × 70 metres. Fieldwork was interrupted by the COVID-19 pandemic, and the final season took place in 2021, adding stratigraphic and architectural observations that clarify aspects of constructional phasing and building function. Excavation has been complemented by systematic surface collection and targeted metal-detector surveys, designed to sample the numismatic horizon and test areas of disturbed stratigraphy.

The assemblage of artefacts is diverse, comprising small finds, numismatic material, and ceramics across multiple horizons. The corpus of Byzantine *folles*, Sasanian drachms, and early Islamic dirhams attests to sustained connectivity across political frontiers and to the permeability of monetary circulation in the region.[1] A burial immediately south of the enclosure contained a purse of forty silver coins spanning some three centuries, from a drachm of Pērōz to a dirham of 170 AH.[2] Early pieces are late Sasanian drachms, while most belong

[1] The framework for this material is Heidemann 1998, whose subject is the region and the problem at issue here: the new frontier at the Taurus cut Syria off from its traditional supply of Byzantine coin, while "the conquest removed permanently the border with the former Sasanian empire", so that "a steady influx of Sasanian silver coins into Syria was unleashed" (95) — silver that "probably reached Damascus as tax payments in Sasanian drahms" (108). Pānkān lies inside the zone that was joined, not on either side of it.

[2] The geographic reach of this silver bears on how far a single drachm may have travelled before entering the ground at Pānkān: Sasanian drachms occur in quantity in Georgia (Tsotselia 2002) and reached Turfan on the eastern edge of the Tarim basin (Skaff 1998). A mint signature is therefore evidence of where a coin was struck and of very little else.

to the Umayyad and early Abbasid caliphates. Few published burials of comparable date in the Middle East combine such composition, character, and quantity.[3] Beyond their numismatic importance, these coins promise to illuminate local responses to broader historical and cultural shifts, including practices of concealment, commemoration, and the negotiation of identity at a crossroads of the hinterland.

Preliminary architectural analysis indicates that Pānkān underwent functional reconfiguration over time. Its siting—prioritising ease of access rather than defensibility—together with the internal spatial organisation and the artefact profile, is consistent with a period in which the building complex operated as a caravanserai or waystation embedded in regional trade. Earlier horizons may reflect different roles too, including the possibility of a late Sasanian supply station or an elite hunting lodge. The internal periodisation advanced here—derived from stratigraphic relationships, construction techniques, mortars, and diagnostic finds—supports this reading while acknowledging that mixed deposits and later reuse complicate interpretation. Based on current evidence, active use appears to have ceased by the thirteenth century, likely due to the disruptions of the Mongol period and the reconfiguration of route systems.

The analytical framework follows the structure of the dissertation. The isolation of constructional phases and their relative and absolute chronology is developed through the architectural and stratigraphic discussion in Chapter 4 and brought together in the interpretive synthesis of Chapter 5. The question of changing function—from a possible Sasanian military installation to later commercial and transit-oriented roles—is tested against converging lines of evidence in that chapter. How ceramics and coinage position Pānkān within Byzantine, Sasanian, and early Islamic networks is likewise examined in Chapter 5, with religiously inflected small finds contextualised against the ecclesiastical and cultural background outlined in §2.4. A regional comparison between the Erbil plain and the Zagros foothills is framed in Chapter 2 (geography, historical background, Silk Roads, and religious geography) and revisited in Chapter 5, which situates late antique Pānkān within Sasanian-period dynamics. Throughout, the working expectation is that the earliest construction belongs to a late Sasanian horizon; that subsequent reconfiguration reflects adaptation to traffic and trade characteristic

[3] Heidemann 2010, 649–650, describes two currencies running side by side and serving different constituencies: high-value gold and pure silver — the principal currency of long-distance merchants, fiscal administration and state expenditure, and of high officials and the military — and debased petty coinage for daily marketing. A purse of forty silver pieces belongs to the former register, and is compatible with a merchant, an official or a soldier without distinguishing between them; he adds that “geographically well-defined borders of currency zones hardly existed”.

of caravanserai-type functions; that the numismatic profile records both regional circulation and episodic deposition; and that an integrated digital workflow refines phasing and functional attribution beyond what conventional recording alone would allow.

Methodologically, the project combines excavation and architectural recording with a digital toolkit designed to address multiperiod reuse and partial preservation. *Structure-from-Motion* (SfM) photogrammetry provides high-resolution, georeferenced three-dimensional models of standing features and excavation areas (Chapter 3.3). GIS-based spatial analysis integrates terrain models, satellite imagery, reconstructed routes, and artefact distributions to enable multi-scalar study, supported by GNSS and total station workflows (Chapter 3.1). RPAS-based aerial survey is presented as a sequence of campaigns in 2014, 2015, and 2016 (Chapter 3.2). Non-invasive magnetometer survey (2014; 2021) is detailed in Chapter 3.4, and the metal-detector programme—ranging from exploratory transects to grid-based sampling and targeted work in the burial area—is presented in Chapters 3.5.1–3.5.3.

The organisation of the dissertation mirrors this logic. Chapter 1 introduces the project; §1.1 presents the site and explains how the study and its illustrations are organised, §1.2 profiles the Kurdish–Hungarian Archaeological Mission (KHAM), and §1.3 surveys the relevant literature. Chapter 2 situates the site and its surroundings (geography, historical background, Silk Road networks, and late-antique religious geography). Chapter 3 presents methods and data acquisition (GIS with GNSS and total station; RPAS-based surveys from 2014–2016; SfM; magnetometer; metal detector work). Chapter 4 offers a detailed account of the fort of Pānkān—from soundings, layout, and nomenclature, through the gate, defensive works, internal structures, and outlying clusters, to its immediate surroundings. Chapter 5 turns to interpretation, situating late-antique Pānkān within the broader Sasanian imperial context of the Zagros foothills and addressing its function, chronology, and material culture—as a fort, a potential ecclesiastical site, and a commercial station—before Chapter 6 offers a concise conclusion. Plates and appendices follow, along with the principal corpora of artefacts (trenches, coins, small finds).

1.1.The Site, and How This Study Is Organised

Because the chapters that follow present a large body of evidence, it may help the reader to have a picture of the place before the evidence for it begins. Pānkān is a fortified enclosure of the late Sasanian period standing on the terrace above the gorge of the Kargh River in the western foothills of the Zagros, thirty-seven kilometres north-north-east of Erbil and about two kilometres below the point at which the river leaves the Razwān range (Figures 1–2). It is close

to square in plan, some seventy metres across and 0.46 hectares in area. Circular towers stand at its four corners and U-shaped towers at intervals along its curtains; a single certain gate opens at the centre of the southern side, with a second probable entrance at mid-north; and about three quarters of the interior was built over with ranges of barrel-vaulted rooms set against the inner face of the wall (Figures 21 and 23). Outside the enclosure, chiefly on the level ground in front of the southern gate, lay an unwalled settlement of mudbrick houses. The complex was founded between 430 and 560 AD, remained in use through the Muslim conquest and the early Islamic centuries, and appears to have been abandoned by about 1300 AD. A full description, with the evidence for each element and the distinction between what was excavated, what survives at the surface and what is inferred, is given in section 4.1.

Three things make the site worth a study of this length. The first is that it belongs to a class of installation — the small, non-monumental fortified enclosure of the Sasanian hinterland — of which very few examples have been both excavated and published, so that a single fully documented site materially enlarges the comparative base. The second is that its deposits run without interruption across the Muslim conquest, a transition for which stratified rural evidence in northern Mesopotamia remains scarce and on which the region's ceramic and numismatic chronologies still depend. The third is the material itself. From an enclosure of half a hectare and its immediate surroundings the project recovered eighty-seven individually catalogued coins, spanning Byzantine, Sasanian, Umayyad and Abbasid issues; twenty-one lead sealings, a class of object almost unpublished for this period in the region; a burial containing a purse of forty silver coins that crosses three successive monetary regimes in a single deposit; and a small-finds assemblage of one hundred and ninety objects including imported metalwork and cast bronze camel fragments. For a rural site of this period in northern Iraq that is an unusually dense body of evidence, and it carries the greater part of the interpretation offered here.

The study is presented in two volumes, and the division between them is deliberate. The first volume carries the argument: the setting and its historiography, the methods and their limits, the architecture of the complex, and the interpretation built on them. The second is the documentation — the area-by-area record of the geophysical survey, the trench-by-trench excavation record, the coins, and the small finds — set out so that it can be consulted independently of the argument and cited by other scholars without reference to it[4]. The reader

[4]The catalogue entries are numbered independently of the discussion so that they can be cited on their own, and each entry states where a parallel could and could not be found.

who wishes to test a statement made in the first volume will find the underlying record, entry by entry, in the second.

The illustrations are divided on the same principle, and it is worth stating it because the division is not arbitrary. Figures that carry an argument — the regional and site plans, the terrain models and orthomosaics, the summary magnetograms, the comparative plans of other sites, and the distribution maps — appear in the main text, at the point at which the argument they support is made. Figures that document rather than argue — the photographic record of each excavation trench, the in-situ record of the burial, and the comparative objects illustrated for the catalogue — appear in the appendix, immediately with the trench, context or object they record. Every figure in both volumes is referred to at least once in the text, and no figure is included that is not. Unless a caption states otherwise, the photographs, plans, models and drawings are by the present author[5].

1.2.Kurdish-Hungarian Archaeological Mission

The Kurdish-Hungarian Archaeological Mission (KHAM) was established in November 2014 under the leadership of Dr Balázs Major as a joint initiative by Pázmány Péter Catholic University (PPCU), represented by its Institute of Archaeological Sciences and Archaeological GIS Laboratory, and Salahaddin University in Erbil, through its Department of Archaeology. This collaborative effort was supported by the Directorate of Archaeology in Erbil, the General Directorate of Antiquities of the Kurdistan Region, and the Erbil Civilisation Museum. The fieldwork was led by both Dr Balázs Major and the author of this dissertation. The mission was built on the cooperation of Hungarian and Kurdish researchers to advance the study and preservation of Kurdish archaeological heritage. KHAM's work primarily focuses on the castle of Dwīn and its surroundings, which are of considerable historical and cultural importance for the Kurdistan Region of Iraq.

The mission's activities align with both academic and cultural objectives. The research aims to uncover and document the region's archaeological record, shedding light on historical settlement patterns, architectural evolution, and material culture. It also contributes significantly to the Kurdish nation's identity-building by documenting sites of symbolic value. The work also enhances educational opportunities for students and researchers from both Hungary and Kurdistan, supporting cross-cultural and interdisciplinary collaboration.

[5]Where a caption names another photographer, illustrator or institution, that attribution stands; figures taken from other publications carry the source and, where applicable, the licence under which they are reproduced.

The mission was financed by a combination of resources, including the MOL Group (Hungarian Oil and Gas Company), PPCU's research grant programs (KAP), and grants from the Hungarian Ministry of Human Resources. This work was carried out as part of the project entitled "Archaeology Research on the Contacts between Hungary and the East" under the Thematic Excellence Program of the National Research, Development, and Innovation Office of Hungary (Our Eastern Heritage, PPCU History and Archaeology Interdisciplinary Research Team; TKP2020-NKA-11).

KHAM's primary concession was the full-scale research and documentation of the castle of Dwīn, including excavation and archaeological surveys of the surrounding area. Initial work began in the 2014 season, utilising non-invasive methods that focused on surface find collection, field walking, and aerial surveys using Remotely Piloted Aircraft Systems (RPAS). These methods facilitated the identification of key architectural features and provided the groundwork for mapping and detailed documentation.

During the initial fieldwork season in 2014, the mission explored the vicinity of Dwīn, where Dr Zidan Bradosty, the head of the Department of Archaeology at Salahaddin University, highlighted the significance of the nearby site of Pānkān. While the site was officially registered as an Ottoman-period caravanserai, previous surveys at Pānkān revealed evidence of earlier occupation. RPAS survey, geodetic measurement, and visual inspection were used to produce a preliminary site plan and to identify areas for targeted excavation.

Early findings, including structural observations and surface artefacts, highlighted the importance of expanding the mission's scope to include the site in subsequent research seasons. The foundational work carried out in 2014 set the stage for a broader and more detailed investigation of Pānkān in the years to come.

The 2015 season concentrated on non-invasive survey at Pānkān, refining the aerial mapping and systematically recording surface finds in preparation for excavation. High-resolution aerial imagery revealed subsurface anomalies indicating buried structures. Meanwhile, field walking and surface collection uncovered ceramic sherds and stone tools, providing evidence of continuous occupation during the Sasanian and early Islamic periods[6].

[6] A caution belongs with any statement of this kind, and it is a regional rather than a local one. The four large survey projects of northern Iraqi Kurdistan share a single ceramic typology which formally encodes "Late Sassanian – Early Islamic" as a period in its own right, alongside "Sassanian" and "Early Islamic (Abbasid)" (Koliński 2016, 164–165); Palermo states the reason plainly — the period's initial and final phases overlap with the Parthian and Islamic periods, and the pottery "shows strictly regional features", with types continuing into the Early Islamic period (Palermo 2016, 289, 293). The problem is general to the empire (Mousavi 2008, 2;

GNSS-derived geodetic control points improved the precision of the site documentation and allowed the recorded data to be integrated into a single regional framework. These results informed the selection of areas for excavation, in particular the central gate complex and the corner towers, as the features most likely to clarify the site's layout and function. These features were prioritised both for their architectural significance and for what they could reveal of the site's historical function within the Sasanian-era settlement network. The aim in selecting these elements was to relate the physical remains of Pānkān to its wider historical context.

The transition to targeted excavations began in 2016. At Dwīn, seven trenches were opened within the citadel to clarify its layout, function, and stratigraphic sequence. Excavations revealed the site's complex architectural evolution, with evidence of multiple construction and repair phases. Architectural measurements combined with the previously collected charcoal sample for radiocarbon dating provided insights into the chronological framework of Dwīn's development.

Fieldwork at Pānkān in 2016 focused on its rectangular enclosure, measuring approximately 70 meters by 70 meters. Building on the earlier aerial survey, a detailed field survey of the visible wall remains was carried out, recording every wall fragment traceable on the surface before excavation began. This was achieved through a third aerial survey, following the proper surface cleaning of the site to enhance visibility. This survey identified well-preserved architectural features, including corner towers and barrel-vaulted rooms built of rubble stone and lime mortar. These findings pointed to the Sasanian origins of Pānkān, subsequently supported by the radiocarbon determinations from the excavated wall mortar, which place its construction between 430 and 560 AD — a range spanning the reigns from Bahram V to Khosrow I.

The first excavation season at Pānkān took place in 2018, following several years of preparatory survey. Work concentrated on a single trench at the southern gate complex. This trench clarified the site's architecture and history, uncovering multiple layers of flooring and wall repairs that provided clear evidence of multiple construction phases. These findings revealed that the building complex had one main gate located in the middle of the S wall without any apparent decoration or stucco, which was narrowed down at a later stage in its use.

Lawrence and Wilkinson 2017, 103), and its cost is documented at Bakr Awa, where a published Sasanian–Parthian attribution of two levels was withdrawn when the pottery proved Early Islamic and a 14C sample gave 675–770 AD (Miglus 2016, 237). The surface material from Pānkān is therefore evidence for occupation across the Sasanian to early Islamic span rather than for its division into phases; that division rests in this study on stratigraphy and on the coins.

The southern gate was a key element of Pānkān's defensive and logistical arrangements. Systematic grid-based metal-detector survey was introduced alongside the excavation. Among its results was a heavily corroded Umayyad bronze coin recovered at floor level within the trench, providing direct evidence of early Islamic occupation. Additional discoveries, including a silver pendant and a *crux gemmata* pendant cross, reflected the site's cultural and religious significance. The trench was recorded by photogrammetry and 3D modelling, producing georeferenced models at sub-centimetre resolution. These models became essential tools for analysing the construction phases and stratigraphic sequences of the southern gate complex.

The second excavation season followed in 2019. Excavation of the southern gate complex continued, and seven further trenches were opened at selected points across the site to investigate its principal architectural elements. The aim was to clarify Pānkān's layout and the functional relationships between its structures. These excavations revealed substantial new features, including stone-lined storage pits, additional corner towers, and previously undocumented wall sections, all of which offer critical insights into the site's logistical and defensive systems.

Metal-detector survey continued, recovering Byzantine and early Islamic coins, bronze belt buckles, and pottery fragments. These discoveries provided further evidence of Pānkān's role as a regional economic hub with long-standing connections to broader trade networks. Detailed stratigraphic analysis within the trenches exposed multiple construction stages, reflecting the site's prolonged occupation and the ongoing adaptation of its architectural features to meet evolving needs.

The use of photogrammetry and 3D modelling was extended in this season. These methods produced accurate digital records of the newly excavated areas and supported analysis of the site's architectural development. The resulting data refined the reconstruction of Pānkān's structural sequence and shaped the direction of subsequent work.

The season also had a training component, carried out with students from Salahaddin University. They received practical instruction in the recording techniques used on site. The 2019 results substantially extended what could be said about the site's development.

The 2021 season was the most extensive undertaken at Pānkān. Ten trenches were opened across a wider area, allowing the newly exposed sections to be integrated into a single site plan. Work focused on the principal structural features and on clarifying the site's layout and functional organisation. Magnetometer survey had been carried out in 2014 on the fields

west and south of the site; in 2021 the method was applied within the enclosure itself for the first time. These surveys detected buried walls, probable building clusters, and further structural features, several of which were subsequently confirmed by excavation. Systematic metal-detector survey also continued, recovering bronze belt buckles and Byzantine and early Islamic coins. The exposed features were recorded by 3D modelling, producing georeferenced models of the excavated architecture. Together, the 2021 results provided the fullest picture yet obtained of the enclosure's plan and internal organisation.

The architectural layout of Pānkān revealed its strategic and logistical significance. The rectangular enclosure, fortified with corner and semi-circular towers, reflected sophisticated Sasanian engineering. Excavation of the southern gate complex identified three distinct construction phases, together with evidence of repair and modification. Stratigraphic analysis indicated that the gate's original floor level dated to the later Sasanian period, while subsequent layers suggested continued use into the early Islamic era.

Grid-based metal-detector survey was carried out alongside the excavations between 2018 and 2021, recovering bronze buckles, silver coins, and pottery fragments. These finds show the site's long-term occupation and its role as a regional centre. Particularly notable discoveries were an intact, elaborately designed bronze cosmetic mortar and a burial containing a purse of 40 silver coins, neither of which would have been found without a systematic metal-detector survey. The 2021 magnetometer surveys added a new dimension to the site's understanding, revealing subsurface structures that had previously been undetectable.

1.3.Literature Review

The archaeological investigation of Pānkān[7] is situated at the intersection of Sasanian frontier studies and the burgeoning field of landscape archaeology in the Kurdistan Region of Iraq (KRI). Traditionally, Sasanian archaeology suffered from a "monumental bias," focusing predominantly on the imperial heartlands of Khuzestan and the Fars province, or the high-status architecture of Ctesiphon.[8] As Ali Mousavi has emphasised in the fullest review of the

[7] Major 2022; Takáts 2025.

[8] Mousavi 2008, the fullest statement of the problem: "among twenty major excavation projects from 1980 to 1990, none was concerned with Sasanian materials", and "the study of spectacular monuments has always dominated archaeological research programs and fieldwork" (2). The wording used here about peripheral outposts and rural infrastructure is this study's inference from that pattern and not Mousavi's formulation; his survey covers Iran alone and does not treat Iraq. For the early orientation of the field towards palace architecture, Pope 1933, and for its long influence, Bier 1993.

field's recent development[9], this focus often neglected the peripheral outposts and rural infrastructures that were essential to the empire's administrative and military resilience. The present study seeks to address this imbalance by providing primary data from a secondary but strategically important frontier node.

A defining characteristic of Pānkān is its relative invisibility in the extant textual record. While the broader province of Adiabene and the administrative centre of Akre appear in Syriac hagiographies and early Islamic geographical treatises—notably in the works of Yāqūt al-Ḥamawī—Pānkān itself lacks direct nomenclature in primary sources. This silence is not atypical of mid- to small-scale military installations. Consequently, the historical reconstruction of the site relies on synthesising broader regional trajectories. The lack of specific historical attestation reinforces the necessity of the current archaeological intervention; without such data, the settlement's role in the Sasanian-Byzantine frontier remains purely speculative.

Because the site sits at the meeting point of several fields, the literature bearing on it is correspondingly dispersed, and it is worth stating at the outset what this review covers and on what principle. Six bodies of scholarship are surveyed below, in the order in which the dissertation draws on them: the research history of Sasanian fortification and of frontier installations, which supplies the architectural parallels; the methodological literature of non-destructive survey, which governs how most of the evidence was generated; the study of the caravanserai and the road-station economy, on which the interpretation of the site's later phases depends; the historiography of the 'Silk Road', which frames the trade argument and, as will be seen, largely omits the stretch of the network in which Pānkān lies; the regional literature on routes and settlement survey in northern Mesopotamia, which supplies the immediate context; and the numismatic, sigillographic and artefactual reference works on which the catalogue in the Appendix rests. Each subsection sets out the state of the field, identifies what is and is not available for comparison, and states what the present study can and cannot contribute to it[10]. A note on coverage is also owed[11].

[9] Mousavi 2008, 1–14. The consequence for identification is stated by him directly: the material culture of the empire is regionally diverse, and "this diversity makes the identification of Sasanian remains difficult; only in southwestern Iran there is a well stratified corpus of artifacts that can be attributed safely to the Sasanian period" (2). That is the position against which the ceramic arguments of Chapter 4 have to be read.

[10]The historical scholarship on the Roman–Iranian frontier, on Adiabene, and on the religious geography of the region is reviewed where it is used, in Chapter 2; the methodological literature specific to individual techniques is treated again, at greater technical depth, in Chapter 3.

[11]The review draws on publications in English, German, French and Hungarian. Scholarship published in Arabic and in Kurdish is engaged where it has been accessible — most importantly Badrī Tawfīq 2017 on the

1.3.1. Sasanian Forts and Frontier Installations: A Research History

The immediate regional context for Pānkān has been established by the large survey and landscape projects of the past two decades, whose methods and results are considered separately below.[12] Two of their findings bear directly on the present subsection. The MULINEM project, in documenting the medieval urban and rural landscape of north-eastern Mesopotamia, identified a pronounced gap in the understanding of settlement between the sixth and the seventeenth centuries, and singled out Adiabene as a critical but understudied frontier region[13,14]; and survey in the Sirwan and Garmian regions has revealed a denser network of Sasanian-period occupation than had been supposed, much of it associated with substantial irrigation works[15]. Both results point in the same direction, and they define the expectation against which the site is interpreted here: that Pānkān is unlikely to have been an isolated fort, and is better approached as one element of an integrated defensive and economic landscape adapted to the topography of the Zagros foothills.

At the broadest level, the provincial architecture and landscape of the Sasanian Empire have recently been reframed by Matthew Canepa as part of a deliberate imperial topography of power, in which building programmes, not confined to the great dynastic centres, extended royal authority visibly across the landscape; Dietrich Huff's standard overview of Sasanian architecture likewise treats fortification, from the great linear defence walls down to isolated

identification of the site — but it is not claimed to have been surveyed exhaustively, and this is a real limitation for a region whose local publication record is substantial and unevenly distributed.

[12]Kopanias and MacGinnis 2016.

[13] Nováček and Melčák 2016; Nováček 2016.

[14] The judgement is Nováček's and it is the clearest statement of the problem from inside the region: the region, "although extremely rich in archaeological heritage, escaped intensive scholarly attention until very recently and the sites of Sasanian and Islamic periods were largely overlooked" (Nováček 2016, 268). His survey of Adiabene supplies both a class into which Pānkān falls — "small-range, strongly fortified towns whose strategic purpose derived from their location on an important route and/or river crossing" (275) — and a morphological parallel at Eski Makhmūr: a rectangular perimeter wall of 53 × 42 m in limestone masonry on a mound at the edge of the Makhmūr Plain, where the Central Tigris–Arbīl route crossed the ridge, dated by surface pottery to the Early Islamic period and read as a qaṣr (271). For the administrative context, the nearest centre is Kafr ʿAzza (Hazza), 15 km south-west of Erbil, "a parallel provincial centre during the Late Sasanian Period" that retained its position into the Early Abbasid period (269).

[15] The survey figures give the order of magnitude: in the Land of Nineveh Archaeological Project area, field walking identified 147 Parthian sites and 78 Sasanian ones, 60 of them continuing from the previous period (Palermo 2016, 286, 289). Two of Palermo's observations bear directly on how Pānkān should be argued. Sasanian sites in this landscape typically occupy "very low mounded or flat sites in the plain" and tend to be larger than earlier ones (289) — a generalisation that a small walled enclosure on rising ground does not fit; and of a small single-period cluster he suggests "a seasonal occupation rather than … a stable pattern" (290). Seasonal use is the default reading for small Sasanian sites here, and the case for a permanent installation at Pānkān has to be made against it rather than assumed.

provincial strongholds, as a distinct and coherent category of the period's built environment[16].

Canepa's reframing is, however, the endpoint of a long and uneven historiography, and the route by which the study of Sasanian fortification arrived there should be set out, because the shape of that history explains why a site such as Pānkān has until recently had so little to be compared against. For most of the twentieth century, the archaeology of Sasanian Iran was, in practice, the archaeology of its monumental and elite architecture: the discipline was built on palaces, rock reliefs, and fire temples, and Arthur Upham Pope's reading of Sasanian remains through the category of the garden palace is characteristic of that early orientation[17]. Fortified sites entered the literature largely when they could be construed as royal or aristocratic residences — Edward Keall's study of Qalʿeh-i Yazdigird, significantly for the present study located in Persian Kurdistan, was published as an account of a "Sasanian palace stronghold"[18], and comparable ambiguities of function attend the complex at Bandian, debated as palace or dynastic shrine[19]. Dietrich Huff's survey for the Encyclopædia Iranica consolidated this body of work into what remains the standard architectural synthesis of the period[20], but it inherited the same emphasis. Reviewing the field in 2008, Ali Mousavi could still characterise the preceding three decades as marked by uneven coverage and a persistent concentration on a small number of monumental sites.[21] The decisive change came from military and frontier archaeology rather than from architectural history. The long campaign of survey and excavation on the Gorgan Wall and the Tammīsheh wall established, for the first time, that Sasanian frontier works could be investigated as an engineered system — with datable construction sequences, calculable garrison capacities and a securely excavated internal

[16] Canepa 2018, 21, where the term is defined: a "topography of power" built or enacted "at innumerable places throughout their lands under the control of the king, agents, or proxies"; and 122 for the Sasanian application — Mesopotamia and the plateau rapidly reshaped, new regional settlements controlling their hinterlands "militarily and economically", and long-derelict sites of northern Mesopotamia, such as Nineveh, renewed as Sasanian settlements. The limits of the book should be stated plainly, since it is cited here for a framework rather than for evidence: its subject is royal and dynastic architecture; fortification is not treated as a category; the Zagros is not named, and Adiabene appears only in Arsacid contexts. For fortification as such the reference remains Huff 1986/2013.

[17] Pope 1933; cf. Bier 1993 on the long influence of the palace corpus.

[18] Keall 1967, 99–121.

[19] Azarpay 1997, 193–196, whose conclusion is that "the function of the Bandian complex, which may have changed over time during its various periods of reconstruction, remains uncertain" (196).

[20] Huff 1986/2013.

[21] Mousavi 2008, 2, where the concentration on monumental sites is described as long-standing rather than current — "the study of spectacular monuments has always dominated archaeological research programs and fieldwork" — and where the fieldwork of the preceding decades is said to have moved instead towards regional survey and rescue excavation. Even so, he records that of twenty major excavation projects between 1980 and 1990 none concerned Sasanian material (ibid.).

architecture — rather than as isolated monuments[22]. That work reoriented the field, and its results were quickly generalised: Eberhard Sauer's edited volume placed Sasanian Persia explicitly between Rome and the Eurasian steppe as a state to be understood through its frontiers[23], and a 2014 special issue of the Journal of Ancient History devoted to the archaeology of Sasanian politics brought together, in a single volume, treatments of the empire's borderland building projects as an instrument of policy, of the relationship between coinage and military construction, of a frontier city, and of the agrarian base that sustained them[24]. Meysam Labbaf-Khaniki has since offered a dedicated synthesis of the castles, walls, and fortresses through which the empire defended its territory[25], and the field now has current reference treatments in both encyclopedic and narrative form[26,27].

The consequence of this reorientation most directly relevant to Pānkān is a second and more recent shift: away from the great linear barriers and towards the small, dispersed installations of the hinterland.[28] Karim Alizadeh's excavation of Ultan Qalası established the fortified site in the Sasanian borderlands as a category worth investigating in its own right rather than as a minor adjunct to the walls[29], and it is just this category to which Pānkān belongs. In Iraqi Kurdistan the relevant parallels have accumulated only in the last decade, and almost entirely since the dissertation's own fieldwork began: the hinterland fortress of Gird-i Kazhaw in the Sharizor[30], the ongoing excavations at Gird-î Qalrakh, whose Sasanian phases have now been reported in detail[31], the mountain site of Merquly[32], and the fortified enclosure

[22]Sauer, Nokandeh, and Rekavandi 2022; Priestman 2013.
[23]Sauer 2017.
[24]Journal of Ancient History 2, no. 2 (2014), the special issue on the archaeology of Sasanian politics: Alizadeh 2014, 93–115; Howard-Johnston 2014, 144–181; Simpson 2014, 116–143; Hartnell 2014, 182–208.
[25]Labbaf-Khaniki 2020, 37–59.
[26] The Iraqi material has a longer historiography than this account of the Iranian field suggests. Finster and Schmidt's survey of the desert west and south of the Euphrates remains the only systematic treatment of Sasanian and early Islamic fortified enclosures in Iraq: it defines the Kastell type by its towers and symmetrically placed gate (Finster and Schmidt 1976, 14); it publishes a Sasanian enclosure of 42 by 46 m in rubble masonry, dated on masonry technique alone (49–50, 54); and it records a late Sasanian church inside a towered precinct of some 110 by 150 m (35–36). Nothing comparable has been undertaken in Iraq since, and the volume's cautions — that the type does not fix the function, and that a narrow gate is inconsistent with caravan traffic — are as useful as its plans. For the Umayyad end of the same sequence, Northedge 2009 supplies the comparative frame, and Whitehouse and Williamson 1973 the first publication of the Sīrāf enclosure with which Pānkān is most often compared.
[27]Farahani 2020.
[28] The asymmetry with the Roman side of the same landscape is instructive. The Roman frontier posts of northern Iraq were excavated and published more than half a century earlier: Ain Sinu in the Sinjar region, a Severan castellum with an adjoining barracks enclosure, occupied between the late second and the mid-fourth century, appeared in 1959 (Oates and Oates 1959, 207–242). The thinness of the comparative base is therefore specific to the Sasanian side of this landscape, not a property of northern Mesopotamia as such.
[29]Alizadeh 2011, 55–77.
[30]Tamm 2020; Tamm et al. 2018.
[31]Wicke 2021, 127–148; Mahmoud, Tamm, and Wicke 2025.
[32]Altaweel 2014.

and church at Bāzyān[33], to which may be added the recently identified Gawri Wall in the western Zagros foothills as evidence that linear works also belong to this landscape[34]. Beyond the region, the small late Sasanian fort at Fulayj on the Omani coast offers the closest functional analogue yet published, since it, too, was built as a modest imperial installation and remained in use through the Islamic conquest[35]. This body of work is complemented by a growing economic literature on the late antique central Zagros[36] and by the regional survey and landscape frameworks established for Adiabene and the Erbil plain[37]. Two conclusions follow from the present study. First, the comparative base against which Pānkān can be interpreted is genuinely new: most of it did not exist when the site was first investigated, which is why so much of the interpretation offered in this dissertation has had to be built rather than inherited. Second, within that base, Pānkān remains almost unpublished — a single study by Balázs Major is the only dedicated treatment of the site in print[38] — so that the present work is less an intervention in an existing debate than a first attempt to place the site inside one.

Three of these parallels carry particular weight in the chapters that follow, and it is worth saying briefly what each is being asked to do. Bāzyān, some 120 km to the south-east, is the closest structural parallel available: a fortified enclosure of Sasanian date enclosing a church, with a glacis and internal remodelling assigned to the Umayyad and Abbasid phases; its excavators hold that the first enclosure wall and the church were built together,[39] so it is not evidence that a monastery was inserted into a disused fort, but it does supply a documented instance in this landscape of a fortified enclosure whose function changed while its walls stood.[40] It is used here in that narrower sense, and not as evidence of what happened at Pānkān. The Gorgān and Tammīsheh walls and their associated forts serve a different purpose: they are the most extensively excavated Sasanian military works available, and they therefore provide the technical baseline — construction sequences, occupation criteria, garrison estimates — against which a small provincial enclosure can be assessed[41]. Pānkān is very much smaller than the great fortresses of that system, but not than every fort in it: Buraq Tappeh, at about half a hectare, is close to Pānkān's own footprint, and it is with installations of that order that the

[33]Ali and Déroche 2016, 11–18; Amin et al. 2023.
[34]Alibaigi 2019.
[35]al-Jahwari et al. 2018, 724–741; Priestman et al. 2023.
[36]Habibi 2024.
[37]Nováček 2016; Ur 2016; Kopanias and MacGinnis 2016.
[38]Major 2022.
[39]Amin et al. 2023.
[40] Déroche 2014, 31–45; Ali and Déroche 2016, 11–18.
[41] Priestman 2013, 252–272.

comparison is worth making.[42] The third analogue is methodological rather than architectural. The long dispute over the identification of a Sasanian phase at Qalʿat al-Bahrain illustrates how difficult it is to separate late Sasanian from early Islamic defensive architecture, where neither coinage nor closely dated ceramics are available, and it defines the evidentiary standard that the stratigraphic and numismatic argument in Chapter 4 has to meet.[43]

Behind these regional parallels stand the general syntheses on which the historical framework of this dissertation depends, and it is worth saying what each is being asked to supply, since they are not interchangeable. Arthur Christensen's *L'Iran sous les Sassanides* remains the point of departure for the administrative and social history of the empire, and is described by the most recent reviewer of the field as[44] "a masterpiece that has always been an indispensable source of information for historians and archaeologists"; it has not been consulted directly here, and is cited only where a later work reports it. Touraj Daryaee's single-volume synthesis provides the current account of Sasanian political and administrative history, including the division of the empire into four military quarters, which he assigns to the reforms of Kavād I and Khosrow I rather than to Khosrow I alone.[45] Parvaneh Pourshariati's study of the Sasanian–Parthian confederacy supplies the argument that matters most for the later phases at Pānkān: that the conquest has been made into a watershed by the discontinuity of the sources rather than by the evidence, and that the treaties by which particular regions submitted commonly left local lords, and sometimes their garrisons, in place.[46] Bertold Spuler's survey of Iran between the Arab and the Seljuk conquests, now available in English, is the standard reference for the administration, taxation and road system of the early Islamic period, and it is also the work that states most plainly the geographical premise of this study, that the Zagros ridge "was a true frontier between Iran and Mesopotamia".[47] For the empire's frontiers as an archaeological subject the essential volume is that edited by Eberhard Sauer, and within it the

[42] Sauer, Nokandeh, and Rekavandi 2022, whose Gorgān and Tammīsheh programme remains the largest excavated Sasanian military corpus; the same monograph also reports the excavations at Qalʿeh Iraj and Buraq Tappeh, and discusses the wider network to which the Dariali and Fulayj programmes belong; the Fulayj excavations themselves are published separately (al-Jahwari et al. 2018; Priestman et al. 2023).
[43] Højlund 2006, 241–242: the pottery from the floor on which the Sasanian date rested "belongs to a well-known Hellenistic/Tylos pottery assemblage that cannot possibly be dated later than the first to second century AD", and none of the diagnostic Sasanian pottery and glass types known from Bahrain can be identified in it; the argument is summed up at 244–245. The standard is therefore the presence of diagnostic period material in a stratified deposit, and it is that standard the argument of Chapter 4 has to meet.
[44] Christensen 1944, quoted from Mousavi 2008, 1; the volume has not been used directly for this study and is listed here as the standard reference it remains rather than as a work consulted.
[45] Daryaee 2009, esp. 123–129 for the administration.
[46] Pourshariati 2008, esp. 279–280, 305 and 420.
[47] Spuler 2015, 288 for the quotation; 291, 323–324 and 423–424 for the administration and the road system; 497–498 for the fortifications.

chapter by Dan Lawrence and Tony Wilkinson on the northern and western borderlands, which supplies both the comparative framework used in Chapter 4 and the network model of empire adopted there.[48] Khodadad Rezakhani's reassessment of the Sasanian east is cited here for its historiographic argument rather than for its subject matter, which lies beyond this study's region.[49] Finally, the proceedings of the 2013 Athens conference edited by Konstantinos Kopanias and John MacGinnis remain the single most useful conspectus of archaeological work in the Kurdistan Region of Iraq, and individual chapters in it are cited throughout the chapters that follow rather than the volume as a whole.[50]

1.3.2. Non-Destructive Survey: Geophysics, Remote Sensing, and GIS

Because the interpretation advanced in this dissertation rests as much on what was detected without excavation as on what was dug, the methodological literature underpinning those techniques requires its own review. Archaeological geophysics has a settled body of general reference works — Gaffney and Gater's introduction remains the standard orientation for archaeologists[51] — and, for the technique that carried most of the survey work at Pānkān, a dedicated monograph: Aspinall, Gaffney, and Schmidt's treatment of magnetometry sets out both the physical basis of the method and the conditions under which archaeological features become magnetically visible[52]. Those conditions matter here. Magnetometry responds to contrasts in magnetic susceptibility and to thermoremanent magnetisation, so it registers fired material, burnt deposits, and the humic fills of ditches and pits particularly strongly, while unfired stone walls in a geologically comparable matrix may produce only a weak signal — which is why the method is best read alongside, rather than instead of, excavation and surface

[48] Sauer 2017; Lawrence and Wilkinson 2017, 99–125.
[49] Rezakhani 2017, whose subject is the eastern frontier — Sistan, the Kushano-Sasanians, the Iranian Huns, the Hephthalites and Sogdiana — and which is therefore not a source for the western borderlands.
[50] Kopanias and MacGinnis 2016. The chapters used here are Ali and Déroche 2016 (Bāzyān), Cereti and Colliva 2016 (the museum coin collections), Koliński 2016 (the shared ceramic typology), Miglus 2016 (Bakr Awa), Nováček 2016 (the urban landscape of Adiabene), Palermo 2016 (the LoNAP settlement figures), Terribili and Tilia 2016 (Paikuli and the Zagros routes) and Tomé, Cabral, and Renette 2016 (the Bazyan valley).
[51] Gaffney and Gater 2003. For the history of the method itself — from its first archaeological application in 1958 to the late 1990s, and covering central and eastern Europe and other continents as well as Britain — Herbich 2015. The collective volume edited by Campana and Piro 2009 assembles the principal techniques together with their landscape applications; the chapter in it by Watters on the complementary character of the different methods is drawn on in Chapter 3 below.
[52] Aspinall, Gaffney, and Schmidt 2008, described by its reviewer as "the first volume to assemble and provide an in-depth discussion of the method specifically addressed to archaeologists in a single publication", with the qualification that the mathematical development of its first three chapters "may prove daunting to non-specialist unacquainted with physical theorems" (Lacroix 2012, 179 and 181).

survey, and why the negative results from parts of the Pānkān enclosure are reported here as method-dependent rather than as evidence of absence.

The specific case for applying these methods to Sasanian fortifications, and to this region, is now well established. The Gorgan Wall project applied remote sensing systematically across its fort corpus — magnetometer survey read together with aerial imagery — and recovered the internal layout of its wall forts, barrack blocks and towers included, at a resolution that excavation alone could not have achieved within any realistic budget[53]. The volume itself, however, records that the two techniques did not contribute equally everywhere: at Fort 2 the barracks registered only faintly in the magnetometer plot and were resolved by aerial survey — a caution directly relevant to the negative magnetograms reported from Pānkān in the next chapter. Closer to Pānkān, the German excavations at Gird-i Kazhaw in the Sharizor combined magnetometer prospection with excavation at a Sasanian hinterland fortress of broadly the same class as Pānkān, in comparable terrain and comparable soils[54]; that project is the single most directly transferable methodological precedent for the present survey, and the comparison of its magnetograms with those obtained at Pānkān is drawn on in the following chapter. To this may be added the wider apparatus of non-destructive landscape work on which the project depends: the standard manuals for archaeological GIS[55], and the now-routine use of declassified CORONA and HEXAGON satellite imagery to recover Near Eastern landscapes as they were before late twentieth-century agricultural and urban expansion[56] — a body of imagery whose value for this very region has been demonstrated by the Erbil plain surveys[57]. Together, these define the methodological benchmarks against which the fieldwork reported below should be judged.

Geophysics is only one component of the methodological literature on which this study draws, and three further bodies of work should be noted, since each governs how a particular class of evidence used below was generated. The first is the survey method proper. The identification and characterisation of Pānkān proceeded, before any excavation, from systematic field walking and surface collection, a practice with its own substantial

[53] Sauer, Nokandeh, and Rekavandi 2022, 76–82, for the remote, pedestrian, magnetometer and topographical survey of Fort 2; at 78, "the barracks did not show up clearly in the magnetometer plot", the barrack plans resting on aerial imagery; at 87–88, barrack dimensions at Fort 4 are from the magnetometer survey "but not verified via excavations", aerial survey supplying the barrack plans in Forts 15, 25 and 26. For the geophysical and aerial surveys of Dasht Qalʿeh, ibid., 387–404.
[54] Tamm et al. 2018, esp. 89–146.
[55] Conolly and Lake 2006; Wheatley and Gillings 2002; for landscape-scale applications, and for the critique of visibility analysis in particular, Chapman 2006.
[56] Ur 2013, 28–36; Hammer, FitzPatrick, and Ur 2022, 679–695.
[57] Ur 2016.

methodological literature concerned with coverage, visibility, and the relationship between what is collected and what is present[58]. In the Near East, this tradition has a particular character, shaped by the extensive regional surveys that have defined the archaeology of Mesopotamian landscapes, and it is within that tradition — and specifically within the recent survey work on the Erbil plain and in Adiabene — that the present fieldwork is situated[59]. The second is the literature on metal-detector recovery. Since a substantial part of the material discussed in later chapters, and almost all of the coinage, was recovered by systematic detector survey rather than by excavation, the methodological debate about what such a survey does and does not sample is directly relevant to the arguments built on it. That debate runs from the early case for the detector as a legitimate instrument of excavation to recent quantitative demonstrations that detection probability varies systematically with the form of the object sought, so that detected assemblages cannot be treated as neutral samples[60]; the consequences for the coin distribution at Pānkān are set out in Chapter 3 and returned to in Chapter 5.

The third, and for the chronology of the site the most consequential, is the literature on scientific dating. The foundation date advanced in this dissertation rests on AMS determinations made on charcoal recovered from construction mortar, and two distinct literatures bear on that fact. The first concerns what a charcoal date in a construction matrix measures: the growth of the wood rather than the raising of the wall, and the interval that may separate them. The second concerns the direct dating of the lime binder itself, a technique that would date the setting of the mortar and hence the act of building, and which has not been applied here. It is among the more contested applications of radiocarbon: the difficulty of separating binder carbon from geological carbonate in the aggregate, the effect of secondary calcite, the unsuitability of current protocols for hydraulic binders, and the demonstrated variation between laboratories are all now well documented, as are the sampling practices that mitigate them[61]. Engaging with both literatures is not optional for a site whose foundation date rests on a single determination, and the discussion in the following chapter states the resulting determinations as calibrated ranges against the current calibration curve, with the calibration software identified[62]. The recording methods themselves — photogrammetric and aerial documentation — rest on a further body of published guidance that has consolidated

[58]Banning 2002; Wilkinson 2003, the standard treatments of survey method and of its Near Eastern landscape tradition respectively.
[59]Ur 2016; Kopanias and MacGinnis 2016; Nováček 2016.
[60]Gregory and Rogerson 1984, 179–184; Cool and Baxter 2016, 1643–1653.
[61]Urbanová, Boaretto, and Artioli 2020, 503–525; Daugbjerg et al. 2021, 1121–1140.
[62]Reimer et al. 2020, 725–757; Bronk Ramsey 2009, 337–360.

considerably over the period of this fieldwork, and which is followed here for the reporting of ground control and residuals[63]. Together, these four literatures — survey, geophysical prospection, detector recovery, and scientific dating — define the methodological ground on which the evidence presented in this dissertation was produced, and each imposes limits that are stated at the relevant point rather than left implicit.

The recording methods themselves rest on a literature that consolidated over the period of this fieldwork, and which is treated at technical length in Chapter 3. Two points belong here. The first is that the aerial and photogrammetric techniques used at Pānkān were adopted not as a matter of preference but because the regional bibliography for Iraqi Kurdistan offered no established recording protocol to follow, so that international method literature had to serve in its place[64]. The second is that the reliability of image-based three-dimensional recording, against which the results reported below should be judged, was established by a body of comparative work published between 2011 and 2014[65,66]. Where this dissertation reports photogrammetric results, it reports them with the ground control and residuals that this literature requires, and the models are treated as measurable records rather than as illustrations.[67]

1.3.3. Caravanserais and the Trade-Route Economy: A Research History

Beyond the question of Pānkān's structural parallels among Sasanian frontier forts, the dissertation's interpretation of the site's later phases as a waystation serving long-distance trade requires engagement with a second, largely separate body of scholarship: the study of the caravanserai (also known, depending on period, region and function, as khān, han, ribāṭ, or funduq) as an architectural and economic institution. The caravanserai—a fortified or semi-fortified structure built around one or more courtyards, offering travellers, animals and goods secure overnight lodging at regular intervals along a route—is attested across an enormous chronological and geographical range, from antecedents in the pre-Islamic Near East through its most familiar, monumentalised form under the Seljuks and their successors, down to its

[63]Bedford 2017; Campana 2017; on accuracy reporting, ASPRS 2023.
[64]Campana et al. 2012; Campana 2017.
[65] Doneus et al. 2011.
[66] Verhoeven 2011, 67–73; Verhoeven et al. 2012.
[67] The requirement is not that published accuracy figures be cited but that they be produced: as Waagen 2019, 13, restates it, "for every unique photogrammetrical workflow, error estimations are required", citing Green, Bevan, and Shapland 2014, 181. Waagen 2019 is itself a worked example of what that involves for a low-cost aerial workflow, and Smith et al. 2014 the closest Near Eastern instance of the combined aerial and terrestrial recording adopted here.

eventual obsolescence in the age of the railway and the motor car[68]. A concise institutional history spanning this whole range, from the Late Antique *pandocheion* of Byzantine Syria to the Islamic-period funduq and khān, is provided by Olivia Remie Constable, whose comparative framework usefully situates the transformation of hostelry institutions across the very Byzantine-to-Islamic transition with which this dissertation is concerned[69]. For the architectural historian's broader classification of the caravanserai alongside other Islamic building types, Robert Hillenbrand's standard survey remains a convenient point of reference[70].

Systematic scholarly study of the caravanserai as a building type began comparatively late, and initially concentrated overwhelmingly on Seljuk-period Anatolia. Osman Turan's 1946 study of Seljuk caravanserais was among the first to treat the subject as a serious object of historical-economic enquiry, explicitly noting the almost complete absence of prior scholarship[71]. The field's true founding monument, however, is Kurt and Hanna Erdmann's three-volume Das anatolische Karavansaray des 13. Jahrhunderts, the product of Erdmann's extensive survey campaigns across Anatolia in the 1950s, which established the first comprehensive typology and catalogue of the thirteenth-century Anatolian han corpus and remains the indispensable reference for the type[72]. Wolfram Kleiss undertook a comparable, decades-long documentation project for Iran, publishing his findings in the multi-volume Karawanenbauten in Iran and subsequently synthesising them within his general architectural history of the country—together constituting the closest Iranian counterpart to Erdmann's Anatolian corpus, and an essential reference for any discussion of Iranian road architecture spanning the Sasanian-to-Islamic transition central to this dissertation[73].

Subsequent scholarship has moved from cataloguing toward analysis, examining the conceptual logic, comparative geography, and network functions of the Seljuk-period material. Ayşıl Tükel Yavuz has examined the organisational concepts—route logic, planning typology, and decorative programme—that shaped the Anatolian Seljuk caravanserai corpus as a coherent architectural system rather than a series of unrelated buildings[74]. İnci Kuyulu Ersoy extended the comparative frame beyond Anatolia to Central Asia, while a recent study by Nastaran Deljavan and Kerim Çınar juxtaposes the Anatolian material directly against Persian

[68]Kīānī and Kleiss 1990. For the terminology of the building type, Petersen 1996.
[69]Constable 2003.
[70]Hillenbrand 1994.
[71]Turan 1946, 471.
[72]Erdmann and Erdmann 1961–1976.
[73]Kleiss 1996; Kleiss 2015.
[74]Yavuz 1997, 80.

Seljuk-period examples such as Ribāṭ-i Sharaf[75]. Most relevant to the present study's own methodological orientation is scholarship that treats caravanserais explicitly as nodes within reconstructed trade networks rather than as isolated monuments: Cinzia Tavernari has used a GIS-based catalogue of medieval Syrian caravanserais to reconstruct the shifting road networks of Ayyubid and Mamluk Syria[76], while Guy Bar-Oz and colleagues' analysis of organic midden deposits at Nabataean-Roman caravanserai sites in the Negev demonstrates that this network-oriented, evidence-driven approach is neither confined to the Islamic period nor to architectural typology alone[77].

Caravanserai scholarship is popularly associated above all with the Seljuk period and its successors, and the literature surveyed above confirms that this remains true of the field's centre of gravity. It is not, however, true that earlier periods have gone entirely unstudied, and the antecedents of the institution are of direct relevance to a Sasanian-period site such as Pānkān. Yifat Thareani's excavations at Iron Age II Tel 'Aroer in the Negev argue that the caravanserai—there serving South Arabian incense-route traffic—is 'a typical institution of pre-industrial cultures that developed trade systems' with roots many centuries before the Islamic period[78], a conclusion reinforced by Bar-Oz et al.'s Nabataean-Roman evidence discussed above. For the specific transition most relevant here—from Late Antique and Umayyad road architecture to the developed medieval khān—Denis Genequand's monograph-length study of Umayyad elite establishments in the Palmyrene and wider Levant substantially extends his already-cited 2006 analysis of the Umayyad *qusūr*, arguing for these fortified rural complexes as a direct architectural forerunner of the later caravanserai[79]; and Reem Al Shqour's study of the khāns of Aqaba traces an unbroken evolutionary line for the fortified roadside station running from the Bronze and Iron Ages, through Nabataean and Roman-Byzantine construction, into the early Islamic period[80]. Andrew Petersen's survey of the historic Hajj road system across Syria and Iraq documents a comparable early Islamic road-

[75]Kuyulu Ersoy 1996; Deljavan and Çınar 2023.
[76] Bar-Oz et al. 2022. Its subject is three small Nabataean–Roman stations on the Petra–Gaza section of the Incense Route, spaced at about a day's journey and of a size not far from Pānkān's own — 40 × 40 m and 42 × 42 m, with a separate 17 × 17 m fort at Orhan-Mor (595). The method is the more important point: where earlier work had concentrated on standing remains, this study excavated the rubbish middens outside the walls, recovering the "Incense Road staples" (606), the dung of the livestock, and Mediterranean and Nile shellfish carried into the desert (607), and concluding that the stations were sustained by a developed economic infrastructure, with traffic in both directions (608). The relevance to Pānkān is methodological: the deposits outside a way-station may carry more information about what passed through it than the building itself.
[77]Bar-Oz et al. 2022.
[78]Thareani 2007, 123.
[79]Genequand 2012.
[80]Al Shqour 2019.

station infrastructure in exactly the broader corridor within which Pānkān and Khān Jinn are situated[81], while the Sasanian caravanserai of Dayr-i Gachīn, already discussed above in connection with Pānkān's own architecture[82], demonstrates that the institution had a genuine pre-Islamic Iranian antecedent as well, and not only a Levantine or Roman one. Together, this body of evidence indicates that the Seljuk-period material represents the type's best-documented and most monumentalised phase rather than its point of origin, and that Pānkān's own Sasanian-period role as a fortified waystation sits within a considerably longer, if unevenly documented, regional tradition. One further body of work should be noted alongside the architectural corpora, because it defines the object of study differently: it takes the road rather than the building as its unit, and it is within that frame that a station of Pānkān's kind is most usefully placed.[83]

Read against this research history, Pānkān occupies a position of some interest: architecturally and chronologically, it belongs among the pre-Seljuk antecedents discussed above rather than the better-known Seljuk and post-Seljuk corpus that dominates the field, while its material assemblage—discussed in detail in the following chapters—registers just the kind of long-distance trade activity that the network-oriented scholarship of Tavernari and Bar-Oz et al. treats as diagnostic of a caravanserai's economic function. The site therefore offers a rare opportunity to examine the institution's structural and economic logic at a period, and in a region, for which comparative material remains comparatively scarce.

1.3.4. The Silk Road and its Western Lacuna

Pānkān's material assemblage—Byzantine, Sasanian and early Islamic coinage, camel iconography, and imported metalwork alike—is repeatedly described in this dissertation as evidence of the site's participation in long-distance, trans-regional exchange conventionally labelled 'Silk Road' trade. The literature on that exchange is very large, and no review of it is attempted here; what follows is confined to the parts of it that bear on the reading of a single

[81]Petersen 1994, 47–56.
[82]Shokoohy 1983.
[83] The comparative frame is set by Alcock, Bodel, and Talbert 2012; for arid landscapes specifically, Förster and Riemer 2013, whose editors argue for desert road archaeology as a distinct field on the ground that the discipline has studied the points of departure and arrival far more closely than the journey between them (Riemer and Förster 2013, 19–58). The complaint is repeated from the Negev: route infrastructure, caravan size and what traders left at the stations "have been investigated only to a limited extent by archaeologists" (Bar-Oz et al. 2022, 593). For the organisation of caravan trade in the region nearest to Pānkān, Seland 2016 on Palmyra; for Iran itself, Siroux 1949, the first systematic survey of Iranian caravanserais, and Siroux 1971 on the roads of the Isfahan region.

site in the western half of the network.[84] The term itself, however, requires some historiographical caution. ‘Seidenstraße’ (‘Silk Road’) was coined only in 1877, by the German geographer Ferdinand von Richthofen, as a retrospective label for an ancient network that had no single contemporary name; while Richthofen drew on earlier usages, the concept as now popularly and academically understood is a nineteenth-century construction imposed on a much older and more geographically diffuse reality[85,86]. Recent historiographical work has gone further, arguing that the term’s conventional geography—and much of the scholarship built on it—carries a marked, and largely unexamined, colonial-era and China-centred bias[87].

Most consequential for the present study is a specific geographical bias within Silk Road scholarship: a persistent tendency for accounts of the network to concentrate on its central and eastern Asian stretches, and to treat the roughly 3,000 km separating Transoxiana from the Mediterranean coast—the very corridor within which Pānkān is situated—as an under-examined transit zone rather than a region worthy of study in its own right.[88] Khodadad Rezakhani has argued pointedly that Chinese primary sources themselves describe trade reaching only as far as Transoxiana and Iran, and that it is modern scholarship, not the ancient evidence, that extends the network conceptually to the Mediterranean while ‘brushing over’ the intervening Iranian and Mesopotamian stretch[89]. Richard Payne has similarly observed that trans-Eurasian trade ‘appears only marginally and offhandedly’ in current accounts of Iranian history in Late Antiquity, despite Sasanian rulers’ active political and economic engagement with these networks[90]. The bias is not confined to older scholarship: a 2023 review of a recent,

[84] The bibliography of trans-Eurasian exchange is now very large, and what follows is an orientation rather than a survey. Narrative syntheses: Hansen 2012; Frankopan 2015; Liu 2023, the most recent multi-author conspectus. The historiographical-critical strand, concerned with the term itself: Chin 2013 on its coinage in 1877, Mertens 2019, Rezakhani 2010, Mishra 2020, and Whitfield 2007. On the merchants, de la Vaissière 2005 on the Sogdians; on the material record, Whitfield 2018; for the centuries that concern this study, Di Cosmo and Maas 2018. What is taken from this literature here is narrow: the historiographical caution about the term, set out below; the observation that the western sector of the network is comparatively under-studied; and, from Payne 2018, the argument that the Sasanian state’s engagement with these networks has been underrated. The evidence from Pānkān is offered not as a contribution to the history of Eurasian trade at large, but to the much smaller question of what one fortified station on its western reach can be shown to have handled.
[85]Chin 2013, 194; Mertens 2019.
[86] Blachford 2024, 25, on the odological character of ancient geographical knowledge — coasts, rivers, roads and mountain ranges set out as itineraries — and the absence of any word answering to the modern “map”; on the Euphrates as “a road more than a frontier”, ibid., 41.
[87]Mishra 2020, 21.
[88] The claim of relative neglect should be stated , because there is a substantial exception: Graf 2018, a study of the route between Syria and China running to some eighty-seven pages, approaching the question from the Roman end. It has not been consulted directly for the present study, and is recorded here as the fullest recent treatment of the network’s western extension rather than as a work drawn on below. What remains comparatively under-studied is not the western terminus but the interior stretch between it and Transoxiana.
[89]Rezakhani 2010, 420.
[90]Payne 2018, 227.

broad-ranging edited volume on the ancient Silk Road observed that even this comprehensive collection's 'centre of gravity tilts toward the eastern portions of the Silk Road network'—a volume, moreover, already cited in this dissertation for its treatment of camel iconography[91]. A related, if distinct, geographical imbalance has recently been identified at the network's eastern end as well, where Annie Chan has shown how Xinjiang has itself become disproportionately central to Silk Road discourse for reasons connected to modern geopolitics rather than ancient trade patterns alone—highlighting that the field's geographical emphases are historically contingent rather than a neutral reflection of the ancient evidence[92].

The Sasanian Empire's own commercial geography is nonetheless reasonably well established at the level of general historical synthesis: the standard account traces the empire's principal overland artery running from Mesopotamia up onto the Iranian plateau, skirting the desert through Media and Khorasan toward Central Asia and India, with Ctesiphon functioning as its western hub[93]. The Zagros corridor through which this route passed, and within which Pānkān lies, has begun to receive dedicated archaeological attention: Habibi's recent study of the economic transformation of the Late Antique central Zagros[94] discusses the strategic importance of routes such as the Great Khorasan Road through this landscape[95], and the recently identified Gawri Wall, a roughly 115 km Parthian-to-Sasanian fortification in the western Zagros foothills, has been explicitly linked by its excavator to the control of this same 'Great Khorasan route' or 'Zagros Gate'[96,97]. For general orientation, Hansen's and Frankopan's widely used syntheses remain useful, if themselves broadly consistent with the eastward-leaning emphasis discussed above[98].

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[91]Qiang Li 2023, reviewing Liu 2023; cf. Sala 2023.
[92]Chan 2025.
[93]Frye 1992, 61–64.
[94]Habibi 2024.
[95] The corridor remained a route of movement into the Abbasid period: in August 749 the garrison of Shahrazur on the western edge of Kurdistan surrendered after a one-day siege, and the advance from Shahrazur through the Zagros to Khāniqīn was thereafter, in Spuler's words, "no longer a risky venture" (Spuler 2015, 41).
[96] The comparison is with a parallel corridor rather than with Pānkān's own, and it is worth drawing because it is far better documented. Canepa 2018, 359, describes the chain of palaces, paradise plantations and hunting enclosures that Khosrow II "built, enlarged, or embellished" along the route from Ctesiphon up the Diyālā valley and onto the plateau — Dastagerd, Qaṣr-e Shīrīn, Bīsotūn, Tāq-e Bostān — with smaller monuments marking the royal road between them; at 360, the strategic consequence: the Khorasan Road and the estates along it "became the pivot of the entire empire in the late Sasanian period, where kings either held the empire or lost it", the decisive engagements of Heraclius's invasion and the Arab conquest falling within it. Nothing of this order is attested for the Erbil–Pānkān corridor, and no claim is made here that Pānkān lay on the road to Ādur Gušnasp; the point is that the Sasanian state is known to have held Zagros route corridors by building along them, and that Pānkān is a small instance of a practice documented on a large scale one crossing to the south-east.
[97]Alibaigi 2019.
[98]Hansen 2012; Frankopan 2015.

Pānkān's evidentiary contribution should be read against this historiographical background. Positioned in the Zagros foothills, north-east of the Mesopotamian plain and squarely within the under-examined stretch of the network identified above, the site's numismatic and material record—spanning Byzantine, Sasanian, and early Islamic material recovered at a single frontier site with an excavated, radiocarbon-anchored sequence—offers just the kind of granular, western-network evidence that existing Silk Road scholarship has been shown to lack. Rather than treating 'the Silk Road' as an adequately studied background against which Pānkān's finds can simply be read off, the present dissertation treats the site as a small but concrete contribution to closing this specific historiographical gap.

1.3.5. Routes, Survey and the Regional Network of Northern Mesopotamia

The historiographical literature surveyed in the preceding section operates at a continental scale, and its debates concern where the centre of gravity of a trans-Eurasian network should be placed. A site such as Pānkān cannot be interpreted at that scale. What is required for it is the regional one: how the roads of northern Mesopotamia are actually reconstructed, on what evidence, and with what degree of confidence. That is a separate literature, and it has developed rapidly over the past two decades, largely because the Kurdistan Region of Iraq became accessible to fieldwork at a moment when the methods for landscape survey had themselves matured.

The central difficulty is that ancient roads in this landscape seldom survive as roads. Two approaches have emerged in response. The first seeks the physical trace of movement itself. Tony Wilkinson's identification of linear hollows in the Jazira — shallow, braided depressions worn by the passage of people and animals and visible from the air as soil and crop marks — established that the routes of the third and second millennia could be mapped directly across the rain-fed plains of Upper Mesopotamia[99], and the subsequent use of declassified CORONA satellite photography extended the method across areas since obscured by mechanised agriculture[100]. The technique is powerful but has a defined range: hollow ways form where traffic converges on a settlement across open, cultivable terrain, and they are correspondingly difficult to detect in broken foothill country, where movement is confined by

[99]Wilkinson 1993, 548–562, the study that established linear hollows as the physical trace of ancient movement in Upper Mesopotamia.
[100]Ur 2003, 102–115, demonstrating the value of declassified CORONA imagery for mapping such networks; for the wider application of the imagery to Near Eastern landscapes, Ur 2013, 28–36.

the ground itself and leaves no comparable signature[101]. This bears directly on Pānkān, which lies at the edge of the zone in which the method works.

The second approach reconstructs routes indirectly, from the distribution, hierarchy and chronology of the sites that lay along them, and it depends on systematic regional survey. Four projects now provide that coverage for the landscape surrounding Pānkān. The Erbil Plain Archaeological Survey has mapped the plain immediately to the south-west of the site across nine seasons, producing the settlement sequence against which any interpretation of the plain's road system must be set[102]. The MULINEM project has addressed the same plain for the medieval centuries specifically, reconstructing the urban hierarchy of Adiabene and the connections between its centres[103]. To the north-west, the Land of Nineveh Archaeological Project has surveyed the Navkur plain and the eastern Upper Tigris[104], and to the south-east the Shahrizor Survey Project has done the same for the plain beyond the Zagros front, where the fortified Sasanian site of Gird-i Kazhaw offers the closest excavated analogue to Pānkān in the region[105]. Together these projects have transformed what can be said about settlement in northern Iraq. They also leave a gap of a specific and, for the present study, awkward kind: each has concentrated on a plain, and the belt of foothills between the plains — the transitional ground on which Pānkān stands — remains the least systematically surveyed part of the landscape[106].

Alongside the survey evidence, a body of modelling work has developed that treats routes as objects of formal analysis. Least-cost path methods calculate the least demanding line of travel between two points across a digital terrain model, and network approaches then ask what role a given site plays within the resulting structure. Applied to road architecture, this has allowed caravanserais to be read as elements of a system rather than as individual monuments, and it has recently been applied within the Kurdistan Region itself[107]. The results of such

[101]Wilkinson 2003, esp. chapters 5 and 7, for the landscape framework within which such features are interpreted.
[102]Ur et al. 2021, 205–243, the synthesis of nine seasons of the Erbil Plain Archaeological Survey.
[103]Nováček and Melčák 2016; Nováček 2016, on the medieval urban landscape of Adiabene and the settlement hierarchy of the Erbil plain.
[104]Morandi Bonacossi and Iamoni 2015, 9–39, for the Land of Nineveh Archaeological Project in the eastern Upper Tigris and Navkur plains.
[105]Altaweel et al. 2012, 1–35, for the Shahrizor Survey Project; for the fortified Sasanian sites of the same plain, Tamm et al. 2018 and Tamm 2020.
[106]The point is one of survey coverage rather than of archaeological potential: the Erbil plain and the Shahrizor and Navkur plains have each been surveyed systematically, whereas the belt of foothills between them, in which Pānkān lies, has not.
[107]For caravanserais treated as nodes within a modelled network rather than as isolated monuments, Tavernari 2012, 712–722; for least-cost path modelling applied within the Kurdistan Region itself, Németh 2024, 428–430.

modelling require the same caution entered earlier in connection with the chokepoint model: a least-cost path is a statement about terrain, not about history, and the centrality a site acquires within a modelled network is not evidence that it possessed comparable importance in fact[108].

The most useful contribution of this regional literature to the present study, however, is not methodological but conceptual, and it takes the form of a caution. It is tempting to reason from position to function: a fortified site beside a pass on a contested imperial frontier looks as though it must have controlled traffic, and the inference is made easily. Fruzsina Alexandra Németh's recent study of the Rania Plain, some 90 km east of Pānkān, shows how the same reasoning can fail. The Rania Plain lies on the Ottoman–Safavid frontier, commands a natural passage between the Mesopotamian lowlands and the Iranian plateau, and formed part of the Soran Emirate; on the map it is a corridor. The evidence indicates that it functioned as very nearly the opposite[109]. The region is absent from Ottoman cartography until the end of the nineteenth century; of the twenty routes through Kurdish territory listed in the standard nineteenth-century route compilation only one crossed it, and that one was avoided in practice by travellers, by officials and by both empires' armies in favour of longer but safer lines through Erbil, Rawanduz and Sulaymaniyah[110]. The archaeological correlate is equally clear: the material from the plain's sites is overwhelmingly of local production, and the few objects of distant origin occur in quantities so small that their arrival through the plundering of travellers is at least as plausible as their arrival through trade[111].

This matters for the argument of the present dissertation in a specific way. It establishes that, in this landscape, the combination of frontier position, defensible terrain and a fortified site does not by itself demonstrate participation in long-distance exchange, and that a valley may be at once a boundary for outsiders and a network for those who live in it. The claim advanced in the chapters that follow — that Pānkān served as a station on a route of more than local significance — cannot therefore rest on the site's position, however suggestive that position is. It must rest on the material: on the quantity and character of the coinage, on the presence of two and subsequently three currency systems in the same deposits, on the lead sealings, and on the imported metalwork. Németh's Rania Plain accordingly functions in what

[108]Brughmans, Collar, and Coward 2016; the caution is the same one entered above in connection with the chokepoint model.
[109]Németh 2024, 440–441.
[110]Németh 2024, 436–438, on the itineraries collected by Wilson in 1895, of which only one — the Baghdad–Tabriz route — passed through the plain, and on its avoidance by European travellers and by Ottoman and Safavid armies alike.
[111]Németh 2024, 441, noting that objects of long-distance origin occur in very small numbers and may have reached the local population through the plundering of travellers or caravans rather than through trade.

follows as a control case rather than as a parallel, and the criteria she applies there are applied to Pānkān in Chapter 5.

1.3.6. Numismatics, Sealings and Small Finds: The Comparative Apparatus

The five bodies of literature surveyed so far concern the site as a place: its architecture, its landscape, its routes. A dissertation whose second volume is a catalogue of eighty-seven coins and several hundred other objects depends equally on a sixth, which is the reference apparatus by which such material is identified, dated, and compared. That apparatus is markedly uneven across the classes of objects recovered at Pānkān, and since the interpretive weight the following chapters place on each class is proportionate to the quality of the apparatus behind it, the unevenness is worth setting out.

Numismatics is the strongest case. Sasanian coinage has been a systematically ordered field since Robert Göbl's typology, which established the descriptive vocabulary — bust, crown, ribbons, border, mint signature, regnal year — in which such coins are still described[112], and it has since acquired a modern corpus in the volumes of the Sylloge Nummorum Sasanidarum, which supersede Göbl as a reference while retaining his method[113].[114] Alongside the typologies stands a substantial hoard literature, whose conventions of publication govern how the coin group from Grave 2019/1 is presented in the Appendix and interpreted in Chapter 5[115], and a body of work on what the mint signatures encode about Sasanian provincial administration[116]. For the Byzantine component, the position is comparably good: the Dumbarton Oaks catalogue provides the type numbers by which the *folles* and half-*folles* from the site are identified[117].

[112]Göbl 1971, the typology on which all subsequent Sasanian numismatic work rests; the coins from Pānkān are described in Appendix 9.2 according to its componential method.
[113]Schindel 2004, the volume of the Sylloge Nummorum Sasanidarum covering the reigns most relevant here; the series has progressively replaced Göbl as the reference corpus while retaining his descriptive apparatus.
[114] The convention is a recognised one. Göbl read the astral symbols that divide the outer field of the obverse into four segments as corresponding "perhaps" to the cardinal points and as "indicating the claim of the cosmic kingship to world domination", while calling the connection "definite, though again unclarified"; the passage is quoted and discussed by Gariboldi 2004, 31 n. 2, whose paper is the fullest treatment of the astral symbolism of this coinage. The descriptions in the Appendix record the positions of these symbols without pressing an interpretation on them.
[115]Tyler-Smith 2004, 308–312, an instance of the hoard-publication genre on which the interpretation of Grave 2019/1 in Chapter 5 depends; for the wider methodological distinction between hoards and site finds, Grierson 1970, 15–18.
[116]Gyselen 2009, for the administrative geography that the mint signatures encode.
[117]Bellinger 1966 and Grierson 1968, volumes 1 and 2 of the Dumbarton Oaks catalogue, which supply the type numbers used in Appendix 9.2.1.

The transitional coinages of the seventh century are a more recent and more contested field, and one directly relevant here, since a probable imitative issue is among the site's finds. The classification of the pseudo-Byzantine series struck in Syria after the conquest, and of the standing-caliph coinage of the Jazīra in particular, has been placed on a workable footing only in the last two decades[118]. For the later Islamic material, the working reference is a checklist rather than a corpus, which is adequate for the general attribution of a worn *fals* but not for more[119], and the publication of early Islamic silver hoards from Mesopotamian sites supplies the closest parallels for the dirhams from the grave[120]. The practical consequence for this dissertation is that the numismatic arguments advanced in Chapters 4 and 5 rest on identifications that can be checked against published type numbers and are correspondingly the most secure in the study.

The lead sealings are the opposite case, and the difficulty is worth stating plainly because twenty-one of them were recovered, and a good deal is made of them below. There is no corpus of Sasanian or early Islamic lead sealings comparable to the numismatic corpora. The only systematic treatment of the object class is Michael Still's unpublished thesis on Roman lead sealings, which supplies a typology of form and closure but no chronological or regional bridge to northern Mesopotamia[121]. The eastern material has been approached instead through the seals that impressed such sealings, and through the clay bullae from Sasanian administrative contexts[122]; for the early Islamic centuries, a body of work on seals from Egypt and Syria has begun to establish what such objects record[123], and on the Byzantine side, the seals of the commercial officials remain the best-studied evidence for the sealing of goods in transit[124]. A separate and much better documented literature exists for the medieval and post-medieval cloth seal, but it is chronologically remote from the Pānkān material and is used here only for the vocabulary of form[125]. The argument built on the sealings in Chapter 5 is therefore

[118]Pottier, Schulze, and Schulze 2008, 87–155, the standard classification of the pseudo-Byzantine series; for the Jazīran standing-caliph issues specifically, Schulze and Schulze 2010, 333–348.
[119] Album 2011, the working checklist for Islamic coinage; the Pānkān fulūs are for the most part too worn for attribution below the level of a general series. Its reviewer's characterisation is also this study's: the checklist cannot replace the scientific catalogues and does not aim to, but is useful as an entry into the literature (Schindel 1999b, 254, on the second edition). For the Arab-Sasanian coins in the purse the reference works are Walker 1941 and Gaube 1973, the latter most valuable for its treatment of the mint signatures though compromised by an unwieldy codification (Lowick 1974, 217–218); Gaube has not been consulted directly for this study.
[120]Bates 1978, a model publication of an early Islamic silver hoard from a Mesopotamian site.
[121]Still 1995, the only systematic corpus of the material and the point of departure for any discussion of lead sealings, although its evidence is Roman rather than Sasanian.
[122]Frye 1989, 545–546, for the Sasanian bullae; Ritter 2017 for the seals themselves and their social meaning.
[123]Sijpesteijn 2018, 99–147; Ramadan 2019, 273–286.
[124]Oikonomides 1986, 33–53, on the seals of the kommerkiarioi and their bearing on the movement of goods.
[125]Cherry 2019; Mordovin 2018, 21–27, on the later cloth-seal tradition, which supplies a working typology of form and closure but no chronological bridge to the material discussed here.

limited: it concerns their quantity relative to other object classes at the site, which is a fact about the assemblage, rather than their individual identification, which the available literature does not permit.

The small finds occupy an intermediate position, and the constraint on them is a general feature of the period rather than a local accident. Sasanian and early Islamic material culture has been published far less systematically than the coinage: excavated assemblages of non-ceramic small finds are few, and the fullest remains Donald Whitcomb's publication of Qasr-i Abu Nasr, now four decades old[126]. St John Simpson's work on Merv and on the circulation of minor objects across the Sasanian world has done most to establish what can be said from such material about exchange and everyday life[127], but there is no equivalent of a type series for the great majority of the object classes represented at Pānkān[128,129]. The catalogue in the second volume accordingly proceeds by direct comparison with individually published parallels rather than by reference to an established typology, and the Appendix states, for each object, where a parallel could and could not be found. This is a limitation of the field, not a shortcoming of the present catalogue, but it does mean that the finds sustain arguments of a different kind from the coins: they indicate the range of activity and connection at the site rather than fixing its chronology.

One further piece of literature deserves separate mention, because a revision within it has altered the reading of the material from around the enclosure. The chronology of the coarse wares of northern Mesopotamia and the Gulf has been substantially revised over the past two decades, and the so-called honeycomb ware — long taken as a diagnostically Sasanian type — is now dated to the eighth century and later[130]. Since honeycomb ware forms a considerable part of the surface collection from the settlement south of the gate, the revision converts a substantial body of what would once have been read as Sasanian evidence into evidence for early Islamic occupation, and it is one of the reasons the site's post-conquest phase is argued

[126]Whitcomb 1985, still the fullest published assemblage of Sasanian and early Islamic small finds from a single excavated site in Iran.
[127]Simpson 2014, 116–143; Simpson and Meek 2018.
[128]The asymmetry is easily stated: for the coinage of this period there are corpora, type numbers and a settled descriptive language, whereas for a bronze pin or an iron knife from a Sasanian context there is usually neither a corpus nor an agreed terminology, and comparison proceeds site by site.
[129] There is no corpus of Sasanian or early Islamic finger rings comparable to the numismatic corpora. The closest are Dalton 1912, the British Museum catalogue, which covers the Byzantine and early medieval material; Hasson 1987 for early Islamic jewellery; and Content 1987 for the Islamic rings and gems of the Zucker collection. For the Sasanian material the discussion proceeds through the seals rather than the rings that carried them: Ritter 2017, and the administrative material in Gyselen 2009.
[130]Kennet 2004, 80; Kennet 2007, 86–122, redating the so-called honeycomb ware to the eighth century and later; for the fine creamware of northern Mesopotamia, Nováček et al. 2016, 194–195.

here to have been more substantial than its Sasanian one[131]. The episode is a useful reminder that the comparative apparatus surveyed in this section is not a fixed background against which a site is read, but a moving one, and that conclusions drawn from it carry the date of the scholarship as well as the date of the object.

1.3.7. The Research Gap and the Questions Addressed

The literature surveyed in this chapter is characterised by a paradox that defines the task of the dissertation. The regional setting of Pānkān is now comparatively well described: the survey projects of the past two decades have established the settlement pattern of the surrounding plains, the research history of Sasanian fortification has produced a class of comparable installations that did not exist as a category fifteen years ago, and the methodological literature governing survey, prospection and recording is mature. The site itself, by contrast, is very nearly absent from that literature[132]. The available scholarship supplies the regional context and the methodological framework, but not the site-specific evidence that would allow either to be tested against a small frontier installation examined in detail.

Four more specific gaps follow from the review, and they shape what this dissertation attempts. First, the category to which Pānkān belongs — the small, non-monumental fortified enclosure of the Sasanian hinterland — is defined chiefly by a handful of sites; the comparative base is therefore thin enough that a further fully published example alters it. Second, the transitional belt of foothills between the surveyed plains of northern Iraq has not itself been systematically surveyed, so that the relationship between the fortified sites of the Zagros front and the settlement systems of the plains remains largely a matter of inference. Third, the historiography of long-distance exchange has, on the evidence of its own reviewers, concentrated on the eastern reaches of the network and treated the Iranian and Mesopotamian corridor as transit ground; detailed evidence from a single node within that corridor is what is lacking. Fourth, the archaeology of the Sasanian-to-Islamic transition in this region continues to depend heavily on ceramic and numismatic chronologies that have themselves shifted, and sites with stratified deposits spanning the conquest are correspondingly valuable.

Against these gaps, the dissertation addresses four questions. What was built at Pānkān, in what sequence, and to what standard — that is, whether a small provincial enclosure in the

[131]The consequence for Pānkān is direct: on the older attribution the surface material outside the enclosure would have read as Sasanian, and on the current one a substantial part of it is early Islamic. The revised chronology is followed here.

[132]Major 2022 and Takáts 2025 are the only dedicated studies of the site

Zagros foothills was constructed to a recognisable imperial pattern, and what its plan indicates about the tradition it belongs to. When was it built, and on what evidence, given that the foundation date rests on a single class of determination? What was it for, and did that change: whether the material record supports the transition from garrison to road station that the site's later phases have been taken to indicate, and by what criteria such a change can be demonstrated rather than assumed? And finally, what the site contributes to the wider questions with which this review began: to the definition of the Sasanian hinterland fort as a class, to the archaeology of the Sasanian–Islamic transition in northern Mesopotamia, and to the evidential record of the western stretch of the exchange network across which its coins and imported objects travelled.

These questions are addressed in the order in which the evidence was produced. Chapter 2 establishes the geographical, historical and religious setting; Chapter 3 sets out the methods and states their limits; Chapter 4 presents the architecture and stratigraphy of the complex; and Chapter 5 draws the material together into an interpretation of the site's function and significance. The catalogue on which Chapters 4 and 5 depend is presented in the second volume.

2. Landscape and Archaeological Setting

2.1.Geographic Setting

The archaeological site of Pānkān is situated in the foothills of the Zagros Mountains in northern Iraq, within the Kurdistan Region, at the extremity of the Erbil Plain, where the Mesopotamian lowlands meet the Kurdish highlands (Figures 1–2). Geologically, it lies on the Arabian Plate, which is bordered to the north by a convergent margin with the Eurasian Plate. This tectonic boundary has produced the fold-and-thrust belt of the Taurus and Zagros Mountains, the region's most extensive mountain chains, which stretch across Iraq, Iran, and southeastern Turkey.[133]

Pānkān occupies a strategic position in this transitional zone, adjacent to the northern edge of the Mesopotamian plains. The site is approximately 37 km north-northeast of Erbil's citadel, 90 km east-northeast of Mosul, 62 km east of the Mor Mattai Monastery, 105 km southeast of Khirbet Deir Situn (a significant late antique site in the region), and 121 km southeast of Bāzyān (one of the best-known Sasanian-era forts in Kurdistan), measured in

[133]AL-Ghamd and Pope 2020, 5.

straight-line distances. Its location affords it both defensive advantage and control over movement through the valleys and corridors that have historically connected[134] major urban centres of northern Mesopotamia, such as Erbil, Nisibis, and Edessa, with the Iranian plateau and eastern regional hubs like Rawanduz. See Figures 1–2.

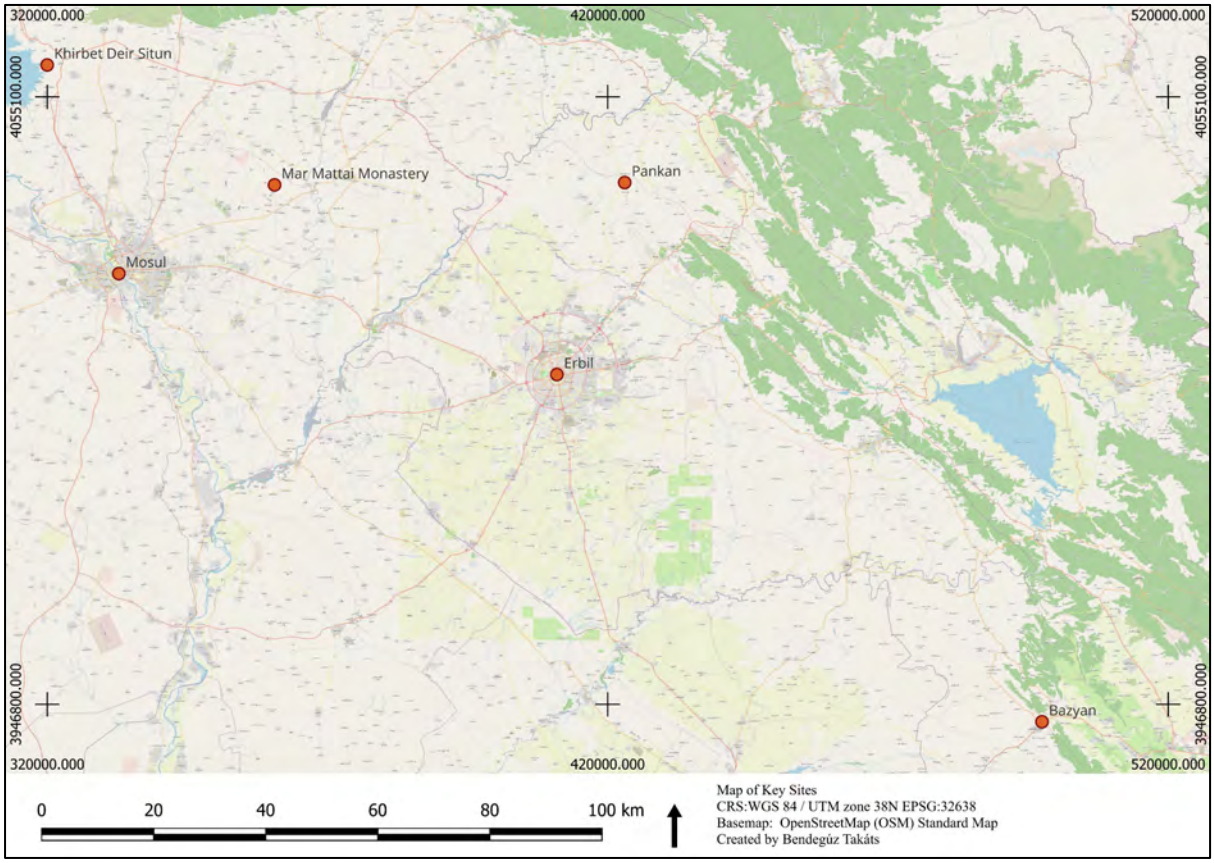

Figure 1. The Region of Pānkān with Key Sites

[134] The characterisation is not only modern. Spuler 2015, 288, writing of the Zagros and the ranges continuing north to the Aras, observes that while these "did not form an exact dividing line, they were so sparsely populated, and what population was there was nearly exclusively nomadic, that the mountain ridge was a true frontier between Iran and Mesopotamia". Pānkān lies on the Mesopotamian side of that ridge, at the point where the ground begins to rise.



Figure 2. The Landscape of Pānkān with the Kargh River Flowing by the site, and the Dwīn Range in the Background

The immediate surroundings of Pānkān are characterised by a rugged landscape of longitudinal valleys and mountain passes that have served as natural corridors since antiquity. These routes facilitated the movement of people, goods, and ideas, funnelling travel and trade between the Assyrian plains and the highlands[135]. Just 2.1 km northeast of Pānkān lies the castle of Dwīn, the initial leading site of interest for KHAM. Perched atop a rocky ridge on the Dwīn range, the castle overlooks a valley system nestled between the Dwīn and Pirmām mountain chains, with the terrain opening toward the Acre basin in the north. This elevated and commanding position exemplifies the historical exploitation of natural topography, where deep fissures, seasonal riverbeds, and narrow thoroughfares were continuously utilised for travel, trade, and defence. The region's sustained strategic and economic relevance, along with its well-known fertility, suggests it attracted human settlement from a very early period.[136] Given this strategic geography, Pānkān likely combined the functions of a military outpost with those

[135] The route system itself is not a modern reconstruction: Terribili and Tilia 2016, 420, place the Paikuli monument "on the main road linking Ctesiphon with the region of Media and far beyond with Khorasan", with a branch towards the Sharazur and Ādurābadagān, and conclude that such monuments "exploited the busiest roads of the kingdom as media for propaganda". The Bazyan valley to the south has been surveyed on exactly this premise — whether sites were positioned to command the few routes and passes through the hill ranges (Tomé, Cabral, and Renette 2016, 427) — with a caution that applies to Pānkān's own surroundings: dating "based on heavily eroded surface sherds alone" proved difficult (428).
[136] Kopanias and MacGinnis 2016.

of a station for monitoring movement, serving trade, and controlling toll collection in its immediate hinterland[137].

The Kargh River (locally known as Pīra Bakir) defines the site's hydrological setting. It flows northeast of Pānkān, carving its way through the Dwīn mountain ridges and effectively dividing the area into two distinct segments: the Baroj Tījī cliffs to the northwest and the Shakhi Razawān range to the southeast. Pānkān is perched on the northern spur of the Shakhi Razawān, overlooking the meandering Kargh River, which served as its primary water supply.[138] The river collects seasonal streams from the surrounding mountains before joining the Greater Zab River approximately 10 km to the northwest.

In the broader hydrological context, the region benefits from additional water sources, including the Tigris River, situated about 109 km to the west, and the Greater and Lesser Zab rivers near Lake Dukan, which lies approximately 10 km away; the Lesser Zab continues another 93 km southeastward. This water-rich environment, in conjunction with fertile valley floors, would have supported agriculture, seasonal grazing, and permanent settlement.

Finally, the region's climate—typical of Iraqi Kurdistan's foothills—features hot, dry summers and cool, wet winters. These seasonal patterns would have shaped both agricultural rhythms and river flow, further enhancing the importance of Pānkān's location. Its setting—at a mountain pass, near abundant water sources, and overlooking critical trade routes—gave the site military and economic significance in Late Antiquity.

2.2.Historical Background and the Methodological Problem

2.2.1. Historical and Topographical Context: From Pānkān to Dwīn

The strategic significance of the region surrounding the modern village of Pānkān and the castle of Dwīn lies in its command over major trans-regional communication lines. Historically, three primary commercial routes converged here, connecting the plain of Erbil to the south, Akre to the north-west, and Harir to the north-east. While the fortification of Dwīn dominates the area's medieval and early modern history, the archaeological evidence presented here points to an appreciably older horizon represented by Pānkān.

[137] Two independent measures can be brought to bear. Spacing: Spuler 2015, 424, records that the road system required inns with reservoirs "every 12–18 km = 2–3 parasangs", with road markers and, later, ribāṭs. Function: the excavators of Bāzyān state that on these passes "military forts were constructed on these routes, as were customs posts for the collection of dues on goods in transit" (Ali and Déroche 2016, 12) — made while listing the Assyrian references to the pass, so a statement about the class of installation rather than about a period. The combination of garrison and toll functions proposed here for Pānkān is therefore the expected one for a site of this kind in this landscape; what the excavation cannot yet supply is direct evidence for the second of the two.
[138]Major 2022, 561.

2.2.2. The Sasanian Foundation: Pānkān as a Logistical Hub

Located in the valley approximately 2.3 km west of Dwīn, the rectangular enclosure of Pānkān, some 70 m across, represents a previously undocumented Sasanian installation. Calibrated radiocarbon dating of 430–560 AD places its foundation in the late Sasanian period. The range is too wide to be attached to a particular reign or building programme, and it is not attached to one here; what can be said is that it spans the reigns of Bahram V and Khosrow I, and that its later part coincides with the renewal of warfare on the north-western frontier that followed the Byzantine foundation of Dara in 505[139].

In contrast to purely defensive installations, Pānkān appears to have functioned as a logistical hub with several overlapping roles. As Tamm et al. have argued for contemporary regional sites like Gird-i Kazhaw,[140] such enclosures may have formed part of a coordinated network concerned with securing water resources and movement along routes crossing the region.[141] The material recovered at Pānkān, in particular the cast-bronze camel-leg fragments, is consistent with its role as a commercial waystation. These finds, interpreted alongside the terracotta camel head from Kazhaw[142] and the zoomorphic support fittings from Nishapur[143], support the accommodation of caravan traffic in the Zagros foothills. Whether such traffic was also taxed here is a separate question, and nothing in the excavated evidence bears on it directly.

The architectural layout of Pānkān, with its centralised courtyard and robust perimeter walls with a defensive *glacis*, finds its closest structural parallel at Bāzyān[144]. Following Déroche's analysis[145], such heavily fortified enclosures in Northern Iraq often served a dual or triple function, blurring the lines between a military outpost, a commercial caravanserai, and a monastic foundation of the Church of the East. The extensive internal residential area at Pānkān indicates that a substantial part of the community, whether a garrison or a religious congregation, lived within the walls and carried out administrative and economic functions

[139]The determination is discussed in Chapter 3.6. On the strategic situation created by the Byzantine foundation of Dara in 505, Maksymiuk 2015, 22–23.
[140] Tamm et al. 2018, 135–138.
[141] The claim, in Tamm's own words and with his own hedging: "we are now in the position to observe something like a network, created to control movement of peoples and commodities along some of the trade routes", Merquly, Sitak and Bazyan possibly parts of it (Tamm 2020, 429); of Kazhaw itself, "especially in connection with the nearby spring of Bestansur we might even assume some kind of caravanserai or customs station" (427). The parallel with the reading offered here for Pānkān — a fortified point at a spring on a route, serving both shelter and control — is close, and the evidential basis in both cases is the same: position, plan and a small quantity of material, not a document.
[142] Tamm et al. 2018, 138, with Abb. 41 at 139 (find B-248).
[143]Allan 1982.
[144]Déroche 2014; Ali and Déroche 2016; Amin et al. 2023.
[145]Déroche 2014, 39–40.

from there. An unwalled settlement was subsequently documented outside the southern gate, and the two are better understood as complementary than as alternatives[146].

2.2.3. Continuity and the Medieval Transition to Dwīn

Numismatic evidence and field survey indicate that Pānkān remained in use, at least intermittently, until the early thirteenth century, suggesting considerable continuity in the late antique route infrastructure through the early Islamic period. However, the valley station's subsequent abandonment coincided with a fundamental shift in regional defensive strategy and settlement patterns. The emergence of the newly built castle of Dwīn on a strategically superior hilltop reflects a more rigid militarisation of the landscape. Unlike Pānkān, Dwīn's architecture is strictly defensive and could not have accommodated a large resident population. This transition from the valley enclosure to the hilltop fortress was accompanied by a significant social change: the appearance of external, unfortified villages in the castle's immediate vicinity. This shift suggests that the protective and administrative functions previously centralised within Pānkān's walls were now divided between a military castle and a surrounding rural population.

2.2.4. The Later History of Dwīn and Local Tradition

Historical accounts of Dwīn remain scarce until the late 18th century.[147] The present structure is generally attributed to the Soran Emirate, specifically to the 16th-century ruler Ali Bek ibn Sulayman Bek[148], under whose reign Dwīn briefly served as the emirate's capital before the seat of power was transferred to Harir. The site later fell under the Babani Emirate, then was reclaimed by Oghuz Bek ibn Ali Bek before 1800. While some sources credit the Sorani ruler Mir Muhammad with the fortification of Dwīn in 1823 (along with the nearby Diri and Banman), fieldwork at the site produced archaeological evidence that it had been fortified well before the nineteenth century. Finally, the widespread local tradition associating Dwīn with the family of Salah ad-Din (the Ayyubid dynasty) must be treated with caution. While Yāqūt's medieval geographic chronicle confirms that the Ayyubids originated from a site named Dwīn (Dvin), he explicitly locates that site in Azerbaijan, corresponding to present-day Armenia. Nevertheless, the persistent local identification of the Kurdish Dwīn with this heritage marks the site's symbolic importance in the regional consciousness, further justifying

[146]The settlement outside the southern gate is described in Chapter 4.7. Its ceramic profile is predominantly early Islamic, so that the relationship between the interior of the enclosure and the ground outside it during the Sasanian phase proper is not yet established.
[147]Muhammad 2007, 56–57.
[148]Muhammad 2007, 57–58.

the current archaeological efforts to establish its historical sequence through rigorous fieldwork.

The historical sequence of Dwīn highlights a broader methodological challenge inherent in researching this region: the severe scarcity of published, accessible data needed to reconstruct a comprehensive historical landscape. This problem is particularly pronounced when examining the post-medieval and Ottoman periods, where the regional defensive and settlement networks remain poorly documented. To bridge this massive gap in primary sources, research must rely on a combination of fragmented external accounts and alternative archaeological methodologies. In this source-deficient environment, the accounts of external travellers carry particular weight. The most notable of these is the *Seyahatname* (Book of Travels) by the 17th-century Ottoman explorer Evliya Çelebi. Although his descriptions must be subjected to rigorous historical criticism, Evliya's observations provide one of the few available windows into the political and spatial realities of 16th and 17th-century Kurdistan.

In the seventeenth-century Ottoman context, Evliya Çelebi conceptualised 'Kurdistan' primarily as an ethno-geographic category rather than a strictly delimited administrative province, thereby encompassing territories defined by Kurdish identity regardless of fluctuating political boundaries.[149] He described this vast territory as a rugged expanse stretching from Erzurum in the north to Basra in the south. Geographically, it spanned from Harir and Ardalan on the Persian frontier in the east to the regions of Damascus and Aleppo in the west. Evliya Çelebi also saw the strategic significance of Kurdistan as a protective buffer for the Ottoman Empire, observing that the thousands of Kurdish tribes and clans residing in these mountainous regions constituted a 'firm barrier' that prevented Safavid Persian invasions into Asia Minor.

However, while these records offer glimpses into the Ottoman-era administration, they remain inherently fragmented. A similarly piecemeal picture emerges from sporadic local studies of the Soran Emirate that attempt to reconstruct the Ottoman-era landscape from highly localised, limited data.

To overcome this lack of historical texts for the Sasanian–Byzantine–early Islamic centuries themselves, the present study adopts a comparative, two-endpoint methodological strategy. Rather than attempting to reconstruct the political geography of sixth- to ninth-century Pānkān directly—for which, as shown above, the primary sources are essentially silent—it brackets this poorly documented middle period between two considerably better-documented

[149]Bruinessen 2000, 5.

moments in the same landscape's longer history, and uses each as a structural analogy for how regional power has been organised around strategic terrain in the northern Zagros.

The first, earlier endpoint comes from the Urartian kingdom's confrontation with the Neo-Assyrian Empire in the ninth to seventh centuries BC. In her recent monograph Landscapes of Warfare, Tiffany Earley-Spadoni argues that Urartu, though vastly smaller than Assyria in population and resources, proved an exceptionally difficult adversary because its power was not concentrated in a single capital but distributed across a dense, GIS-modelled network of mountain fortresses and fire-beacon stations, allowing the kingdom to coordinate defence and administration across a rugged, route- and resource-constrained landscape[150]. This 'fortified regional network' model—in which control of a limited number of strategically placed nodes translates into influence over a territory disproportionate to the controlling polity's raw size—offers a suggestive analogy for interpreting small Sasanian-period strongholds such as Pānkān, sited directly at a convergence of routes rather than at a demographic or agricultural centre[151].

This analogy, however, should not be adopted uncritically. The equation of node-control with territorial control has itself been questioned within landscape archaeology: Monica Smith has argued that ancient states are better modelled as 'spiky' networks of nodes and connectors than as continuous territorial blocs, because control of a point does not automatically extend to the space between points[152]; and, in a study concerned specifically with the Neo-Assyrian side of the very imperial confrontation invoked by Earley-Spadoni, Bradley Parker has shown that large parts of the Assyrian provincial system were separated from the imperial core by intervening territory that was never brought under direct administration, so that fortified nodes projected influence without implying continuous control of the ground between them[153]. More broadly, the methodological literature on network approaches in archaeology has cautioned against treating a node's calculated centrality within a reconstructed network as a direct proxy for its historical importance or power[154]. The chokepoint-control model is therefore used here not as an established law but as a heuristic, congenial to the older observation in economic archaeology that strategically sited 'gateway communities' at natural route junctures can acquire an importance out of proportion to their size[155]—a heuristic whose

[150]Earley-Spadoni 2025.
[151]Earley-Spadoni 2025; cf. Earley-Spadoni 2015 on the intervisibility analysis underlying this model.
[152]Smith 2005, 832, 841.
[153]Parker 2013, esp. 126, 138–140.
[154]Brughmans, Collar, and Coward 2016.
[155]Hirth 1978, 37.

applicability to Pānkān's own, far less understood middle period must be argued for on the site's own architectural and material evidence in the chapters that follow, rather than assumed by analogy alone.

The second, later endpoint is the political geography of the same border region under the late Ottoman Empire, for which independent documentary evidence survives in far greater quantity than for the Sasanian-to-early Islamic centuries. As outlined above, this landscape came under the control of Kurdish hereditary emirates—Soran foremost among them in the immediate vicinity of Dwīn—granted extensive fiscal and administrative autonomy by the Ottoman centre in exchange for defending and policing the frontier with Safavid, and later Qajar, Iran[156]. Recent historical scholarship has emphasised that such emirates derived their disproportionate regional importance specifically from their control of the principal mountain passages and buffer zones between the two empires, exploiting this position—together with cross-border kinship networks used for intelligence and negotiation—to play Ottoman and Safavid/Qajar authority against one another and to renegotiate the terms of their own clientship[157]. Sabri Ateş's study of the Ottoman-Iranian frontier likewise treats the wider Zagros as a structured 'buffer' landscape whose political organisation was determined by the strategic passages running through it rather than by continuous territorial administration from either imperial centre[158]. Dwīn's own fortunes across the sixteenth to nineteenth centuries—from Soran capital, to Baban possession, to its refortification by Mir Muhammad in 1823—can be read as a series of contests for this kind of route-controlling position, within the same physical landscape whose Sasanian-period antecedent this dissertation investigates[159].

One qualification of this second analogy deserves separate statement, because it changes the direction of the comparison. The account given above presents the Kurdish emirates as pre-existing local powers whose control of mountain passages the Ottoman centre was obliged to accommodate. Özoğlu has argued that the relationship was substantially the reverse[160]. On his reading the Ottoman state was not merely responding to an established tribal order but was itself the principal agent in the formation of the emirates as durable political units: by recognising and consistently supporting hereditary succession within particular families it froze a competition for local authority that had previously been open; by administering the region through the *timar* and *sancak* framework it deepened the internal

[156]Atmaca 2021, 45–49; Bruinessen 1992.
[157]Atmaca 2021, 45–72.
[158]Ateş 2013, 31–138.
[159]Ghalib 2011.
[160]Özoğlu 1996, 5–27, the argument being summarised at 27.

stratification of the resulting polities and gave them defined administrative boundaries; and the emirates that emerged from this process were, in their internal organisation, something like the imperial structure in miniature[161]. The local intermediary power the empire dealt with on its frontier was thus, in part, a product of imperial administration rather than an obstacle it encountered.

The implication for interpreting a site such as Pānkān is worth drawing out, if only as a caution. It is natural to read an imperial fort at a route junction as an instrument applied to a landscape whose social organisation is treated as given. The Ottoman case suggests that a permanent installation of this kind is more likely to be one term in a reciprocal relationship: a fixed point that local authority forms around, competes for, and is in part defined by.[162] Nothing in the excavated evidence from Pānkān can demonstrate that such a process occurred there, and no claim to that effect is made here. What the observation does is to specify what the analogy is an analogy for. It is not that the Sasanian state confronted a settled tribal order in these foothills and built to contain it, but that the presence of an imperial garrison at a crossing is itself a fact in the local political landscape[163], and one whose consequences are not visible in the archaeology of the fort alone.

Although the Urartian–Assyrian and the late Ottoman endpoints differ in almost every historical particular—language, religion, imperial structure, technology, and the nearly two-and-a-half millennia separating them—they share a structural feature directly relevant to interpreting Pānkān: in both cases, a comparatively small, mountainous polity or set of polities derived political and economic significance disproportionate to its demographic or agricultural resources from its control of a limited number of route-defining chokepoints within the same rugged Zagros terrain, rather than from continuous territorial dominance. Bracketing the poorly documented Sasanian-to-early Islamic centuries between these two better-attested moments does not license the assumption that Pānkān's own occupants exercised comparable political authority; it does, however, provide an independently motivated, comparative expectation—that small fortified installations at route junctures in this landscape tend to matter more than

[161]Özoğlu 1996, 23–25, on the Ottoman recognition of hereditary succession, the effect of the timar and sancak framework on the internal stratification of the emirates, and the consequent definition of their administrative boundaries; cf. Bruinessen 1992 for the underlying social analysis.

[162] The administrative geography of the analogy is the same landscape: the emirates were concentrated in northern Iraq and in Shahrizor, "the latter being the administrative center of the region"; Baghdad held the right of appointment but "had to select from one of a certain number of dynasties"; and the relationship ran on mutual advantage, the emirates "exempted from certain taxes and acting almost independently", their alternating loyalty between the Ottoman and Persian sides the centre's chief concern (Ceylan 2011, 48).

[163] Habibi 2024, 214, who notes that the literary sources place nomad forces, kurd, within the Sasanian armies, and that Middle Persian texts attest to the regulation of seasonal migration in Sasanian law.

their size alone would suggest—against which the site's excavated evidence is tested in the chapters that follow.

The results of these alternative research strategies point to a clear objective for future work. Rather than examining these sites in isolation, future work requires a systemic approach. Once the primary processing of the current excavations is complete, a necessary mid-term goal for regional scholarship is to develop a comprehensive "network archaeology" model that maps the spatial relationships and logistical connections between these strongholds and valleys.

Within this poorly documented but strategically important frontier landscape lies Khān Jinn (also known as Qal'at al-Jinn). Initially, the site was recognised merely as an Ottoman waystation or caravanserai. The results of the present investigations require revising the chronology. The former waystation, situated in a valley 2.3 km west of Dwīn castle and adjacent to the modern village of Pānkān, played a substantial commercial role in the area. Calibrated radiocarbon results from the excavations date the structure to 430–560 AD, identifying a previously unrecorded Sasanian waystation.

The field survey and the identified coinage indicate that the site remained in use until at least the early thirteenth century, which suggests that the route through the region retained its importance over a long period. Following the eventual abandonment of the waystation, the responsibility for defending this main artery appears to have shifted to the newly built castle of Dwīn. This shift in the defensive centre from the valley floor to the strategically dominant castle hill catalysed a change in local settlement patterns, leading to the emergence of new villages. No remains of a contemporary town were identified at the rectangular 70 × 70 m waystation itself; a substantial residential area within the enclosure appears instead to have met its immediate needs. Although an important commercial hub would typically attract auxiliary settlements, no traces of such habitation have been found in its immediate vicinity. Conversely, the later castle of Dwīn had a strictly militarised architecture that could not accommodate a large residential area within its walls, thereby leading to the emergence of several smaller settlements in its shadow.

2.3.Small Fortifications on the Sasanian Frontiers: Parallels from the Hinterlands

From the beginning of their empire, the Sasanians were in an inherited conflict with the Roman Empire for control of the ancient Near East.[164] After the split in the Roman Empire, the struggle continued, and competition between the Byzantine and Sasanian Empires drove major

[164]Daryaee 2009; Sauer 2017; Farahani 2020.

developments in military infrastructure, culminating in a massive, empire-wide preventive "military buildup" during the 6th century.[165] One primary manifestation was the fortification of frontier zones and strategic hinterlands.[166] The study of Sasanian military sites in frontier zones is limited compared with that of their Roman and Byzantine counterparts. This is further narrowed by the limited availability of research on small Sasanian enclosures, especially fortified structures occupying an area of 1 ha or less[167]. Thus, the building complex at the village of Pānkān stands out for its Sasanian origins, providing an essential addition to the archaeology of the late Sasanian period in Northern Iraq, and demonstrating that the defence of the Zagros foothills was integrated into a much wider imperial strategy.

Among the vast range of defensive structure types, sizes, shapes, and functions, this chapter focuses on forts with similar characteristics within the Sasanian Empire, such as the fort of Pānkān. Recent fieldwork has brought to light a recurrent configuration rather than a standard size: a compact square enclosure of mortared rubble, with projecting corner towers and a single narrow entrance flanked by towers.[168] Installations of this general form are now

[165]Kennet 2005, 107–108.

[166] Blachford 2024, 6, who describes the zone between the two empires as a "semi-fortified buffer zone stretching from the Caucasus in the north to the deserts of Arabia in the south", and observes that the near-absence of natural barriers in Mesopotamia made that buffer "an organic outcome from the lack of any clear boundary between imperial claims to rule".

[167] Sauer, Nokandeh, and Rekavandi 2022, 4, on the late Sasanian defensive project as one that "dwarfs all earlier Near Eastern defensive installations"; cf. ibid., 3–5.

[168] Sauer, Nokandeh, and Rekavandi 2022, 751, on the square fort with projecting rounded to U-shaped corner towers: close parallels such as Fulayj make it "tempting to assign them to the Sasanian Empire", but similar architecture occurs earlier in the Merv Oasis, Chorasmia and Bactria and later in the Islamic world, "so that there can be no certainty" without evidence for construction date and occupants; the design was "remarkably long-lived and built across an astonishingly wide geographic area". The plan therefore places Pānkān in a family; the chronology argued here rests on the stratigraphy, the radiocarbon determination and the coins.

attested across the empire, on trade routes and frontiers alike, from the al-Bāṭina plain in Oman (Fulayj)[169,170] to the Persian Gulf (Sirāf)[171].[172,173]

The placement of such outposts suggests a sophisticated ‘defence-in-depth’ strategy, designed not merely as a rigid barrier but as a permeable frontier zone that could monitor and delay hostile movements before they reached the imperial heartland.[174,175] This reflects a broader Sasanian military doctrine that prioritised frontier depth over isolated monumental fortifications.[176,177]

[169]Priestman et al. 2023.

[170] None of the excavators cited here uses the term “module”, although Priestman comes close, observing that the Sīrāf building “has walls that are almost exactly double the length of those at Fulayj, perhaps signifying the use of standard units within the construction template” (Priestman 2024, 36). The dimensions vary widely — Fulayj almost exactly 30 × 30 m (Priestman et al. 2023, 293; al-Jahwari et al. 2018, 728), the inner enclosure at Sīrāf about 62 m square (Priestman 2024, 17), Pānkān some 70 m — and what recurs is a configuration rather than a measurement: a compact square enclosure of mortared rubble, projecting corner towers, a single narrow flanked entrance. Priestman is explicit that this configuration is not by itself a dating criterion (2024, 37); the chronology argued here rests on the stratigraphy, the radiocarbon determination and the coins.

[171]Priestman 2024.

[172] The same configuration was described as a type for Iraq half a century ago: Finster and Schmidt 1976, 14, list three-quarter-round corner towers, half-round interval towers and a symmetrically placed gate structure as what places a building “in die Reihe der Kastelle”, while being equally clear that the type does not determine function — Qaṣr Ḥubbāz belongs to the same class of towered square buildings and yet, on their reading, served neither as a khān nor as a fortification (ibid.). The point made in the preceding note about the Sīrāf group holds for the Iraqi group as well.

[173] The closest published Iraqi parallel in scale and construction is Building A at Quṣair, some 60 km south-west of Nāṣirīya: 42 by 46 m, rubble masonry throughout, round towers at the corners, a half-round tower at the middle of each flank, a single entrance, and a strictly symmetrical interior of six near-equal rooms opening in the manner of īwāns onto a large court (Finster and Schmidt 1976, 49–50). The excavators assign it to the Sasanian period on the masonry alone, declining to press the unexcavated plan further, and place the adjacent Building B, of brick and comparable to ʿAṭšān, in the Umayyad period, provisionally as a travel station (ibid., 54). Two enclosures of successive date and differing function on one site is the sequence at issue here, and it was published in 1976.

[174] Blachford 2024, 24, who argues that frontier forts “were often there only to observe an enemy’s approach, or to act as an assembly point for campaigns, not as a hard line of defence”, and that the distribution of the Mesopotamian forts reflects the logistical limits of imperial power rather than a linear scheme of territorial defence; on the projection of modern territoriality onto ancient frontiers see ibid., 21–25.

[175] For the diplomatic record of a fort built to hold a pass, and of the argument over who should pay for it, see Dignas and Winter 2007, 191–193: John Lydus reports an agreement that the two states should “share the costs and establish a fortress at the described entrance and set up a garrison in these places in order to stop the barbarians from pouring through”, and that in the event the Persians built and manned it alone; Priscus preserves the Sasanian embassy to Leo I complaining that they “would no longer bear the costs and protection of the place by themselves”.

[176] Wiesehöfer 2010, 112: “the outer line, the Euphrates fronted by forts”, was backed by the Tigris and its canals “and, behind the Tigris, by the Zagros”. The Zagros is thus the innermost of three lines rather than a frontier in the ordinary sense — the sense in which Pānkān’s position is understood here. On the same page, against the weight often placed on the battle of Nineveh, he holds that the army defeated there “was a relatively small, scratch force sent north to bar the route to Ctesiphon”.

[177] The formulation follows Lawrence and Wilkinson 2017, 118: the linear barriers conform to Breeze’s “frontier in depth”, creating arenas “for trapping, engaging and defeating enemy forces” (quoting Breeze 2011), and — the observation bearing most directly on Pānkān — no similar features exist in north Syria, where the Sasanians faced an enemy of comparable strength and organisation, so a landscape without a linear barrier is not evidence of a landscape without a frontier policy. For the southern frontier, Morley 2017, 276, reads Shapur’s Ditch with allied Arab forces beyond it as “a form of defence in depth”.

The Great Wall of Gorgan is among the most significant military fortification projects within the Sasanian Empire. It is the longest fort-lined barrier known from antiquity, and the excavators set it in a wider imperial context: the largest military fortresses of the ancient world are also Sasanian, though they lie elsewhere — Qalʿeh Iraj at 175 ha, and a probable campaign base of some 210 ha identified on satellite imagery at Ghobal on the western frontier.[178] However, as Alizadeh demonstrated through the example of Ultan Qalasi in the Mughan Steppe[179], Sasanian border defence was never limited to isolated walls; it relied on a deep network of fortified settlements, outposts, and agricultural canals. This frontier area of the former Sasanian Empire is relatively well explored compared to the Sasanian rectangular enclosures of Northern Iraq. My research aims to provide new data to this hitherto neglected hinterland.[180]

This pattern of state-directed infrastructural investment in the frontier zones is not isolated to the Gorgan Plain. Recent investigations at Ultan Qalası in the Mughan Steppe indicate that in the middle of the fifth century — plausibly under Yazdegerd II — the Sasanian state undertook a colonisation of the steppe in which fortified settlements and an extensive irrigation network were laid out together, within a short enough span to bear the marks of a single state-sponsored project.[181]

Unlike most known geometric enclosures in the Gorgan Plain, numerous examples occupying 1 ha or less can be found north of the Gorgan Wall and River, which may have been connected to contemporary route systems, at least into the Islamic period.[182]

The Gorgan Plain has numerous small- and medium-sized forts that could have been essential elements of the Sasanian defence network along its northern frontier zone before and

[178] Sauer, Nokandeh, and Rekavandi 2022, 4.
[179]Alizadeh 2011.
[180] Payne 2015, 161 and 138, states the evidential position and thereby the warrant for the present study: an understanding of the settlements of Bēt Garmai "will, however, require an archaeological basis" (161), and the region's archaeology, "at least in the Sasanian period, remains understudied", East Syrian hagiography being the only literary evidence for aristocratic exploitation of land and labour (138); the Sasanian stucco from Qara Tepe outside Kirkuk "shows that at least some aristocrats in the region erected palatial abodes on their lands" (ibid.).
[181] Alizadeh 2011, 74–75. His own formulation is careful: the establishment of Ultan Qalasi "appears to have taken place within a short period of time and thus bears the hallmarks of a state-sponsored project" (74), and while many have attributed it to Khosrow I, he argues from the stratigraphy and the radiocarbon determinations that the reign of Yazdigerd II (438–57) supplied the conditions for it. Ultan Qalasi is on a wholly different scale from Pānkān — its north-eastern side alone measures some 720 m (ibid., 59) — and the comparison drawn here is one of policy, not of size.
[182] Sauer, Nokandeh, and Rekavandi 2022, 18, where the observation is carefully hedged: several examples in this size category lie north of the Gorgān River and Wall and "may have been associated with route systems in use from at least the Islamic period. However, without further evidence it is difficult to speculate on the dating of these features."

after the construction of the Gorgan Wall.[183] The Gorgan Wall Survey (2005-2009) developed a morphological typology of common site forms in the Gorgan Plain, which attributes geometric fortified enclosures to Sasanian-period occupation.[184]

Based on current evidence, only a small number of rectangular sites of this kind can be reliably dated to the Sasanian period. The 2014-2016 field survey within the Gorgan Wall Survey identified sites datable to the late Sasanian occupation and classified the geometric fortified enclosures by area into three categories: over 6 ha, 2-6 ha, and 1 ha or less.[185]

The Gorgan Wall Survey documentation (2014-2016) covered 35 sites and included site visits, field walks, and surface collections from geometric enclosures identified on CORONA satellite imagery.[186] They have identified additional large geometric enclosures, most plausibly interpreted as elements of Sasanian imperial military infrastructure.[187]

The best examples are Buraq Tappeh (GWS-2, c. 0,5ha, a small fort), Tureng Tappeh (a prominent Qal'eh-like mound with occupation dating back thousands of years), and possibly Qal'eh Qabrestan (GWS-56, also interpreted as a possible Sasanian fort based on its morphology [fig 2.9]).[188] Buraq Tappeh is the closest of these to Pānkān in size, at about half a hectare. Its excavators describe it as a strategic guard-post, perhaps watching a crossing of the old Gorgān River, and they enter a caution that applies to the whole group: site morphologies of this kind are just as often associated with other periods.[189]

The field surveys could not have been carried out on the most relevant group of geometric enclosures of 1 ha or less. Their identification was based on archive CORONA

[183] Sauer, Nokandeh, and Rekavandi 2022, 249–250. The point should be stated as they state it: the Gorgān Plain holds the densest known concentration of medium to large forts in the late antique world but "only a few known small forts". They also decline to classify by area — there is, they write, "no obvious logic to sub-classifying our forts into those falling above and below some arbitrary acreage" — and note that such forts "sometimes formed networks, notably in interior territories, such as Fars or the area of modern Iraqi Kurdistan" (249).
[184]Sauer, Nokandeh, and Rekavandi 2022, 11.
[185] Sauer, Nokandeh, and Rekavandi 2022, 14, for the three size categories — over 6 ha, between 2 and 6 ha, and 1 ha or less — and ibid., 24 fig. 2.19, whose caption reads "early or late Sasanian occupation".
[186]Sauer, Nokandeh, and Rekavandi 2022, 11, Fig. 2.1.
[187]Sauer, Nokandeh, and Rekavandi 2022, 22.
[188] Sauer, Nokandeh, and Rekavandi 2022, 18, for the three sites and their sizes, and for the caution that follows them: "these site morphologies are just as often associated with other chronological periods"; ibid., 253, for Buraq Tappeh as "a strategic guard-post" perhaps guarding a river crossing. The same authors warn at ibid., 246 that caravanserais "needed to be defensible and it is unsurprising that they are often indistinguishable from military forts", which is a reason for caution rather than a licence to read one function into the other.
[189] Nokandeh et al. 2006 and Sauer, Nokandeh, and Rekavandi 2022, 253, for Buraq Tappeh as a strategic guard-post. For the general caution about identifying forts from morphology alone, Lawrence and Wilkinson 2017, 103: without ground-truthing "it is almost impossible to assign settlements and features definitively to specific periods".

satellite imagery; thus, morphology was the primary comparative dating method, and surface collection could not be used to refine their chronologies.[190]:

A. database ID KH_51
B. database ID KH_63
C. database ID KH_74
D. database ID KIA_13
E. database ID KIA_7
F. database ID KH_11
G. database ID KH_93
H. database ID KIA_28
I. Fort 14A, north of Fort 14

Fort 2 is an example of the smallest and most common fort type on the lowland section of the Great Wall. It had only two barracks.[191] Its proximity to the Sari Su River valley and its role as an overlooking control base make it a close example of Pānkān, sharing similar characteristics.

The strategic role of Pānkān is closely mirrored by contemporary sites in the Sharizor plain, most notably Hill B (Hügel B) at Gird-i Kazhaw. In the immediate geographical context of Northern Iraq, the fortlet on Hill B at Gird-i Kazhaw provides a highly pertinent structural analogue to Pānkān.[192] Magnetometry there recorded a fortification wall of 55–60 m diameter at the foot of the mound, a ring-shaped zone of some 100–110 m diameter beyond it containing rectangular structures of about 5 by 10 m, and a ditch about 10 m wide enclosing the whole, which held water at least seasonally; the prospected summit plateau measures about 20 by 25 m.[193] Like Pānkān, the installation stands on a height above a movement corridor and beside a

[190] Sauer, Nokandeh, and Rekavandi 2022, 18, where the position is stated more strongly than a methodological preference: none of the enclosures of about 1 ha or less could be visited in 2014–2016, and there is therefore "no associated dating information" for them; the plans are at ibid., 19 fig. 2.8.
[191]Sauer, Nokandeh, and Rekavandi 2022, 76.
[192]Tamm et al. 2018, 134–138.
[193] The figures are from the magnetometer survey in Tamm et al. 2018, 95: a fortification wall of 55–60 m diameter at the foot of the hill; around it a ring-shaped area of c. 100–110 m diameter with rectangular structures of c. 5 × 10 m in its northern part; the whole zone enclosed by a ditch c. 10 m wide, at least temporarily water-filled; a prospected plateau of c. 20 × 25 m. The building programme at Gird-i Kazhaw is dated by a coin from the upper layers of the fortress wall to Kavadh I (488–496 and 498–531 AD) or the early 6th century (Tamm 2020, 426). Its mudbrick fortification wall, still standing c. 4 m high and 3–4 m wide (ibid., 427; excavated width c. 3.2 m, Tamm et al. 2018, 107, 111), is three times the thickness of the Pānkān curtain; what is called a glacis there is a slope of rubbish layers at about fifty degrees rather than a built revetment, and the one excavated room "might have been a quarter for the local garrison, giving shelter for maybe five soldiers" (Tamm 2020, 427–428). Early Islamic material at Kazhaw is almost absent — five glazed sherds and a single piece of

water source. Its interior, however, is known from two partially exposed rooms behind the curtain only, one of which may be an open area rather than a room, so its plan cannot yet be set beside Pānkān's.[194]

The context of Pānkān is clearer when viewed within a broader regional network of Sasanian fortifications. As Tamm et al. outline, contemporary sites in the Shahrizor plain and its environs—Gird-i Kazhaw, Merquly, and Sitak—may be read as a regional network concerned less with defence against an external enemy than with overseeing and profiting from the traffic passing through; the Kazhaw fort itself they connect with the building programmes initiated under Kavād I (488–531).[195] These relatively small installations, occupying about one hectare or a little more, were not designed to house massive armies; extrapolating downward from the Gorgān Wall project's calculations, the excavators suggest that such a fort might have held no more than fifty men.[196] That networks of this kind are so poorly known is part of their argument rather than incidental to it: work on Sasanian military structures has concentrated on the far larger installations of the frontier zones, while regional defensive arrangements in areas less exposed to an external enemy remain almost unstudied.[197]

Beyond pure military defence, these Sasanian outposts also aimed to secure and tax long-distance trade. Positioned along transit routes connecting the Iranian plateau with the Mesopotamian plains, forts like Gird-i Kazhaw were established near reliable water sources to

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honeycomb ware (ibid., 426) — whereas the Abbasid component at Pānkān is substantial: the two sites are comparable in class and foundation date but not in their later histories.

[194] Tamm et al. 2018, 107 and 113–114: only two rooms behind the curtain have so far been reached, separated by a wall c. 0.8 m wide standing almost 2 m high; the western, its clay floor falling steeply, may be an open area, while the eastern — level clay floor, a stone installation with glass vessels including one nearly complete, a large hearth — is read, by analogy with other Sasanian fortifications, as possibly a quarter used for sleeping and preparing food alike. No courtyard plan has been recovered.

[195] Tamm et al. 2018, 134–136: the fort on Hill B is attributed to the building programmes initiated by Kavād I on the evidence of a coin of that reign from the upper courses of the wall and the late Sasanian stamped pottery (134); the proposed network — its stated purpose the securing of trade routes and the skimming of revenue rather than defence — is acknowledged to have massive gaps at present (135), and Merquly may already be a Parthian foundation, its late Sasanian levels a reduced reoccupation (135 n. 55). Only the Kazhaw fort is dated by excavation; the mountain site has since received a dedicated publication as the joint fortress of Rabana-Merquly, its principal architectural phase placed in the first century BC (Brown, Raheem, and Abdullah 2022).

[196] Tamm et al. 2018, 136: with areas of barely a hectare, the garrisons at Kazhaw, Merquly and Sitak cannot have been large; applying the Gorgan Wall Project's calculations for the far more massive north Iranian fortifications, up to 50 men might have been housed. The Gorgān figure on which this rests is just under 500 men for forts of 1.5–2 ha (ibid., 136 n. 61, citing Sauer et al. 2013a, 233), so the fifty is an extrapolation downward and not an excavated figure; Tamm's own later estimate for the one excavated room at Kazhaw is "maybe five soldiers" (Tamm 2020, 428).

[197] Tamm et al. 2018, 138: research on Sasanian military structures has concentrated on the far larger frontier installations, while regional defensive networks in less exposed areas remain almost unknown. The same page lists the readings entertained for the Kazhaw fort without deciding among them — a forward watchpost for the settlement on Yasin Tepe, a guarantee of its water supply, or a waystation on the caravan route through the plain. The list matters for its method as much as its content: the evidence on which it rests — position, plan and a small quantity of material — is the same as that available at Pānkān.

serve as secure waystations and customs posts.[198] The significance of the Zagros foothills in this network cannot be overstated; as Sala observes, this region constituted a natural 'overlap zone' where the habitats of the Central Asian Bactrian camel and the Arabian dromedary intersected.[199] This geographical advantage made the area an ideal hub for breeding high-capacity hybrid camels, helping replenish caravans.[200] Following the Late Antique technological shift from wheeled transport to pack animals, outposts like Pānkān served as critical logistical nodes designed to accommodate the needs and flexibility of these beasts of burden.

Archaeological finds from across the region are consistent with this caravan traffic. Excavation at Gird-i Kazhaw yielded a terracotta head of a harnessed camel or dromedary[201]; the excavations at Pānkān produced two finely detailed cast-bronze camel leg fragments (Appendix 10.6.1, Cat. no. 2229 and 8.6.4.2).

Rather than being mere utilitarian scrap, these bronze fragments—which feature carefully articulated hooves and lower legs—likely held both functional and symbolic significance. Regarding their functional reconstruction, typological parallels from early Islamic metalwork suggest they may have served as zoomorphic supports for a larger object. Similar to the bronze lion support fittings excavated at Nishapur,[202] the Pānkān camel legs could have formed the base of an ornate vessel or a cylindrical incense burner, a category of objects frequently supported by animal paws or feet (Aga-Oglu).

The widespread presence of camel iconography along the Silk Roads—ranging from Egyptian terracotta models to Chinese sancai tomb figures—suggests that these representations often served apotropaic or votive functions. In the martial and commercial context of a frontier

[198] Tamm et al. 2018, 135, 136 and 138: besides securing the route, the skimming of taxes and a closer binding of trade to the empire are named among the principal aims, the caravans imagined setting out from Hamadan for Erbil or points further west (135); the customs-post reading is offered for the Bāzyān building rather than for Kazhaw (136); the waystation function of the Kazhaw fort, in connection with the spring of Bestansur, is proposed at 138. All three are advanced as possibilities, not as demonstrated functions.
[199] Sala 2023.
[200] The term needs justifying rather than assuming. Wordsworth 2024, 75: "caravanserai" — literally the "palace of the caravan", synonymous in use with khān, ribāṭ and funduq — is routinely applied to the architectural and archaeological evidence uncritically; at 295 the objection in one sentence: "by using the term one assigns both function (housing caravans) and qualitative properties (palatial) to a given building". Neither is demonstrated at Pānkān, and the word is used in this study for a functional reading argued from position, plan and finds, not as a classification.
[201] Tamm et al. 2018, 138, with Abb. 41 at 139 (find B-248): "Ein Beleg für die Bedeutung des Karawanenhandels mit Trampeltieren fand sich im Terrakottakopf eines angeschirrten Kamels oder Dromedars aus Bereich B." The excavators add that a comparable head from the early Nippur surveys was dated there to the Neo-Babylonian to Parthian range, and that the Kazhaw piece, coming from a secure context, shows how cautiously such datings in the older literature must be treated, "auch da die Differenzierung zwischen parthischer und sasanidischer Zeitstufe häufig fehlerbelastet ist" (138 n. 69).
[202] Allan 1982.

fort, soldiers and merchants may have used or dedicated these zoomorphic objects, invoking spiritual protection for their arduous journeys. Together, these finds reinforce the hypothesis that Pānkān fulfilled a substantive economic role, physically and symbolically facilitating overland commerce while asserting imperial control over regional trade networks.

The site of Bāzyān provides an excellent example for the complexity of hinterland installations, where a Sasanian-style fortification was integrated with a Nestorian Christian monastery, reflecting the multi-ethnic and religious landscape of the late Sasanian frontier.[203] This mirrors the defensive sophistication seen at Qal'eh-i Yazdigird, where massive rubble-and-mortar masonry was used to secure high-altitude aristocratic strongholds.[204]

The value of small Sasanian enclosures in Northern Iraq extended far beyond their immediate military function. Recent excavations[205] at the contemporary rural site of Gird-î Qalrakh in the Shahrizor Plain provide an excellent example of the deep integration of these hinterland sites into the imperial economic network. Their findings in Area B—a mud-brick complex yielding hundreds of loom weights alongside administrative bullae and stamp seals—provide direct evidence that such rural settlements were centres of craft production and local administration.[206] By analogy, the robust infrastructural layout of Pānkān strongly suggests that it functioned not merely as an isolated garrison, but as an active logistical and economic waypoint, fully participating in the agrarian and commercial life of the Zagros foothills.

This functional interpretation of Pānkān finds a close parallel in the 'rural manor house' (*Herrenhaus*) recently excavated at Gird-î Qalrakh. This structure, covering at least 500 square metres, combined an elite residence with intensive craft production and administration. The presence of over 200 loom weights and remnants of a weaving frame suggests that such hinterland enclosures were active centres of textile manufacturing rather than mere military garrisons.[207] The discovery of administrative bullae, vessel stoppers for high-value commodities, and a bronze signet ring reinforces the hypothesis that these sites acted as localised tax or trade stations.[208] Pānkān's layout may have accommodated a similar convergence of military oversight, storage (as seen in the jar-lined rooms of Qalrakh[209]), and economic activity. See Figure 3.

[203]Déroche 2014, 39–43.
[204]Keall 1967.
[205]Wicke 2021; Mahmoud, Tamm, and Wicke 2025.
[206]Mahmoud, Tamm, and Wicke 2025, 122, 131–134.
[207]Mahmoud, Tamm, and Wicke 2025, 137, 144.
[208]Mahmoud, Tamm, and Wicke 2025, 145–146.
[209]Mahmoud, Tamm, and Wicke 2025, 133–135.

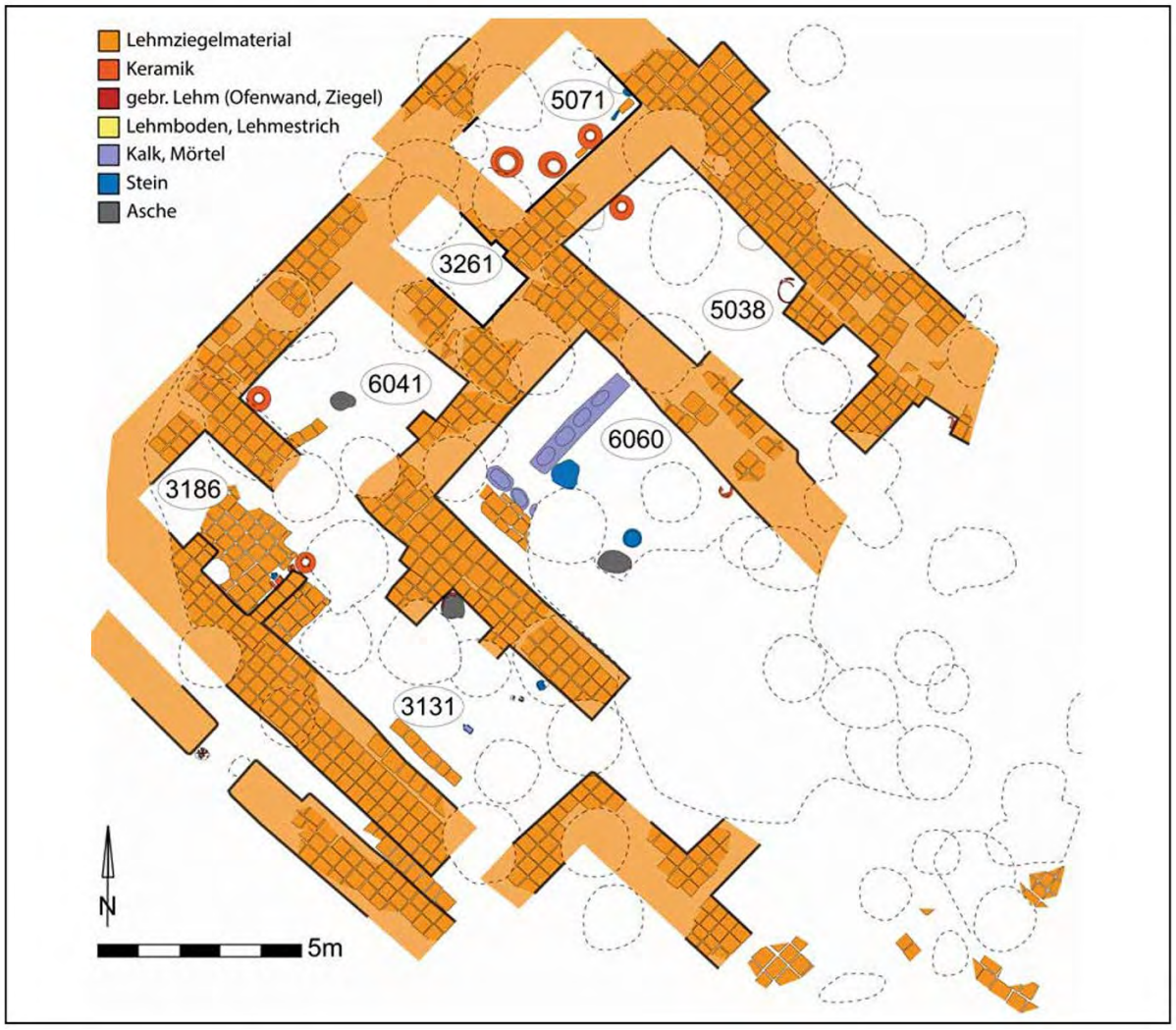

Figure 3. Brick-accurate plan of the early Sasanian layer in Area B at Gird-î Qalrakh (after Mahmoud, Tamm, and Wicke 2025, 132, fig. 14).

2.3.1. The Hinterland Forts

While the northern linear barriers blocked major incursions, the Sasanian hinterland was secured by a network of small, multifunctional fortifications. These structures rarely served a single purpose. As Shokoohy[210] notes regarding the Sasanian caravanserai of Dayr-i Gachīn, such geometric outposts were designed to serve long-distance trade and, at the same time, to house substantial military reserves.[211] The name "Dayr" (often indicating a monastery or a gypsum-domed sanctuary in Pahlavi) highlights that military, commercial, and religious functions frequently overlapped in these Sasanian hinterland hubs. This multifunctionality is

[210]Shokoohy 1983.

[211] Shokoohy 1983, 445–446 and 461: dayr, in Arabic "monastery" or perhaps "hospice", "seems a natural term for a caravanserai", the lexica adding the senses of a dome and of a fire temple; the combination of lodging and garrison is a report, not an inference — at 446 he quotes Iṣṭakhrī: "Dayr al-jiss is a caravanserai [built of] gypsum and fired brick. The Sulṭān's guards live in it. It is a stage for travellers and there are no farmlands and no trees." The conclusion at 461 places the building on "a remote stretch of the Sasanian highway".

exceptionally evident in Northern Iraq and the Zagros foothills.[212] The nearby site of Bāzyān, which shares striking architectural similarities with Pānkān—including the use of rubble masonry, thick lime mortar, and exterior glacis—has been interpreted not merely as a fort but as a monastic site, or as a place of pilgrimage bound up with the veneration of a saint's relics; its excavators present these as competing hypotheses rather than as a settled identification.[213] Similarly, excavations at the late Sasanian fort of Fulayj in Oman (a 30×30 m square enclosure with U-shaped towers) indicate that even isolated, small-scale defensive structures were effective in controlling local agricultural plains and securing maritime and overland trade routes on the eve of Islam.[214]

2.3.2. Umayyad Castles

The influence of Sasanian architecture, particularly its scale and the development of monumental forms—on subsequent Near Eastern traditions has long been recognised in modern scholarship.[215]

The architectural features of Sasanian small forts—characterised by square layouts, U-shaped or semi-circular buttressing towers, and agglutinative construction techniques[216]—did not disappear with the fall of the empire. During the Early Islamic period, this Late Antique military architecture was adopted directly by the Umayyad elite. According to Genequand[217], none of these buildings can be regarded as a properly fortified structure: the enclosure walls are thin, the towers solid and no higher than the curtain, and arrow slits and crenellations are absent. What was retained was the appearance, and the reason he gives for retaining it is display — a desire to have an impressive aspect reflecting the power or high status of the owner. Other

[212] Finster and Schmidt 1976, 50, supply the test: at Quṣair they reject the caravanserai resemblance on two physical grounds — the built area is too small, and the single entrance, 1.75 m in clear width, is ill-suited to letting people, animals and caravan baggage pass unhindered. Applied to Pānkān the criterion cuts both ways: the Sasanian gate, 3.8 m wide as first built and 2.9 m after the jamb walls were added, would admit pack animals without difficulty; the early Islamic reduction to about 1.2 m would not. Whatever the enclosure was doing in its first life, it had ceased by the later phase to be usable for caravan traffic.

[213] Amīn et al. 2023, 121–122, where the problem is set out as the relation between three elements — the fortification of the complex, the insertion of a church within it, and the function of the surrounding rooms — and where the two readings of the site, as a monastic foundation and as a place of pilgrimage bound to the veneration of a saint's relics, are advanced as hypotheses; Déroche 2014, 39, for the glacis and the masonry.

[214] Al-Jahwari et al. 2018; Priestman et al. 2023 Al-Jahwari et al. 2018, 728; Priestman et al. 2023, 293.

[215] Pope 1933, 75–76.

[216] Keall 1967, 99.

[217] Genequand 2006, 12: "none of them could be considered as a military or properly fortified structure. They just have a fortified aspect intended to create an impressive or imposing effect" — thin external walls, solid towers never higher than those walls, no arrow slits or defensive crenellations, the Large Enclosure at Qaṣr al-Ḥayr al-Sharqī excepted; the quoted explanation is his conclusion at 25, and the reading of the castles as caravanserais or road relays is reported at 3–4 as the view of others, not adopted. Northedge 2009, 244, rejects it outright: "They are not caravanserais, and they are not military forts guarding the roads … It is evident that the ideal was to build a residence that looked like a fort."

functions have been proposed for the group, among them agricultural colonisation, the management of relations with the tribes of the steppe, and service as staging posts on the trade and pilgrimage roads; the question remains open. For instance, the Marwanid mansion at Balis[218] on the Euphrates provides an important example of the spatial organisation of Sasanian enclosures that directly influenced the palatial and logistical waystations of the succeeding Islamic era, providing a framework for understanding the potential post-Sasanian afterlife or functional transformation of sites like Pānkān.

While retaining the outwardly martial appearance of Late Antique castella—such as the approximately 70x70-meter module with projecting half-round towers—these structures represent a functional shift. As Genequand argues, their defensive devices were formal rather than effective: the enclosure wall preserved the outward form of a military model whose function it no longer served.[219]

The internal spatial logic of these post-Sasanian and Umayyad enclosures reveals a complex architectural pedigree. The systematic division of the interior into discrete apartments (the so-called *Syrian bayt*), heavily utilised in Umayyad elite residences, appears to have deep roots in Late Roman domestic architecture rather than being an exclusive adoption from eastern Iranian models.[220]

While Pānkān lacks the monumental palatial upgrades of the renowned Umayyad quṣūr, its highly adaptable and strategically sound Sasanian layout would have made it a practical asset for continued use or reoccupation during the early Islamic transition. However, this specific architectural continuum gradually evolved in subsequent generations. As Siegel outlines, the early Abbasid complexes at al-Raqqa demonstrate a systematic reliance on rectangular ground plans with defined rational proportions—such as 1:2 or 2:3—indicating a shift away from the predominantly square enclosures characteristic of earlier periods.[221] Consequently, Pānkān's nearly square layout anchors its structural logic firmly within the Late Antique and Umayyad architectural horizon, distinguishing it from the later spatial models of the Abbasid era.

[218]Ritter 2019, 50. Fig.15.
[219] Genequand 2006, 8, for the "square enclosure about 70 m long" shared by the buildings first recognised as Umayyad castles — with Mshattā at 140 m and Qaṣr Kharāna at 35 m as the exceptions he names — and for the solid corner and interval towers, most often a segment of a circle; ibid., 12 and 25, for his assessment of their defensive value and for the conclusion that "the reason to keep an external military appearance is to be found in a desire to have an impressive aspect, reflecting the power or high status of the owner".
[220]Northedge 2009, 244–245.
[221]Siegel 2009, 404.

2.4.Late Antique Religious Geography of the Region

2.4.1. Zoroastrianism in the Sasanian Empire: Imperial Religion and Religious Coexistence

The Sasanian Empire (224–651 AD) established Zoroastrianism not merely as a dominant religious system but as an integral component of imperial governance and identity. As Payne emphasises, Zoroastrianism provided the ideological vocabulary through which the monarchy asserted legitimacy, order, and cosmic alignment. The framework within which that vocabulary operated was cosmological: human history stood in the "state of mixture", the age in which good and evil creation are commingled and before the restoration of the world, and the empire was conceived as the instrument through which humanity contributed to that restoration.[222] Within it *xwarrah* — the manifestation of divine power, which the rites of the Good Religion were performed to augment — attached not only to rulers but to places, mountains among them.[223] Thus, religion was not separate from politics but co-constitutive of it, with the king positioned at once as ruler and as sacral agent.[224] The vocabulary conventionally used for this arrangement — "church and state", "state religion", "toleration" — is itself a modern import, and recent work argues that it obscures more than it explains when applied to Sasanian Iran; the terms are retained here only where the sources cited use them.

This model of rulership was supported by religious institutions, and above all by the fire foundations, which were at once cultic establishments and holders of property[225]. They were endowed and maintained through aristocratic patronage, and the endowments that sustained them — land and the revenues attached to it — bound the priesthood into the same

[222] Payne 2015, 6–10 (at 9 for the claim that without the institutions of the Good Religion "the practice of Iranian imperialism was inconceivable"); Canepa 2018, 271–272, for the same claim expressed in architecture and landscape, and 272 for the cosmological reckoning that placed the empire near the end of the world-age. Payne's argument is drawn on throughout this section.

[223] Payne 2015, 28, on gumēzišn, the "state of mixture", as the age of human political history, and on the empire as the vehicle for organising humanity's contribution to the cosmological struggle; on xwarrah as "manifestation of divine power" attaching also to mountains, ibid., 60, and on its augmentation by Zoroastrian rite, ibid., 83. The formulation is Payne's; the Avestan term aša, sometimes introduced at this point in general accounts, does not figure in his analysis and is not used here.

[224] Becker 2014, 8–15, who argues that "church-state relations", "state religion" and "tolerance" are categories imported from modern liberal political thought and that in the Sasanian case religion and politics were "not simply intermingled, but imbricated and impossible to separate" (12); the term he proposes instead is political theology (16–17).

[225] Boyce 1987, 9–10; Canepa 2018, 272 and 283–284, on the place of such foundations in the Sasanian landscape of power: the Avesta never references monumental fire temples, no primary sources earlier than the Middle Iranian era corroborate the late Middle Persian accounts of the Great Fires, and the only one of the three located and excavated, Ādur Gušnasp at Takht-e Solaymān, shows nothing before the fifth century — the sanctuaries were built "largely ex novo" by the Sasanians (283). If the empire's most venerated fires are archaeologically elusive or unlocated, the absence of an identified fire foundation in the countryside around Pānkān carries correspondingly little weight.

landholding order as the nobility, so that religious and aristocratic interests were not easily separable[226]. The normative literature of the Middle Persian tradition, and the *Dēnkard* in particular, sets out a corresponding scheme of obligation for clergy and laity alike and projects a vision of imperial unity founded on doctrinal conformity and ritual purity. That literature states what the religious establishment held to be proper; it is not a description of what was practised across the empire, and the distinction matters for a province as distant from the Zoroastrian heartland as Adiabene[227].

This system was not uniform across the empire. Religious authority in northern Mesopotamia — in Adiabene and Bēt Garmai, east of the Tigris and reaching to the Zagros, where Pānkān lies[228] — worked through negotiation with established local hierarchies rather than through their direct domination, and Payne's study of these provinces is the fullest demonstration of the point.[229] That should not be mistaken for the absence of the Zoroastrian institution. Payne records fire temples and Zoroastrian religious authorities at Arbela, at Karka d-Bēt Slok and in other urban centres of the province, with the Christian ecclesiastical hierarchy organised in the same cities. What is thin is not the institution but the excavated record of it, and the absence of identified fire foundations in the countryside should be read with care. It may reflect the genuine thinness of the institution in this landscape; it also reflects how little of the region has been excavated with the period in view, and how difficult a small fire sanctuary is to identify from surface remains alone[230]. The negative evidence from Pānkān is treated here in the second sense rather than the first.

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[226] Payne 2015, 8: fire temples served "not only for the performance of a normative version of the Yasna ritual … but also for the consolidation and transmission of aristocratic landholdings through pious endowments, the predecessors of the waqf institutions that have played crucial roles in Muslim economies".

[227] On the normative character of the Middle Persian religious literature, Payne 2015, 20–21, on the Dēnkard and the Bundahišn: works that "have little to yield in the way of historical detail but much to reveal of the history of the development of Zoroastrian ideology and institutions" (21); cf. ibid., 37, where Zoroastrian cosmological thought is said to have predisposed its interpreters "to polyphonic discourse rather than the definition of normative orthodoxies".

[228] The extent of the district, in the standard reference formulation: "The Adiabene is the country between upper and lower Zab, that is the land of the Kurds" (Eilers 1983, 496), reporting Widengren's view of the region as the bridge between Semitic Mesopotamia and Iran proper in the Parthian era. Pānkān lies within it.

[229] Payne 2015, 127–163, the chapter on northern Mesopotamia — Bēt Garmai and Adiabene, the provinces in which Pānkān lies: staging grounds for the sixth-century campaigns against Rome (134); a region of long-standing political autonomy with an Aramaic-speaking local elite at the Roman frontier (136); its aristocrats holding rural estates on the rain-fed plains between the Zagros and the Tigris, the Iranian nobles among them "brokers between the royal court and the local nobility of the province" (137). For the fire temples and Zoroastrian authorities of Arbela and Karka d-Bēt Slok, 138.

[230] The observation concerns the state of survey and excavation as much as ancient practice; on the modest physical form of many such foundations, and the difficulty of recognising them archaeologically, Boyce 1987, 9–10.

In these western territories, the Sasanian state ruled over large Christian, Jewish, and other non-Zoroastrian populations.[231] Payne argues convincingly that these communities were not merely tolerated but incorporated into imperial frameworks through systems of indirect rule, landholding, and fiscal responsibility[232]. This approach allowed local Christian aristocracies to thrive under Sasanian suzerainty, provided they did not challenge the monarchy's legitimacy. The persistence of religious pluralism, then, was not a failure of Zoroastrian universalism but a calculated imperial strategy of rule via differentiated religious privilege.

The practical expression of Zoroastrianism was accordingly more malleable in the outlying provinces than its doctrinal formulation implies. In regions such as Adiabene imperial authority rested not on religious uniformity but on negotiation and accommodation, and the frontier required a working diplomacy of toleration in districts where Christian and Jewish populations contributed substantially to the fiscal and administrative structures of the state[233].

Persecution, when it occurred, was highly contingent. The explanation long given for it — that Christians were suspected of loyalty to Rome — is the one Payne's reassessment sets aside for the fourth century, treating the accusation as a fifth-century literary construction and locating the cause of the violence in internal politics.[234] These moments of repression were followed by periods of accommodation, such as the recognition of the Church of the East in 410 AD.[235] Payne resists reading this rhythm as an oscillation at all, arguing instead for a consistent rather than fluctuating use of violence, deployed in particular circumstances to establish the norms on which Christian and Zoroastrian elites would deal with one another. The "state of mixture" is his term for those norms in operation: multiple confessional identities

[231]Varghese 2007, 278–280.
[232] Payne 2015, 23–58 and 127–163.
[233] Atiya 1968, 267, on the fiscal burden: excessive taxation with the Byzantine wars as the pretext, Shāpūr II doubling his normal impositions, and Khosrow I exacting a poll tax from Christians in lieu of military service — a sequence Atiya compresses into "the latter days of Sassanid rule", although Shāpūr II belongs to the fourth century.
[234] Payne 2015, 38–42: the accusation of Roman sympathies is a fifth-century literary topos rather than a fourth-century reality, and "the cause of the violence that Christians encountered was a matter of internal politics only indirectly related to the Roman wars" (39); for the rejection of the fluctuation model, 26–27; for the judgement that the measures of Shāpūr II and Yazdagird I "were of a piece", 43. Baumer 2008 for a general narrative account.
[235] Becker 2014, 13, who connects the violence occasionally suffered by Christians to their universalism and to the fact that their piety was shared with the Christian Roman empire, and observes that the closed character of Zoroastrianism may explain why the martyrs of the later Sasanian period were predominantly elite converts.

managed within a shared imperial structure, on terms that left the superiority of the Good Religion unchallenged.[236]

The religious architecture of the West, including Adiabene, reflected looser control and often overlapping cultic spaces.[237] Thus, Sasanian religious policy should not be viewed as a monolithic imposition but as a strategic system of symbolic dominance that allowed religious heterogeneity in areas such as Pānkān.

Payne's insight that the Sasanian state articulated difference in religious terms without requiring uniformity is especially applicable here.[238] This layered religious landscape proved foundational to the persistence of Christianity, and of the Church of the East in particular, in the centuries that followed. Christian communities did not efface the Zoroastrian past but recontextualised it — Payne's account of the shared martyr shrines shows the mechanism at work — and the breadth of the East Syrian hierarchy at the end of Sasanian rule, as Atiya documents it, registers the outcome.[239] Rather than enforcing religious hegemony, the empire brokered a mixture of coexistence calibrated to secure loyalty and sustain provincial governance. In places like Pānkān, far from the empire's spiritual heartland, Zoroastrian authority was likely more symbolic, filtered through local officials, and shaped by proximity to trade routes and multicultural settlements.

2.4.2. Christianity in Northern Iraq and the Church of the East

Northern Iraq in Late Antiquity and the early Islamic centuries was one of the principal centres of Eastern Christianity and lay under the ecclesiastical jurisdiction of the Church of the East. Arbela (modern Erbil), Nineveh (in the vicinity of modern Mosul) and Kirkuk (ancient Arrapha) were episcopal and metropolitan centres of the region.[240] Christianity is held to have reached northern Mesopotamia during the second century, carried by merchants and by

[236] Payne 2015, 2, where the phrase is introduced, and 9–10, where its two senses are distinguished — the Zoroastrian gumēzišn, the mixed state of the world before its restoration, and the contemporary sense of state and mixture; for the cosmological background, ibid., 28.
[237] Atiya 1968, 240 and 257, on a church that developed beyond the Roman frontier and was for that reason out of reach of Antiochene and Constantinopolitan pressure: its members "were protected from Greek practices and Byzantine encroachments by their very existence within the confines of" the Persian empire (240); Baumer 2008 for a general narrative.
[238] Payne 2015, 72–77, on the martyr shrine as a place shared on different terms — "the 'place of the gods' became the place of the martyrs, sacred to both Zoroastrians and Christians, albeit on different terms" (76) — and ibid., 127–132, on Bēt Teta and Melqi in northern Mesopotamia.
[239] Atiya 1968, 255–257, for the extent of the East Syrian hierarchy at the end of Sasanian rule and for the internal factors to which he attributes its subsequent expansion. He enters his own caveat at 255: it is "not easy to define the extent of the Nestorian Church in Persia under Sassanid rule, nor is it possible to provide an accurate description of its territorial organization", and the list he prints is Assemani and Le Quien as summarised by Vine, not his own reconstruction.
[240] Baumer 2008.

missionaries from Edessa and Nisibis; by the third century Arbela was a bishopric, and in the fourth it was raised to a metropolitan see[241].

A caution belongs here, because the earliest and fullest account of that succession is a disputed text. The Chronicle of Arbela, attributed to Mĕšīḥā-Zĕḵā and published by Alphonse Mingana in 1907–8, traces the bishops of Adiabene back to the apostolic age and supplies most of what is claimed for the see before the fourth century. Its authenticity has been contested since shortly after publication, some scholars regarding it as a modern fabrication. At the same time, its defenders have pointed to internal details that can be checked against independent evidence — among them the solar eclipse of 218 AD and the date of the Sasanian accession in 224 AD — as arguments for a genuine sixth-century original[242]. The question is not settled, and the appropriate course for an archaeological study is neither to rely on the Chronicle nor to dismiss the tradition it preserves, but to leave the earliest phases of the Arbela episcopate out of the argument altogether[243]. What is not in dispute, and what matters for the interpretation of a site in this landscape, is that by the fifth and sixth centuries Adiabene was a heavily Christianised province with a metropolitan at Arbela, and that its Christian aristocracy was integrated into the Sasanian order rather than standing outside it. That integration, and the hagiographic literature through which it was expressed, is the subject of Walker's study of the Mar Qardagh legend, which takes Adiabene as its setting and remains the fullest treatment of Christianity in this particular landscape[244].

What is known of the ecclesiastical organisation of this region rests on a narrow and particular body of evidence, and it is worth naming it, because the limits of that evidence set the limits of what an archaeological study can reasonably expect from it. The principal source is the acts of the synods of the Church of the East, assembled and edited by Chabot as the Synodicon Orientale, which record the bishops present at each council from 410 onwards and so supply the framework within which the provinces and sees of the church are

[241] Bonnéric, Amin, and Couturaud 2023, 17, who place the beginning of Christianity in Mesopotamia at the end of the second century at the earliest and assign the leading role in its diffusion through Adiabene to Antioch and Edessa; for the metropolitan status of Erbil and its bishoprics see also Simpson 2005, 285.

[242] Payne 2015, 219 n. 29, cites the Chronicle "as a medieval compendium of ecclesiastical traditions, not as a modern forgery", and at ibid., 224 n. 9, excludes it from his own evidence "on account of its chronological distance from the late Sasanian texts"; the standard discussion is C. and F. Jullien 2001. Dignas and Winter 2007, 32, describe it as "a Syriac–Nestorian source of the sixth or seventh century whose authenticity and reliability are controversial among scholars". For the text, its transmission and the century-long dispute over its authenticity, Kawerau 1991.

[243] The consequence for the present study is limited but real: the earliest phases of the Arbela episcopate cannot be treated as secure evidence, whereas the metropolitan status of the see in the fifth and sixth centuries is independently attested in the synodal record.

[244] Walker 2006, the fullest study of Christianity in late antique Adiabene, built around the legend of Mar Qardagh and its Arbela setting.

reconstructed[245]. From this material, together with the later chronicles and the monastic literature, Fiey built the topographical reconstruction of Christian northern Iraq that remains standard, and which places the dioceses, villages and monasteries of Adiabene as as the sources permit[246]. The character of that evidence should be kept in view. It is a record of the church's own administrative hierarchy, compiled by and for that hierarchy: it names sees and the men who held them, not the places where ordinary Christians lived and worshipped. A settlement of the size of Pānkān would not appear in it under any circumstances, and its absence from the written record is therefore uninformative[247,248].[249] Whether there were Christians at Pānkān, and whether there was ever an institution there, has to be decided from the ground.[250,251]

It is worth stating in advance what would decide it, since the question returns in Chapter 5. A church of the East Syriac type is architecturally distinctive and recognisable on plan alone: a longitudinal nave with a raised sanctuary at the east, a bema set in the nave in the earlier tradition, and a defined set of associated spaces. The excavated example at Bāzyān was identified in exactly this way, from its plan and its fittings rather than from its portable finds[252]. Portable objects are much weaker evidence, and the distinction matters here. A pendant cross establishes that someone at the site owned or carried a cross; it does not establish a congregation, still less an institution, and objects of this class circulated as personal ornament

[245]Chabot 1902, the standard edition of the synodal acts, which records the bishops present at each council from 410 onwards.
[246]Fiey 1965–1968, the topographical reconstruction of Christian northern Iraq built on the synodal, chronicle and monastic sources; vol. 1 covers Adiabene.
[247]The point applies equally to the Islamic geographers: their concern is with towns, districts and the stages of the main roads, and the absence of a place of this size from their itineraries carries no evidential weight either way.
[248] Simpson 2005, 286, who observes that work on Adiabene has concentrated almost entirely on the Syriac sources, on standing churches and monasteries, and on the excavated churches at Musaifnah and Qasr Serij.
[249] The general case for building an argument of this kind on coins is put by Heidemann 2010, 648: for the period before the fifteenth century there are almost no primary documents, the literary sources are "necessarily biased", and without material evidence the historian can neither corroborate nor refute them. That is the position exactly at Pānkān, where the written record does not reach the site at all.
[250] The state of the evidence is set out by Bonnéric, Amin, and Couturaud 2023, 19: most of the Christian sites of Iraq were excavated by the methods of their time, their documentation is incomplete — particularly as regards stratigraphy, measured drawing and material culture — and none of the more recently excavated sites has yet been published exhaustively.
[251] Payne 2015, 10–11, who observes that archaeological research in the Near East has tended to neglect the Sasanian period, yet that the handful of excavations directed at Iranian sites have produced a remarkable number of churches, monasteries and Christian objects; he cites Hauser's estimate that over half of all excavations of Sasanian strata or buildings have yielded Christian material.
[252]The church at Bāzyān and its fittings are described in Chapter 5.5; for the excavated evidence, Ali and Déroche 2016, 11–18, and Amin et al. 2023.

well beyond the communities that produced them[253].[254] The two crosses from Pānkān were recovered by detector survey outside the enclosure rather than from stratified deposits, and the bronze vessel compared with the Bāzyān example has been identified elsewhere as both a lamp and a cosmetic mortar[255]. The case for an ecclesiastical function at Pānkān accordingly rests, so far as it rests on anything, on the plan of the north-eastern block and on the regional pattern by which disused fortified enclosures were taken over for monastic use[256]. Chapter 5 advances it as a hypothesis that further excavation could test, and it is not treated as established anywhere in this dissertation.

This Christian expansion did not occur in a vacuum. The Sasanian administration, while ideologically grounded in Zoroastrianism, operated within a religiously diverse empire. Under the reforms of Kavād I and Khosrow I,[257] the empire was divided into four great military quarters (kusts), each overseen by a spāhbed.[258] Within this framework, local marzbāns (march-wardens) held significant autonomy in managing the defence and taxation of these volatile borderlands.[259]

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[253] The 2023 volume on Christianity in Iraq supplies the comparative warrant, and it is stronger than a general methodological remark: at al-Ḥīra the cultic small finds "must come from private houses or graves" (Harrak 2023, § 98), and at Nineveh Christian lamps and cross plaques occur where "no churches can be identified" (§§ 58–59); at Bāzyān the find-spots of the cross plates are unrecorded (Amin et al. 2023, n. 34), and what licensed the reading there was architectural — a church with a bema inserted among collective dwellings (§ 13) — its excavators still declining to fix the function (§ 30). Two crosses recovered by detector outside an enclosure are, against that standard, not evidence of a building's function.

[254] The caution is Simpson's: "Archaeological data rarely confirm conclusively the ethnic, far less the religious, affiliation of the occupants of a site" (Simpson 2005, 285).

[255]The two crosses were recovered by metal-detector survey outside the enclosure and are not from stratified deposits; their find-spots are recorded in Chapter 3.5 and the objects are catalogued in Appendix 10.1.4. On the bronze vessel and the competing identifications proposed for objects of this form, see the discussion in the Appendix.

[256] Nováček 2023, n. 65 (following Fiey, Levine and Morony), identifies the district and bishopric of Rassōnīn with the westernmost Zagros ridge east of Arbela — the ridge in which Pānkān lies — and, n. 80, notes a monastic foundation of c. 600 reported "probably founded near the village of Šaqláwá, 40 km northeast of Arbela", its location textual rather than archaeologically identified. Neither datum places a church at Pānkān; together they establish that the ground had an ecclesiastical geography by the late Sasanian period.

[257] Maksymiuk 2023, 167–168: four spāhbeds answerable directly to the king replaced the single Ērān-spāhbed, the quadripartition being "directly related to wall-systems of defense" (167); the sources disagree over which regions were assigned to which kust, so the attribution of any Zagros district to a given quarter remains an inference; against Gyselen, she holds that the old title did not survive the reform (168).

[258] Daryaee 2009, 124, assigns the quadripartition to the reforms of Kavād and Khosrow I, with numismatic evidence pointing to Kavād I. Two qualifications belong here. First, the boundaries of the four quarters are not settled (ibid.; Pourshariati 2008, 95). Second, Adiabene is not to be assigned to the northern quarter, kust-i ādurbādagān: Pourshariati places Iraq and the western regions in kust-i khwarbarān (2008, 503; at 106 the western spāhbed holds "the troops of Iraq up to the frontier of the Byzantine empire"), and Shahinyan's reconstruction of the Caucasian kust does not include Adiabene (2016, 192–193). For the marzbān as warden of the marches, Pourshariati 2008, 503; for early Sasanian mowbeds and marzbāns put in charge of provinces, Adiabene named as an instance, Daryaee 2009, 129.

[259] Wiesehöfer 2010, 110, describes the same reform and adds a detail that bears directly on installations of Pānkān's class: with the registration of landholding, the fixed land tax and the new poll tax, "the empire was divided into four military districts, and special units took on policing and border control duties", the

As Payne emphasises, Christian communities were integrated into the imperial framework through a "state of mixture," in which religious identity was balanced with participation in the broader political culture.[260] The formal recognition of the Church of the East in 410 AD, as established by the Synod of Seleucia-Ctesiphon, was a decisive step in this accommodation.[261,262] It is tempting to read the catholicos as thereby becoming the intermediary between the Sasanian state and its Christian subjects, but Payne's account of the sixth century argues the reverse: the tenure of Mar Aba exposed how vulnerable that office was, and it was worldly Christians rather than bishops who emerged as the most powerful intermediaries with the court.[263] Atiya complements this by observing that the Church of the East emerged as a thoroughly Persian ecclesiastical body, loyal to the crown yet detached from imperial dogma.[264] This arrangement offered relative security and exceptional missionary reach.

As Atiya emphasises, the Church of the East's growing independence rested on political detachment from Byzantium and equally on a substantial theological tradition cultivated in Syriac. This linguistic and liturgical autonomy enabled the Church to evolve a specifically Persian Christian worldview, resistant to Hellenistic influence and attuned to its own regional realities. The Church thus became a carrier of Eastern identity, rooted in the rural, multilingual, and multiethnic landscape of northern Mesopotamia.[265]

The Church of the East developed a distinctly Persian Christian identity, separate from the imperial church of the Roman East. It promoted its theological independence by establishing schools at Nisibis and Gundeshapur, using Syriac liturgy, and adopting a

sigillographic basis being Gyselen 2001. He assigns the measures jointly to Kavād and Khosrow, as does Daryaee.

[260] Payne 2015, 2 and 9–10.

[261] Baumer 2008.

[262] Bonnéric, Amin, and Couturaud 2023, 18, on the synod of Seleucia-Ctesiphon of 410 and on the metropolitan of the city, designated by the Sasanian king, who thereafter ruled over the other bishops with the title of catholicos.

[263] Payne 2015, 93–126, on the reforms of Mar Aba, the inquest to which he was subjected, and the interaction of Christian law-making with Iranian political practice; the conclusion drawn there is that the sixth century "disclosed the contested nature of Christian norms, the frailty of the ties that bound bishoprics, and the vulnerable position of the patriarch", and that "worldly Christians rather than bishops emerged … as the most powerful intermediaries with the court and even as the leading organizers of Christian communities" (95).

[264] Atiya 1968, 253, on a church that "reached maturity under the hegemony of the Persian kings" and declared its independence of the West at the end of the fifth century; ibid., 267, on the status defined at the Synod of Seleucia in 410 and recognised by Yazdagird I.

[265] Atiya 1968, 240: unlike the Antiochenes, who used a Greek liturgy, the East Syrians "continued to speak a particular dialect of Aramaic known later as Syriac and persisted in the use of their ancient liturgy in the same language"; ibid., 253, on the school of Nisibis succeeding that of Edessa, where students led a quasi-monastic life under a rule enforcing residence and work and where, in Labourt's judgement as Atiya reports it, the earliest theological university on record was born.

dyophysite Christology—positions that distanced it from Byzantine orthodoxy.[266] This differentiation was not merely theological but also political, allowing Christians to demonstrate loyalty to the Sasanian regime while maintaining religious autonomy.[267]

Payne argues that Christians were not passive subjects but active participants in Sasanian imperial life. Bishops could serve as regional powerbrokers, managing local conflicts and giving the state a point of purchase in the countryside. Their relation to the fiscal system was contested rather than settled: the refusal to collect taxes is what the hagiographers of Simeon bar Ṣabbaʿe made into a principle, while in the mid-seventh century the catholicos Ishoʿyahb III sought the privilege of levying the land and poll taxes on the Christians of Iran himself. The views of the bishops between them do not survive.[268] This dual role as both religious leaders and civic agents reinforced Christianity's durability in northern Iraq.[269] Even during periods of persecution—such as under Shapur II or Yazdegerd II—Christian communities demonstrated resilience by appealing to their administrative utility and by anchoring themselves within local economies and landholding patterns.[270]

Understanding a settlement like Pānkān therefore requires close examination of the local material record before broader conclusions are drawn about its role in regional networks. The excavations have yielded specifically Christian artefacts, and the unusual internal building cluster towards the eastern side does not rule out the possibility that a monastery stood there.

A compelling regional parallel is the nearby site of Bāzyān. The relationship between the church and the enclosure at Bāzyān is, however, less straightforward than it is sometimes presented.[271] On the excavators' current reading the site began as a domestic structure — possibly an aristocratic dwelling — and the church and the fortification of the area may be

[266] Bonnéric, Amin, and Couturaud 2023, 18, who trace the dyophysite position to the influence of Theodore of Mopsuestia on the School of Nisibis and date its formal adoption by the Church of the East to the middle of the sixth century.
[267]Baumer 2008.
[268] Payne 2015, 42, for the refusal attributed to Simeon, for Ishoʿyahb III's claim to levy " the combination rejected in the accounts of Simeon", and for the observation that the intervening bishops' views have not survived; ibid., for the bishop of Karka d-Ledan, spared when almost all his colleagues were executed, as a possible dissenter.
[269] Payne 2015, 127–163.
[270] Payne 2015, 23–58 and 127–163.
[271] Ali and Déroche 2016, 18, set out four phases, three of them Sasanian: the north-eastern sector; a first enclosure wall "constructed at the same time as the majority of the buildings, in particular the church"; a second enclosure wall; then the glacis and internal modifications, assigned to the Umayyad and Abbasid periods. In Sounding 4 the first rampart rests on natural soil with Sasanian ceramics and a bone cross pendant of the sixth or seventh century (15). Church and fortification at Bāzyān are therefore contemporary, and the sequence gives no warrant for a monastery inserted into a disused fort.

contemporaneous with one another rather than successive[272], which weakens rather than strengthens any simple model of monastic reoccupation of a disused fort.[273,274]

Whether Pānkān underwent a comparable transformation and served as a rural Christian waystation cannot be decided on present evidence, and the Bāzyān sequence is not a template that can simply be transferred.[275] The Christian material from the site is consistent with a landscape in which Christian communities were well established by the late Sasanian period, which is what the written and excavated record for Adiabene and Bet Garmai independently indicates; it does not by itself measure the confessional composition of the immediate surroundings.[276] This demographic and religious landscape may also explain the notable concentration of Byzantine coins at the site, suggesting sustained trade and economic ties with the Byzantine Empire's Christian territories.[277]

The hypothesis regarding Pānkān's potential ecclesiastical function aligns with the current understanding of the religious landscape in late Sasanian Northern Iraq. The hinterlands stretching from the Shahrizor Plain to the Zagros passes were heavily populated by Christian (Church of the East) communities, forming a dense network of dioceses, villages, and fortified

[272] Millar 2022, 349–350, summarising the *History of Mar Qardagh*, set near Arbela in the mid-fourth century: a commemorative festival held near Qardagh's fortified house, a church later built where he died, and apostasy defined as destroying "the churches and monasteries he built" to "build anew the fire temples" (para. 51). A fortified aristocratic residence near Arbela that acquires a Christian cult focus is thus a familiar shape in the hagiography of this landscape — a reason to keep the possibility open at Pānkān, not evidence for it: Millar is explicit that the narrative is the product of a later period and "a masterpiece of evocative and imaginative story-telling" (349).

[273] Bonnéric, Amin, and Couturaud 2023, 20, summarising Amin et al. 2023: the excavations conducted since 2011 indicate that Bāzyān began as a domestic structure, possibly an aristocratic dwelling, and that the church and the fortification of the area may be contemporaneous with one another rather than successive; the authors propose an identification with the monastery Babta of Maḥoze, founded in 610 or 620 by Sabrišoʿ.

[274] Finster and Schmidt 1976, 35–36: at Quṣair in the Iraqi western desert the later of two churches is dated late Sasanian on its construction technique, stucco and squinches comparable to Qaṣr Šīrīn, and it stands within a towered precinct wall of c. 110 × 150 m with a monumental stone gate on the eastern side. A church inside a towered enclosure is therefore not, in this region, an anomaly requiring the reuse of a derelict fort to explain it; the same authors observe that the Iraqi churches form a group of their own, Mesopotamian rather than Syrian in character (36).

[275] Bonnéric, Amin, and Couturaud 2023, 23, who conclude that the change of power is "almost undetectable archaeologically", that there is no rupture in the plan of churches, in cross motifs or in material culture, and that Christian settlements such as Bāzyān and al-Quṣayr were in fact enlarged, the decline setting in only around the ninth century.

[276] The caution is Payne's own, and it applies directly here: "attempts to measure religious loyalties in the province on the basis of exclusively Christian sources are imprudent … There is no reason to believe that Christians eclipsed other groups in the region, as Manichaeans and polytheists appear among the bnai ḥere even in sixth-century accounts" (Payne 2015, 136).

[277] The point bears on how objects of Byzantine type in an Iranian frontier assemblage should be read. Canepa 2009, 2, argues that earlier scholarship, by treating such material as the residue of "a passive movement of objects from silk trade and war booty", both underestimated the depth of the interaction and reinforced the idea of a cultural "iron curtain" between the two empires.

monasteries.[278] In this geopolitically sensitive borderland, the distinction between a military outpost, a commercial caravanserai, and a monastic foundation was frequently blurred, and Pānkān may well have been an institution of this combined kind.[279] The same indeterminacy is recorded at Gird-i Kazhaw, where the excavators leave the function of the excavated pillared building open between a church, a monastery complex and a waystation, on evidence of the same order as that available here.[280]

The Church of the East's adaptability in frontier zones such as Adiabene reflects the decentralised nature of its authority: where the Roman church centralised, it operated through a federated system of dioceses and monasteries — an advantage in a region where Christianity coexisted with Zoroastrians, Jews and others.

Atiya further notes that the Church's federated structure relied heavily on monastic centres, which were at once religious outposts, educational institutions and manuscript producers. Monasteries along trade and communication routes played a significant role[281] in providing hospitality, theological training, and access to sacred texts—functions of immediate relevance in the region of a hinterland site like Pānkān. Their presence also helped sustain continuity during regime changes, supporting the spiritual life of dispersed Christian communities.[282]

The mechanism Payne documents is not episcopal but aristocratic. Christians who acquired patrimonies could construct themselves as aristocrats on the model of the traditional ruling houses, and it was nobles — acting as martyrs, as bishops, or as pious laymen — who erected the institutions of the Christian community in northern Mesopotamia. He is at the same

[278] For the shape of that network on the ground see Bonnéric, Amin, and Couturaud 2023, 19, summarising Nováček's survey of the Bet Garmai dioceses, which finds a regular spacing of some 40–55 km between sees as early as the beginning of the fifth century and places monasteries and churches predominantly in the periphery of the cities rather than within them.

[279]Baumer 2008.

[280] Tamm et al. 2018: the excavators leave the building's function open between church, monastery and a Christian-run way-station — a precursor of the caravanserai (137–138). It is a hall of at least 20 m with a pier-flanked nave, of limestone poured with lime mortar, floored with square baked bricks (119–123); its closest parallel is the church at Bāzyān, some 60 km to the north-west, and from the resemblance of both to Syrian churches they suggest builders resettled in the course of the Roman wars (123, 136, with Daryaee 2009, 40 and Alizadeh 2011, 75). The Christian presence rests on cross-stamped sherds rather than an identified liturgical plan (133, 137), stamps of this kind being confined to northern Mesopotamia in the late Sasanian period (133).

[281] For the monasteries as the institution through which the church carried into the Islamic centuries, Atiya 1968, 292: "even after the coming of the Arab, the monasteries remained the chief solace of the church for survival and sustained expansion"; ibid., 293, for the increase of monastic foundations in the sixth and seventh centuries, and for Thomas of Marga, monk of Bēt ʿAbhē from 832 and later metropolitan of Bēt Garmai, whose Book of Governors is the fullest monastic source for the province in which Pānkān lies.

[282] Atiya 1968, 256: "the backbone of Nestorian expansion lay with its monastic rule, which furnished the church with a great army of dedicated men"; and, for the institutional form the expansion took, ibid., 257: "wherever they installed a new bishopric, a school with a library and a hospital with medical services were included in the project."

time explicit that the resulting institutional prime indicates neither a swelling of Christian numbers nor successful missionary work.[283] Whether arrangements of this kind existed around Pānkān is not known, and no physical remains of them have been identified.

The development of Eastern Christianity in Mesopotamia cannot be read from the relations of the two empires alone. Its strength lay in the internal factors Atiya identifies — a monastic system and a hierarchy "ready for action and self-sacrifice", and the practice of founding a school and a hospital alongside each new bishopric — institutions that gave the church its resilience and its capacity for growth away from the metropolitan centres.[284]

To summarise, Christianity in northern Iraq thrived not in opposition to imperial structures but through careful negotiation with them. The Church of the East's success rested on its ability to balance theological independence with political integration—a model Payne places at the centre of Sasanian–Christian relations.[285] In Pānkān, this translated into a religious landscape shaped by flexible institutional authority, pragmatic coexistence, and embeddedness within transregional Christian networks.

2.4.3. Religious and Political Tensions with Byzantium

The rivalry between the Sasanian and Byzantine empires was as much ideological and theological as it was territorial and political.[286] From the fourth century onward, religion became a defining axis of imperial identity in both polities. While the Byzantine Empire increasingly fused Nicene Christianity with imperial orthodoxy, the Sasanians articulated their

[283] Payne 2015, 68, where the mechanism is described: with the creation of patrimonies "Christians could begin to construct themselves as aristocrats on the model of the traditional ruling houses"; ibid., 144 and 163, on nobles as the founders of the region's churches, shrines and monasteries; and ibid., 11, for the caution that such an institutional efflorescence "indicates neither the swelling of Christian ranks nor widespread, successful proselytism in the late Sasanian period".

[284] Atiya 1968, 257, for the internal factors he identifies: a monastic system and a hierarchy "ready for action and self-sacrifice", and the practice of founding a school and a hospital alongside each new bishopric. He adds, in the same place, that "the tendency to exaggerate the gravity of religious persecutions in the East has to be re-considered".

[285] Payne 2015, 200, where the model is stated: the mutual recognition of distinct political and religious spheres in 410, and thereafter a collaboration in which "norms communicated through violence — and its communal remembrance — allowed Christians to be included in imperial institutions without weakening the superior position of Zoroastrianism".

[286] Canepa 2009 is the sustained treatment of the rivalry as a competition in images and ceremony: the two courts devised "a sacral, yet extrareligious visual and ritual language of legitimacy and debate" (1), out of which "a hybrid, international culture of kingship developed" (3). His epigraph is Khosrow II's letter to Maurice on the two eyes of the world (1), printed without comment — the connection to his title is an inference rather than a statement of his. The methodological point bearing on this assemblage is his criticism of earlier work for "ghettoizing" evidence of cross-cultural interaction behind a supposed "iron curtain" between the two realms (2). For the most recent restatement of the relationship in the language of international order, Blachford 2024.

sovereignty through Zoroastrian priestly authority and ritual centrality, creating an environment in which inter-imperial religious identities became politicised.[287]

For Christians within the Sasanian Empire, this polarity introduced an enduring tension. Although the Church of the East had established its institutional independence from the Roman ecclesiastical world at the Synod of Seleucia-Ctesiphon in 410 AD, suspicions persisted. It is tempting to explain the violence of the fourth century by that suspicion, and the explanation has a long history in the scholarship: Christians as a latent extension of the Roman state, exposed whenever the empires went to war.[288] The most recent full treatment rejects it. On Payne's reading the accusation of Roman loyalties is a fifth-century literary device rather than a fourth-century charge, and the executions of Simeon bar Ṣabbaʿe and the bishops of his circle in the 340s followed from their refusal to collect taxes for the crown, not from their religion or their supposed sympathies.[289] The cause of that violence, on this account, was internal Iranian politics only indirectly connected to the Roman wars.[290]

However, these persecutions were neither uniform nor permanent. Payne emphasises that Sasanian policy toward Christians was not unrelenting hostility, but calibrated pragmatism. He resists the model of rulers oscillating between repression and integration, holding rather that the measures of Shāpūr II and Yazdagird I were of a piece and that the violence was consistent in purpose if intermittent in occurrence. Recognising the Church of the East's autonomy allowed it to reframe itself as a Persian ecclesiastical body, loyal to the Sasanian shahs and increasingly embedded in state structures.[291] Atiya reaches a comparable judgement from another direction, cautioning that the gravity of the eastern persecutions has been overstated, and that the violence of a despotic reign fell on Christian and non-Christian alike.[292]

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[287] Payne 2015, 164–198.

[288] That the reading Payne rejects was the received one can be seen from Eilers 1983, 499: after 379 the Christians of the Sasanian empire "fell under suspicion, not unfounded, of conspiring with enemies of the state in the west". The same page records the ecclesiastical geography relevant here: dioceses by the third century "with episcopal sees at Sinjar, Arbela, Kirkuk, Hulwan and others".

[289] Payne 2015, 38–42. The case is made in three steps: that the traditional narrative rests on Eusebius's report of a letter from Constantine and on hagiographical accusations first recorded in the mid-fifth century (39); that "in the fourth century … Christians could not be identified as agents of Rome" (39); and that Simeon and the ecclesiastical leaders associated with him "perished in the 340s for failing to cooperate in the extension of the fiscal system, not simply for being Christians" (42).

[290] Payne 2015, 23–58.

[291] Payne 2015, 26–27 and 38–43, for the argument that the East Syrian hagiographical corpus reveals "the consistent, rather than fluctuating, use of violence against religious others" (27), and that the measures of Shāpūr II and Yazdagird I "were of a piece" (43); Baumer 2008.

[292] Atiya 1968, 257: "the tendency to exaggerate the gravity of religious persecutions in the East has to be re-considered in the general framework of the eastern state, where the whims of a despot or dictator resulted in the persecution of Christian and non-Christian alike without discrimination."

This strategy of localised integration is evident in the roles of episcopal and monastic institutions throughout the frontier regions. Bishops could act as arbiters of disputes and as points of contact between the imperial administration and local communities, and in that measure ecclesiastical leadership reinforced imperial sovereignty rather than threatening it. Their part in taxation, as noted above, was disputed within the church itself and should not be stated as a general rule. What the evidence will carry is narrower. The hierarchy was territorially organised across this region — a metropolitan at Erbil for Adiabene, another at Karka for Bēt Garmai — and its heads held a status defined by their own synod and recognised by the crown.[293] That recognition tethered Christian communities to the Sasanian order, offering protection in return for local stability and loyalty, without making bishops officers of the administration.

The contrast with the Byzantine East only intensified this dynamic. The post-Chalcedonian fragmentation of Christianity had marginalised many Eastern Christian groups, especially those adhering to dyophysite Christology, which the Church of the East espoused. For many Syriac-speaking Christians, the Sasanian Empire was not a place of persecution but a haven from Byzantine doctrinal coercion and ecclesiastical exclusion. The consolidation of a distinct Persian Christian identity was thus both a theological manoeuvre and a political safeguard.[294]

In cultural terms, too, Christian identity in Sasanian lands expressed a distancing from Byzantium. The retention of Syriac as the language of liturgy and learning, where Antioch used Greek, reinforced that independence, and the schools of Nisibis and Jundishāpūr were the institutions through which it was transmitted. The trajectory should not be extended past the conquest: by the early caliphate the leading East Syrian scholars were bilingual and preferred to write their principal works in Arabic.[295]

In this context, the transformation of sites like Pānkān from forts to possible ecclesiastical nodes should be understood not merely as religious shifts but as responses to

[293] Atiya 1968, 255, for the ecclesiastical provinces of the region — Adiabene, with a metropolitan at Erbil and bishops at the sees he prints as Honita and Maalta, and the province he prints as Garamasa — Bēt Garmai — with a metropolitan at Karkha and bishops at Sciaarchadate and Dakuka — and 267 for the status defined at the Synod of Seleucia in 410. On monastic property, 292: “each monastery had an abbot, but he was subject to the local bishop who administered all monastic property”. His material on bishops as arbiters between rulers and communities (277, 283) is nineteenth-century and Ottoman, and is not read back into the Sasanian centuries here.

[294] Baumer 2008.

[295] Atiya 1968, 240 and 253, for the retention of Syriac and for the school of Nisibis; ibid., 299, for the later trajectory, where he heads the section “Waning of Syriac Literature” and notes that the great Nestorian scholars of the early caliphate, Ḥunayn ibn Isḥāq among them, “were bilingual, but they preferred in principle to write their best works in Arabic rather than Syriac”.

broader imperial and theological realignments. Located along key trade and communication routes, Pānkān would have been part of a wider network of Christian settlements adapting to the ebb and flow of imperial fortunes. One documented mechanism for such a superimposition is recorded for Adiabene itself, where the hagiographer of Mar Qardagh has the saint convert the fire temples his own house had built into churches and monasteries. That is a literary notice rather than an excavated sequence, and it concerns cult buildings rather than forts; it is entered here as the form the transfer of sacred space took in the region, not as a parallel for Pānkān.[296]

The ideological frontier between Ctesiphon and Constantinople thus permeated even the Sasanian periphery. Rather than a simple dichotomy of persecution and survival, the Christian experience in northern Mesopotamia — particularly in places like Pānkān — was marked by tactical adaptation and by integration into imperial institutions. Participation in the government of the province is documented for the caliphate rather than for the Sasanian centuries, and is not read backwards here. The picture that results is not one of "insiders" and "outsiders" but of a polity negotiating religious plurality for its strategic ends.[297]

2.4.4. Transformation under Islam

The historiography on which this section draws should also be named. The standard narrative account of the Islamic Near East between the sixth and the eleventh centuries remains Hugh Kennedy's, and his study of the armies of the caliphs is the fullest treatment of the military and social organisation of the conquest state — the institution whose garrisons took over installations such as Pānkān[298]. For the specific question raised by the Pānkān sequence — what happened to provincial elites and provincial infrastructure in northern Mesopotamia after the conquest — the essential works are Robinson's study of the transformation of the region's elites and Morony's account of the administrative and social continuities of Iraq[299]. Together these define a picture of the conquest as an administrative substitution at the top of a structure that continued to function beneath it, and it is that picture, rather than a model of rupture, against which the early Islamic phases of the site are read here.

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[296] Payne 2015, 144, reporting the History of Mar Qardagh: "Qardagh had the fire temples that his house had constructed converted into churches and monasteries." The passage is hagiographical, and Payne cites it as evidence for aristocratic patronage rather than for a pattern of physical reuse.

[297] Atiya 1968, 267: under Islam the community "continued to thrive as a special community in the same way as they had done under the Sassanids". His evidence for Christian participation in provincial government (269, 271) is Abbasid, not Sasanian. Payne 2015, 199–204, for the institutional continuities across the conquest.

[298] Kennedy 2016 remains the standard narrative account of the period; for the military and social organisation of the conquest state, Kennedy 2001.

[299] Robinson 2000 for the transformation of the elites of northern Mesopotamia specifically; Morony 1984 for the administrative and social continuities in Iraq. The Festschrift in which the only published study of Pānkān appeared is itself dedicated to Kennedy: Major 2022.

The Arab-Muslim conquests of the 630s AD marked a fundamental shift in the political order of northern Mesopotamia, including the region around Pānkān.[300] The transformation was not, however, an abrupt break, but a prolonged process of negotiation and accommodation between the new authorities and the region's established religious communities.[301] The early Islamic state inherited a plural administrative structure from the Sasanians and, rather than dismantling it, incorporated existing elite networks into the fabric of Umayyad and later Abbasid government[302,303]. For northern Mesopotamia, the process has been examined in detail by Robinson, whose account of the transformation of the region's elites provides the closest historical framework for the early Islamic phases documented at Pānkān[304]. On the Iranian side of the same transition the record is largely numismatic: copper issues struck in the names of local lords, retaining the Sasanian obverse and the Middle Persian formula[305] *xwarrah abzūd* while accommodating the new order, are in several districts the only surviving evidence that such men existed at all. The Pānkān material belongs to the same transitional horizon: late Sasanian drachms and Abbasid dirhams were carried together in a single purse rather than succeeding one another in the ground.[306]

One principal mechanism of this integration was the *dhimma* system: legal recognition and protection for Christians, Jews and Zoroastrians in exchange for the *jizya*, formalising their

[300] Robinson 2010, 196–197: al-Qādisiyya in Muḥarram of either 636 or 637, Ctesiphon in 637, Nihāwand in 641, and — the operative statement for this region — northern Mesopotamia "had by around 640 fallen" to armies from the Syrian steppe and up the Tigris. Wiesehöfer 2010, 112, prefers a revised chronology (al-Qādisiyya 6 January 638, Nihāwand 642), noted as a departure from the received dates. The transition at Pānkān therefore begins about a decade later than the conquests in Syria and southern Iraq.

[301] Whitcomb 2016, 13 and 23, who characterises Muʿāwiya's political role as the coordination of a population of Christians and Jews as well as Muslims, and reads the transitional coinage as emphasising continuity "with clear indications of new organization".

[302] Morony 1984, on the administrative and social continuities across the conquest in Iraq; for northern Mesopotamia specifically, Robinson 2000.

[303] Zarrinkub 1975, 19: Ḥulwān was taken peacefully in 19/640, Kirmānshāh "too submitted peacefully", and the districts of Māh were divided between the Kufan and Basran garrisons as Māh al-Kūfa and Māh al-Baṣra. The corridor in which Pānkān lies therefore passed to the new authority by negotiated submission rather than by storm — the setting in which an undestroyed fort changing function is to be read.

[304]Morony 1984 remains the standard treatment of the administrative and social transition in Iraq; for the elites of northern Mesopotamia in particular, Robinson 2000.

[305] Tyler-Smith 2000, 150–151: "the coins of Yazdgerd III cannot yet be used to chronicle the Arab conquests of Iran"; the pattern of minting changed in years 19 and 20 as though the dates were immobilised, leaving open whether the coins were struck by the Arabs or by governors still loyal to the dynasty; and coins in Yazdagird's name continued to be produced for at least nine years after his death, without Arabic inscriptions. A Sasanian type is therefore no guarantee of a Sasanian issuing authority, and the near-invisibility of the conquest in the numismatic record is a positive finding rather than a gap.

[306] Daryaee 2016, 73–74 and 77–78: the Umayyads depended on the cooperation of the Iranian nobility because the small Arab army could not directly control the many smaller settlements of the plateau, and for these local lords "it is only the numismatic evidence that provides the names of certain individuals along with dates" (74); on the coinages that retain the Sasanian obverse, the Middle Persian legend and the formula xwarrah abzūd, ibid., 77–78.

status as protected communities (ahl al-dhimma) with their own institutions and internal governance.

For the Church of the East, this new context proved surprisingly advantageous. With the collapse of the Sasanian state and the eclipse of Zoroastrian religious authority, Christianity—particularly the East Syriac tradition—remained the most institutionally cohesive religious structure in the former Persian domains. The patriarchal see at Seleucia-Ctesiphon continued to function, and the vast network of Christian monasteries, episcopal centres, and scriptoria across Mesopotamia remained active. Syriac-speaking Christian elites, many of whom had already served under the Sasanians, found new roles as scribes, translators, physicians, and fiscal administrators in the expanding Islamic state.[307]

The Khuzistan Chronicle, a seventh-century witness written within a generation of the events, shows what that continuity looked like in this particular landscape. When Ctesiphon was ruined and its gates carried off, the catholicos Ishoʿyahb III withdrew not to another capital but to Bet Garmai, to the village of Karka,[308] where he governed the church for eighteen years and where he was buried — the patriarchate of the Church of the East relocating, at the moment of imperial collapse, into the very district in which Pānkān lies.[309] The Chronicle is equally explicit about the terms on which such continuity was bought: his successor was esteemed by the Arab administrators because, as bishop of Mosul, he had assisted the Muslim army during its conquest of the city and had procured provisions for it, and it was the Arabs who advanced him for the catholicate.[310]

The value of the Short Chronicle is not that it stands outside the Sasanian court tradition. Its editor argues the opposite: that it is very probably the earliest Syriac text known to draw on official Sasanian material, and that the distribution of its coverage across the reigns closely tracks that of the Khwadāy-nāmag itself. What distinguishes it is proximity rather than

[307] Morony 1984; Robinson 2000; Baumer 2008.
[308] Payne 2015, 134, who identifies the same man: Yazdin, a Christian aristocrat from Karka d-Beit Slok, held the office of wāstaryōšansālār, "master of the cultivators", as chief fiscal administrator for Mesopotamia and possibly for the empire under Khosrow II, and his son Shamta took part in deposing the king of kings.
[309] Al-Kaʿbi 2016, 82, for the withdrawal of Ishoʿyahb III to Karka d-Bet Garmai, the eighteen years of his patriarchate and his burial in the martyrium there; ibid., 84 with n. 212, on the standing of his successor with the Arab administrators and on the services for which it was granted; on the ecclesiastical geography of the same district in the preceding generation — the metropolitan of Adiabene, the bishop of Karka d-Bet Slokh and the sees of the Zabs — ibid., 36–38.
[310] The integration of Christian notables into the late Sasanian order is visible in the same text: Yazdin of Karka d-Bet Garmai, the great Christian officer of Khosrow II, is described as a builder of churches and monasteries who was "famous in both empires of the Persians and of the Byzantines" and who is said to have sent a thousand silver coins to the king every morning (Al-Kaʿbi 2016, 42–44).

independence — a seventh-century writer with access to that material, working before the Abbasid-era reworkings through which the same tradition otherwise reaches us.[311]

The early Abbasid caliphate not only tolerated but actively drew upon Christian scholars and clergy. Christian secretaries, translators and physicians served the courts and administration of Iraq in numbers, bringing with them a long tradition of Graeco-Syriac learning, and the Church of the East entered a period of intellectual productivity during the eighth and ninth centuries in which its members made a substantial contribution to the translation movement[312].

The wholesale replication of earlier blueprints rarely marked the architectural transition from Sasanian to Islamic rule. Instead, as Bier cautions, early Muslim builders selectively appropriated specific ceremonial spaces—most notably the iwan and domed chamber ensemble—to physically manifest a continued concept of kingship, while modifying the broader structural context to suit new logistical and administrative realities.[313]

This process of adaptation and resilience is archaeologically visible at sites such as Bāzyān, where excavations have documented the continued use of ecclesiastical structures and even architectural renovations during the Abbasid period. Liturgical activity appears to have persisted into the 9th century, with structural and decorative updates signalling institutional vitality rather than decline.[314] Although no church or monastery has yet been conclusively identified at Pānkān, its strategic position along key communication routes, along with numismatic evidence extending into the 13th century, suggests similar patterns of prolonged occupation and adaptation under Islamic governance.[315]

Islamic geographers and chroniclers, including al-Masʿūdī and Yāqūt al-Ḥamawī, documented the continued presence of Christian communities in northern Mesopotamia, often

[311] Al-Kaʿbi 2016, xxi and xxiv, on the Khwadāy-nāmag as the official Sasanian record and on the correspondence between its distribution of material and that of the Chronicle; the claim that the Chronicle "may be the earliest Syriac document known which relies on official Sasanian sources" is made at ibid., ix.
[312] Atiya 1968, 268–270, on the conquerors finding and using the Nestorian centres of Nisibis, Jundishāpūr and Merv: "these schools furnished the state with an able body of administrative personnel, notably accountants and scribes. Physicians, teachers and interpreters were also supplied by the educated Nestorian community" (269); the House of Wisdom founded by al-Maʾmūn in 830 "was staffed essentially by Nestorian scholars" (270). On the Christian secretarial, medical and translating elite of the early Abbasid period, Morony 1984.
[313] Bier 1993, 60–62, at 62: early Muslim princes did not imitate the Sasanian palace "in a comprehensive sense"; where influence appears it is "invariably … in the official portions, more specifically in the throne-room ensemble". On reuse rather than imitation: Sasanian walls determined the plan of the Ilkhanid palace at Takht-i Sulaymān — a case he calls rare — and a Sasanian palace at Samarra was renovated when al-Mutawakkil's Qaṣr al-Jaʿfarī was built in 859–862 (61).
[314]Amin et al. 2023, 135–138.
[315] Occupation running from the Sasanian or early Islamic centuries into the thirteenth is not peculiar to Pānkān. At Abū Qīr near Hīt, a square qaṣr of the same tower-set type, the surface material — hard red- and black-fired wares, Samarra ware and medieval Islamic pottery — was read as indicating "einen relativ langen Okkupationszeitraum … der etwa das 9. bis 13. Jahrhundert umfaßt" (Finster and Schmidt 1976, 14).

emphasising their scholarly contributions, medical expertise, and educational institutions. Their accounts align with archaeological and historical data indicating a robust and evolving Christian presence in the region, particularly in semi-urban and rural nodes such as Bāzyān.[316]

Nonetheless, as Atiya and Payne caution, this coexistence was not without limits. From the later eighth century onward, Christians faced fiscal pressure, episodic violence and a hardening system of legal disabilities as the Muslim population of the region grew — a system, Atiya adds, that was not regularly applied and was enforced with considerable laxity. Yet even amid such challenges, the Church of the East maintained its transregional ecclesiastical network, extending as far as Central Asia, India, and China. The relative security and administrative tolerance that the Caliphate offered during the early Islamic centuries facilitated this outward expansion.[317]

The transformation of religious life in the Pānkān region under Islam, then, was neither a total rupture nor a straightforward continuation but a recontextualisation: Christian communities adjusted to the new order by recalibrating their political posture and emphasising their internal cohesion, and their endurance through successive imperial orders shows how negotiation, continuity and institutional memory shaped identities in northern Mesopotamia.

3. Methodology

The evidence presented in the chapters that follow was produced by six methods: geodetic control, aerial photogrammetric survey, three-dimensional recording by Structure from Motion, magnetometer prospection, systematic metal-detector survey, and radiocarbon dating. Each is treated here in the same order — what the method does and on what principle, what was done with it at Pānkān, and what it cannot establish — because an argument built on a technique is only as strong as the reader's ability to judge the technique[318].

The order in which the methods are presented is the order in which they were applied, and that order was not arbitrary. Geodetic control came first because every subsequent record—aerial, geophysical, photogrammetric, and excavated—is referenced to the same coordinate framework and would otherwise be incomparable. Aerial survey and photogrammetric

[316]Baumer 2008.

[317] Atiya 1968, 269, on the hardening of the disabilities as the Muslim population of the region grew, with his own qualification that "this system was not regularly applied", and ibid., 270, that "in practice considerable laxity was accorded by the rulers in their enforcement"; ibid., 271–272, where he dates the beginning of the decline to the later eighth century and attributes it as much to the wealth, ostentation and simony of the church itself as to pressure from without. For the extent of the network in the same period, ibid., 257–266. Morony 1984.

[318]The published literature governing each of these methods is surveyed at section 1.3.2; the account here is confined to what was done at Pānkān and to the limits of what it can support.

recording followed, because they establish the surface plan against which everything else is located and because they had to precede excavation, which destroys what it records. Geophysical prospection and detector survey were used to decide where to excavate, and their results therefore logically precede the trenches, even though they were carried out in later seasons. Radiocarbon dating comes last because it was applied to material recovered by the preceding methods.

Two cautions apply throughout. The first is that every technique used here samples rather than records exhaustively: a magnetometer registers a contrast in magnetic susceptibility, not a wall; a metal detector registers a detectable object, not the assemblage; and a trench records the volume it opens and nothing else. The second follows from it. Where a method returned nothing, that result is reported below as a property of the method in that ground rather than as evidence of absence. Where an argument in a later chapter depends on such a result, the dependence is stated at the point at which the argument is made.

3.1.GIS and Geodesy

Archaeological work at Pānkān became analytically coherent only when all observed, measured, aerially recorded, and excavated data could be brought into a single, spatially consistent framework. What was required, therefore, was not simple mapping but a system capable of storing, relating, and comparing everything from RPAS imagery to individual trench points within a single coordinate reference system—the function for which a database-centred spatial information system is designed. This was the role of GIS and geodetic control in the project: to provide a single reliable spatial frame accommodating the RPAS flights (2014–2016), the excavation trenches (2018–2021), the magnetometer grids, the metal-detector transects, and the earlier Dwīn material from the first KHAM seasons. Without that frame, the result would have been a set of images; with it, the same material became measurable and comparable archaeological data. This aligns closely with established archaeological GIS literature, which emphasises that spatial data become analytically useful only when geometry, attributes, and provenance are preserved together and remain queryable over time.[319] The project was fixed from the outset in WGS 84 / UTM zone 38N (EPSG:32638[320]). This is the appropriate UTM zone for the site's longitude in northern Iraq, and all the software used (QGIS, ArcGIS Pro, Metashape Professional, and AutoCAD) supports it, allowing area and length to be calculated directly. Another advantage is that EPSG:32638 is widely used in

[319] Cf. Conolly and Lake 2006; Wheatley and Gillings 2002; Chapman 2006.
[320]https://epsg.io/32638

regional remote-sensing products (satellite imagery, DEM services), so later integrations required little or no reprojection. The advantage of adopting a single projected CRS and sticking to it is that any new dataset—from an RPAS, a camera, a total station, or a handheld GPS—can be checked immediately against the existing layers for positional plausibility. This mattered because the datasets were acquired under markedly different conditions: flights in dusty autumn weather, GNSS logged in midday heat, total-station work in confined trench corners, and, in 2021, magnetometer grids recorded close to a power line. A single CRS was the simplest available quality-control measure. In practice, routine spatial quality control involved loading each new layer and checking its alignment against the 2016 orthomosaic, so discrepancies were identified before they could propagate into the excavation database.

Given the range of field conditions and research questions, we adopted a tiered positioning strategy (Figure 4).[321] For quick reconnaissance, drawing the outer extent of the enclosure, and logging footpaths and access routes, an ordinary GPS was sufficient. We used three Garmin Oregon 650t units for this purpose, supplemented where convenient by GPS-enabled handsets and RPAS flight logs. In open terrain, these gave roughly 3–5 m horizontal accuracy, which is adequate for marking points and features of interest, such as surface scatter of pottery. We also imported photograph GPS tags from the RPAS and action cameras as approximate points; these served as context only and were never used as control. This level of positioning corresponds to what many field manuals refer to as "resource-grade"[322] GPS is entirely adequate for prospection-level recording and reconstructing approach routes to the site.

Where higher accuracy was required — wall corners, tower centres, ground control points for the aerial surveys, and later the trenches — survey-grade GNSS was used. Two Leica Viva GS14[323] smart antennas were operated in base–rover configuration, controlled with Leica CS15[324] field controllers. One remained on a tripod and logged continuously, while the other was moved across the site. This yielded centimetre-level positions in the field, which were subsequently refined using Continuously Operating Reference Stations[325] (CORS) data from the U.S. National Geodetic Survey—specifically, the Iraqi station ISER[326] (Iraq Survey) at Erbil, which is unusually generous for the region because it is publicly available and provides carrier-phase and code-range data for 3D positioning. For reproducibility, it should be recorded

[321]Historic England 2015b, the standard guidance on GNSS in archaeological field survey; on the accuracy classes referred to here, ASPRS 2023.
[322]On positional-accuracy classes and the applications for which each is appropriate, see ASPRS 2023.
[323]https://leica-geosystems.com/products/gnss-systems/smart-antennas/leica-viva-gs14
[324]https://leica-geosystems.com/products/gnss-systems/controllers/leica-viva-cs15-and-cs10
[325]https://geodesy.noaa.gov/CORS/
[326]https://geodesy.noaa.gov/cgi-cors/corsage_2.prl?site=ISER

that Iraq appears to be the only Near Eastern country providing geodetic data of this quality free of charge. This infrastructure materially improved the survey's absolute accuracy. The ISER antenna was installed in 2009 on an 11 m-high building, utilising a stainless-steel tribrach adapter with levelling screws to ensure a stable reference. With PPK corrections applied to the local base, control points typically fell within 2–3 cm, comfortably within the tolerance required for tying in photogrammetry, magnetometer grids, and excavation trenches. Under unfavourable satellite geometry or minor multipath, we accepted a horizontal error of up to 5 cm as a practical upper threshold, consistent with RTK performance reported for mixed topography in Iraqi Kurdistan. See Figure 4.



Figure 4. The Initial GNSS Base Setup at the Site. (Photograph by Dr Balázs Major)

Where GNSS remained insufficient, whether through multipath or because architectural recording required millimetre precision, a total station was established on the GNSS-derived control points. This was necessary primarily in the more confined areas, such as some of the 2018–2021 trenches, where measurements on the section walls and in blind spots along the enclosure required greater precision than could be achieved by attempting to get RTK to initialise under poor sky visibility. The total station increased the relative precision from centimetres to millimetres. This was kept tied to the same UTM 38N framework, so that excavation plans, RPAS orthomosaics, and geophysical grids remained in one system. GNSS thus supplied absolute position, while the total station refined local geometry. This distinction

between absolute and relative control proved important when comparing excavation drawings with photogrammetric wall elevations, since the total-station geometry remained locally reliable even where individual GNSS occupations required re-adjustment in post-processing.

All of this contributed to a single GIS project for Pānkān. The resulting dataset comprises WGS 84 control points, GNSS and GPS tracks, RPAS orthomosaics, DEMs and DTMs, contour lines, vector wall traces, trench outlines, magnetometer rasters, and high-resolution satellite imagery. These were stored, where possible, in open, well-documented formats—GeoTIFF for rasters and GeoPackage for vectors—with Shapefiles retained only where compatibility required it. Each layer carries basic ISO 19115/19157 metadata recording its content, date of capture, processing history, and CRS, so it remains interpretable after several years. This approach also meant the GIS could serve as the "spatial engine" for other research questions without rebuilding the spatial database each time. This is not merely a matter of administrative tidiness: it allowed the 2014–2016 aerial models to be reused in 2018–2021, and it distinguishes the Pānkān GIS from an undocumented working folder. Put differently, the GIS was designed from the outset to support both immediate field documentation and long-term, cross-project archaeological inquiry.

In sum, the aim of Chapter 3.1 is to make explicit that the project did not merely "use a GPS" or "produce a 3D model" but constructed a hierarchical positioning framework—ranging from consumer-grade GPS, through survey-grade GNSS supported by CORS data, to total-station measurements—and subordinated all subsequent recording techniques to this framework. This enables later chapters to confidently place a magnetometer anomaly against a wall trace visible in the orthomosaic, or to integrate the 2021 excavation trenches directly into the 2016 RPAS-based site plan without recourse to approximation. It also ensures that the Pānkān dataset remains auditable: the site can be revisited, re-measured or re-analysed in the future, and the spatial relationships will remain internally consistent.

3.2.RPAS-Based Survey

It was evident at the outset that a single season of RPAS photography would not be sufficient. The enclosure surface is uneven and partly under seasonal vegetation, and the excavations planned for 2018–2021 were expected to alter it. The RPAS work was therefore planned as a multi-season documentation programme (2014, 2015, 2016) rather than as a single exercise. The aim was simple yet ambitious: to create a pre-excavation, metrically reliable, georeferenced image and surface record of the site that could be used repeatedly and integrated directly into the GIS and geodetic framework described in Chapter 3.1. The intention was that

the RPAS data should function as survey data rather than as illustration. This is close to how recent archaeological remote-sensing literature treats RPAS as a rapid, flexible platform that becomes valuable only when geodetically controlled, properly documented, and re-processable.

The work was accordingly divided into three stages. The 2014 season addressed a preliminary question: whether flight was feasible at all, and whether a usable photogrammetric block could be obtained over Pānkān under severe logistical constraints, with only half a battery available. In 2015 the method was refined by flying systematically from a more capable platform and, most importantly, by tying every flight to ground control measured with Leica GNSS and corrected against Iraqi CORS data. In 2016, the site was re-flown after the wall tops had been cleaned to record it in its most legible condition before further trenches were opened. This progression—pilot, systematic, confirmatory—follows current good practice in RPAS-based heritage recording, as it reduces risk and allows the team to improve image geometry and GCP layout from season to season.

In autumn 2014, a DJI Phantom 2 was flown with a GoPro Hero 3 Black (12 MP). This was not a survey-grade camera: it carried a fisheye lens with pronounced radial distortion, and only half a battery was available within the permitted survey window. Power was unstable, and flight permissions arrived late. The flight nonetheless produced a complete, current view of the enclosure when vegetation was low and shadows manageable. The images were processed in Agisoft PhotoScan Professional (then at version 1. x), allowing the software to self-calibrate the lens, and removed obvious outliers through gradual selection. The resulting orthomosaic was not perfect, but it was rectified well enough to serve as a planning backdrop for the 2015 season and for drawing the first geophysical grids. Structure-from-Motion (SfM) was only beginning to enter mainstream archaeological practice, and converting a consumer camera on a small RPAS into a measurable raster was enough to show the method was viable at Pānkān.

The 2015 campaign was designed to yield survey-grade rather than illustrative data. By then the Leica Viva GS14 GNSS equipment was on site (two receivers in base–rover mode, controlled with CS15), and tests had already been made of the U.S. National Geodetic Survey's Continuously Operating Reference Station (CORS) at Erbil—site name Iraq Survey, four-character ID ISER—as a source of reference data. The station, whose installation is described in Chapter 3.1 above, is unusually valuable because Iraq appears to be the only Near Eastern country that offers such geodetic data to the public free of charge. A local base was logged with the Leica receivers, the ISER RINEX data were downloaded, and the baselines were post-processed so each ground control point had a securely determined absolute position.

With this geodetic framework in place, a DJI Phantom 3 Professional was flown several times a week over approximately three weeks, under varying visibility and weather conditions. The integrated, gimbal-stabilised 12 MP camera, the more predictable on-board GNSS, and the live video feed made planning and quality control much easier than in 2014. On most days, we flew three to five productive hours, cycling through ten batteries and covering the 70 × 70 m enclosure together with its immediate surroundings, so the excavations and the magnetometer transect could be seen in context. Flights were planned with high forward and side overlap (approximately 80% / 80%) and a consistent ground sampling distance across blocks; in addition to nadir imagery, oblique coverage was flown across the whole area, concentrating on corners and areas of high relief to reduce the doming effect characteristic of parallel image networks. Ground control points were placed around the perimeter and at the centre of the site, and a separate set of checkpoints was measured and withheld from block adjustment, being reserved for accuracy testing as ASPRS, Historic England,[327] and other guidance documents[328] recommend.[329]

This change — from a small number of approximate points in 2014 to numerous centimetric ground control points and independent checkpoints in 2015 — altered the character of the resulting products. Following bundle adjustment in PhotoScan and export to GeoTIFF, the orthomosaics and DSMs were imported directly into the project GIS in WGS 84 / UTM 38N (EPSG: 32638), as described in Chapter 3.1. Horizontal errors for well-conditioned blocks were typically in the 2–3 cm range after PPK, and under unfavourable satellite geometry or mild multipath an upper limit of 5 cm was accepted, which is consistent with RTK/PPK performance for similar Iraqi/Kurdish conditions reported in the geodetic literature[330]. This meant that, from 2015 onward, the RPAS data were sufficient to serve as the planimetric base for the site, not just for visualisation. See Figure 5.

[327] Bedford 2017, the Historic England guidance on photogrammetric recording.
[328] ASPRS 2023, superseding the first edition of 2014.
[329] A published benchmark for what a low-cost RPAS photogrammetric workflow can achieve under field conditions is Waagen 2019, 16, from two seasons at Satricum: a mean ground-control error of 0.98 cm, a mean horizontal error of 17.1 mm against twelve independent check points (s = 6.2 mm), and a repeatability between successive models of the same volume of 2.7 mm — with a mean error under 2 cm, “already at least as accurate as the usual TS measurements”. The residuals reported here fall in the same range; the comparison is offered so that the figures above may be judged against a published case rather than taken on trust.
[330]The tolerances applied here follow the accuracy classes defined in ASPRS 2023; for their application to heritage recording see Bedford 2017.

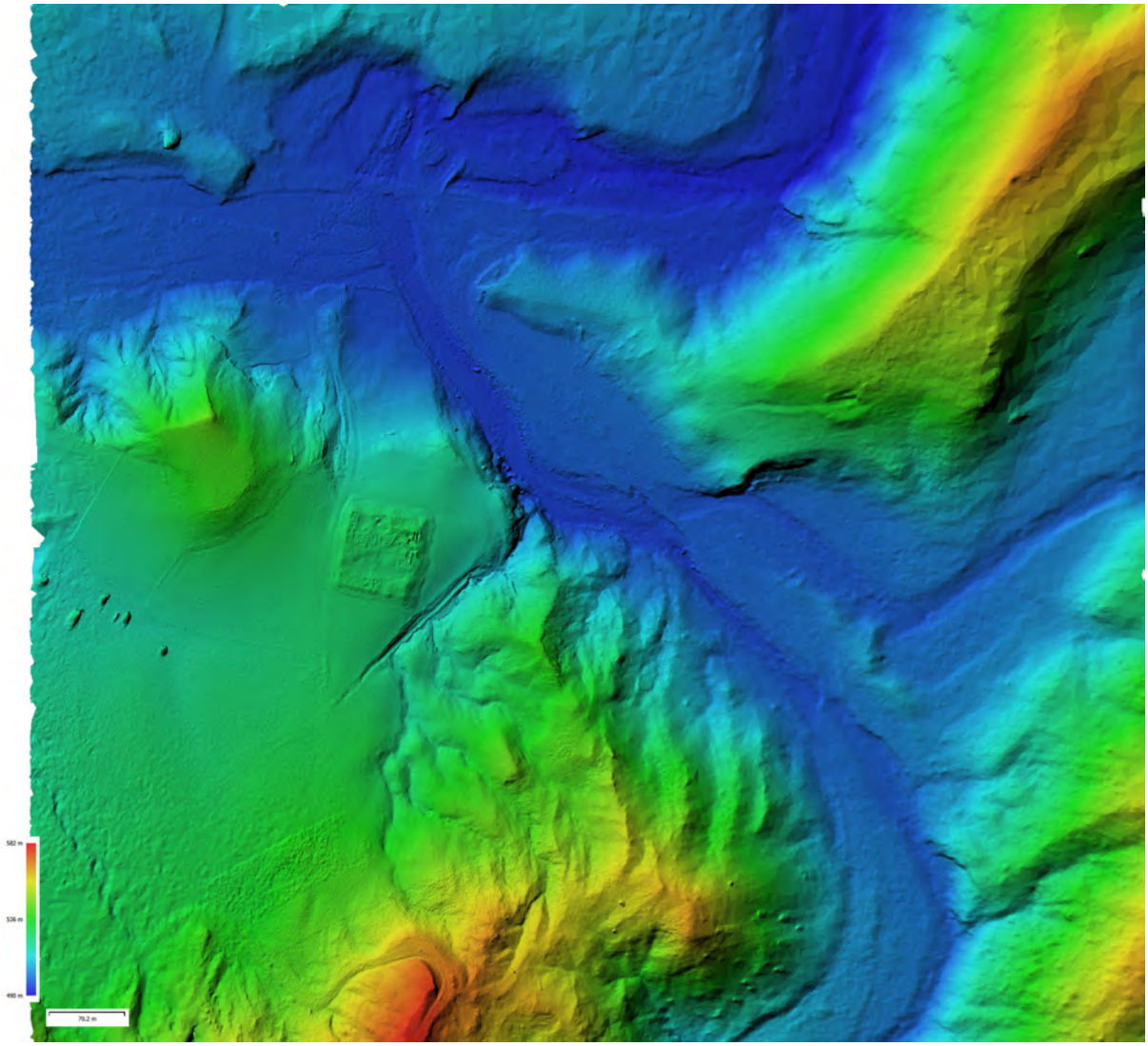

Figure 5. Digital Elevation Model of the 2015 RPAS-based Survey

By 2016 it was established that trenches would be opened at Pānkān in the following seasons. The site was therefore re-flown with a Phantom 3 Professional, repeating the 2015 procedure but after the wall tops had been cleaned and vegetation cleared from the principal corners. The aim was to record the enclosure in the most legible condition obtainable. We used the same ground sampling distance, overlap strategy, and ground control layout. We processed the images in Metashape, the successor to PhotoScan, which by then offered improved depth-map generation and camera-model handling. The 2016 orthomosaic is therefore the flattest, cleanest and most easily digitised raster in the whole series. This block served as the geospatial base for trench planning between 2018 and 2021, with doubtful areas — shadowed corners, collapsed wall sections, and small patches of vegetation — cross-checked against the 2015 data. This cross-seasonal comparison is a key strength of RPAS-based documentation and is

now widely promoted in archaeological remote sensing.[331] Re-flying improved accuracy and additionally introduced a temporal dimension useful for interpreting the site as a whole.

The aerial outputs were not treated as complete once Metashape had produced an orthomosaic. They were imported into QGIS and ArcGIS Pro, inspected against the GNSS control layer, and checked to confirm that the measured ground control residuals matched the RMSE H and RMSE Z values given in the processing report. Where a ground control point drifted more than expected, we reprocessed the block or flagged the point in the metadata. All imagery, including RAW and JPEG files, together with the GNSS control files and Metashape project files, was archived as a unit to permit later reprocessing. This is not a trivial consideration: as the software improved between 2015 and 2021, several early projects were reopened, realigned under stricter settings, and re-exported as denser point clouds and higher-quality meshes without re-flying the site. That sort of longevity only works when the RPAS survey is integrated within a properly managed GIS/geodesy system.

Because every RPAS block shared the CRS and control logic of the GNSS and total-station work, operations became possible that are frequently attempted in field archaeology but seldom achieved with accuracy: magnetometer rasters could be draped over the 2016 orthomosaic to test whether a linear anomaly in fact followed a visible wall, and the 2018–2021 trench polygons could be projected onto the pre-excavation plan to establish exactly how much masonry had been removed. RPAS missions also produced many incidental oblique photos—for example, on return legs or when avoiding wind gusts—which captured the state of fields, roads, fences, parked vehicles and temporary structures. These were also imported, since in a rapidly changing hinterland zone even incidental documentation of this kind carries heritage value.

The RPAS survey limitations should also be stated. Flights were made principally in good visibility and low vegetation; high winds and rain were avoided, and the DJI camera supplied 12 MP JPEGs rather than raw metric imagery. These constraints were mitigated by dense, accurately measured ground control, repeated flights under differing light and ground conditions, and external geodetic control from the ISER CORS. The limitations of a non-metric camera and difficult logistics were thus offset by firm geodetic control and repeated coverage. This strategy is increasingly common in archaeological RPAS projects[332], especially when budgets do not allow for higher-end RTK drones or when permissions restrict flight time.

[331]Campana 2017; Bedford 2017.
[332]Campana 2017; cf. Doneus et al. 2011 and Verhoeven et al. 2012 for comparable low-cost, control-led workflows.

To sum up, the RPAS-based survey at Pānkān followed the same logic as the GIS and geodetic work: observe early, control firmly, and keep everything in a single spatial language (EPSG:32638). Because three seasons were flown with compatible parameters, we measured ground control with survey-grade GNSS and corrected it against CORS. Because both imagery and metadata were archived, the 2014–2016 aerial dataset can be treated as a stable archaeological resource rather than a set of illustrations. This allows later chapters to overlay geophysics, insert the 2021 trenches into the 2016 plan without guessing, and re-run 3D modelling whenever software or research questions demand it. See Figures 6–8.

3.2.1. 2016. The Final RPAS Survey

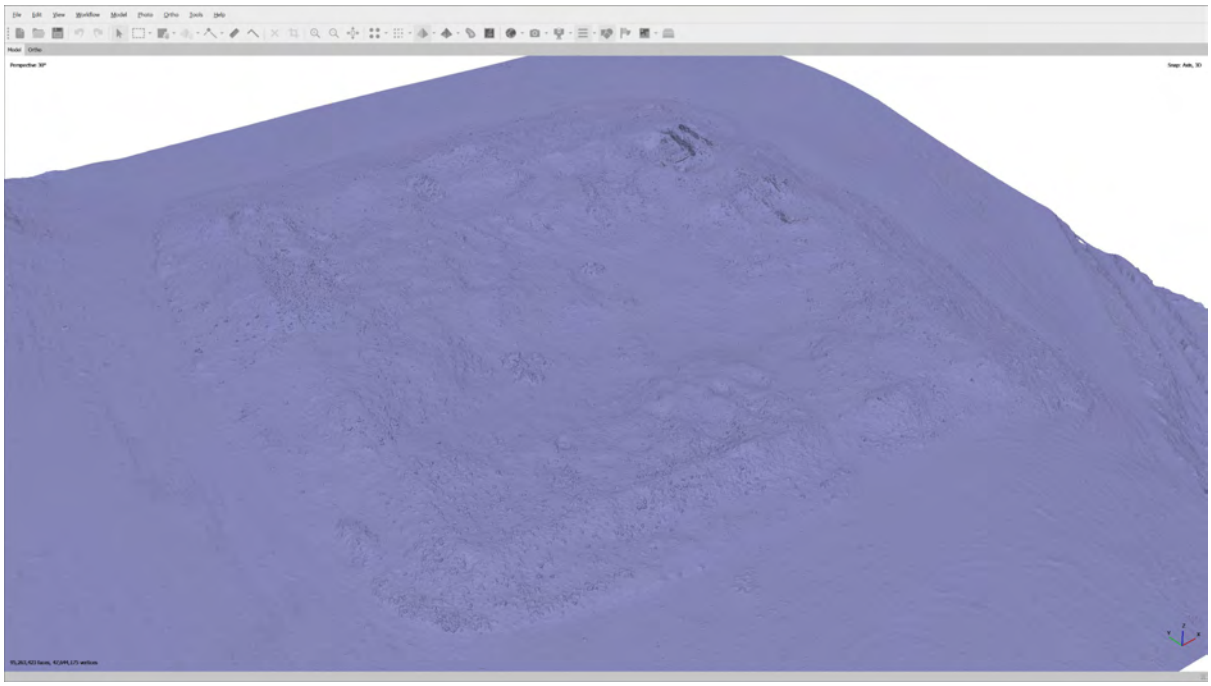

Figure 6. Solid Model View of the 2016 RPAS-based Survey

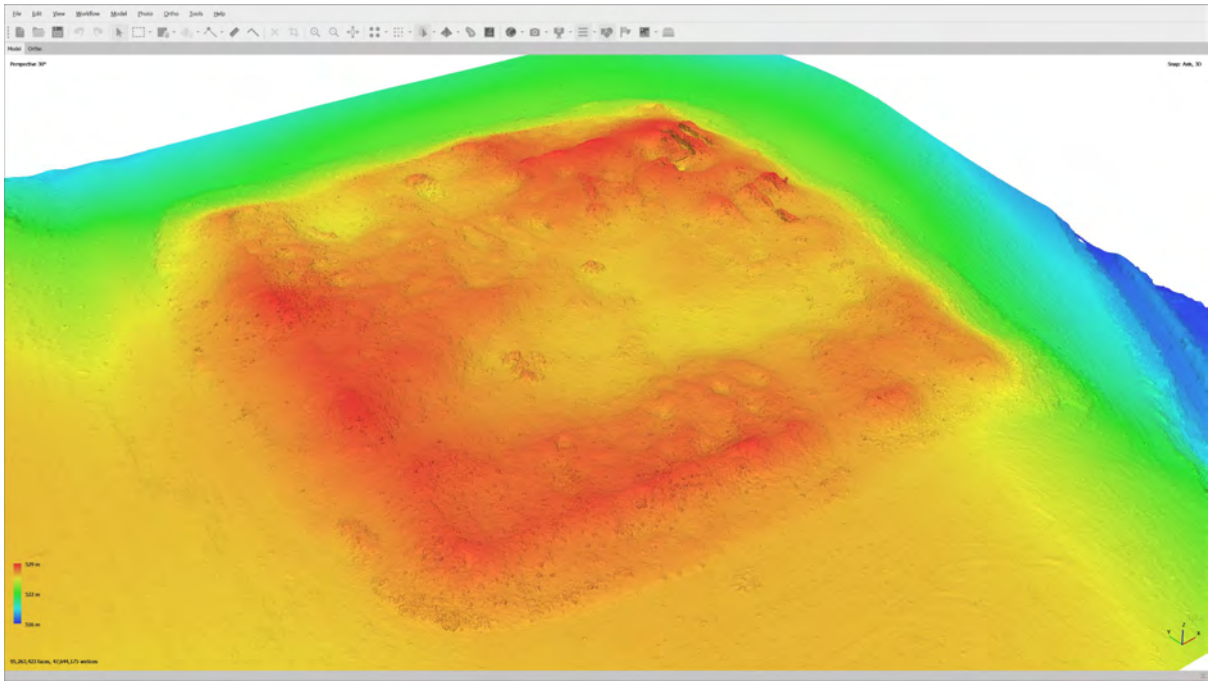

Figure 7. Elevation Model View of the 2016 RPAS-based Survey



Figure 8. Textured Model View of the 2016 RPAS-based Survey

3.3.Structure from Motion: Methodological Framework

3.3.1. The Shift to Photogrammetry in Heritage Preservation

The adoption of 3D photogrammetry for archaeological purposes has increased markedly over the past two decades, altering how sites are surveyed and recorded. For years, the 3D mapping and prospection of archaeological sites primarily relied on terrestrial and aerial

laser scanning. However, short-range and aerial photogrammetry has seen a notable resurgence, driven by advances in *Structure-from-Motion* (SfM) algorithms.[333] SfM-based processing reconstructs measurable geometry by aligning overlapping images to generate high-resolution 3D models and point clouds. The approach entered archaeological practice through Verhoeven's demonstration that consumer aerial photography could be converted into metrically usable three-dimensional reconstructions, and was consolidated within a few years into a body of method literature setting out how such recording should be conducted and reported.[334] The Ghent studies established its integration into routine excavation workflows, rather than its use for set-piece monuments, by quantifying both the attainable accuracy and the time cost of recording successive excavation surfaces in three dimensions.[335] Advanced algorithms now enable sophisticated software-based image analysis and automated image matching, allowing large datasets to be combined reliably.

Various methods exist for creating 3D models for archaeological purposes, and the Kurdish-Hungarian Archaeological Mission (KHAM) initially used laser scanning at the castle of Dwīn. Financial and technical constraints made 3D photogrammetry the practical alternative for recording the site before excavation and documenting exposed features during each season.[336] As a lower-cost, reliable alternative to laser scanning, SfM has replaced many stages of manual field recording and is now a standard element of archaeological documentation.[337]

Implementing these techniques at the archaeological site of Pānkān—located approximately 37 km north-northeast of Erbil in the Kurdistan Region of Iraq—was not merely a methodological choice but a necessity for cultural heritage preservation. The site consists of the remains of a roughly 70×70 metre fortified architectural complex dating to the late Sasanian and early Islamic periods (Figures 1–2). Due to decades of regional conflict and isolation, many archaeological monuments remained unexcavated until the 2010s. While relative peace has allowed new research, the region's political uncertainties, intermittent armed conflicts, and lack of local heritage infrastructure mean excavated structures remain at risk of degradation. In this context, systematic digital documentation provides a durable virtual record, helping to ensure

[333]Doneus et al. 2011; Verhoeven et al. 2012; Campana et al. 2012.
[334]Verhoeven 2011, 67–73, the paper that introduced SfM-based reconstruction from aerial photographs to archaeological practice; for the wider methodological framework, Remondino and Campana 2014.
[335]De Reu et al. 2013, 1108–1121; De Reu et al. 2014, 251–262, on the integration of image-based 3D recording into routine excavation workflow.
[336] The recording experience on which the present workflow draws is reported in Gering et al. 2017, on three-dimensional field recording at Ostia, and Takáts 2019, on the documentation programme at Margat.
[337]Bedford 2017, the standard published guidance for photogrammetric recording of cultural heritage.

that scientific and cultural data remain accessible even if the physical remains are damaged or destroyed.

3.3.2. Data Acquisition and Hardware Implementation

Remote sensing has long been used to study archaeological landscapes, and its scope has widened considerably with technical developments in the present century. During the fieldwork seasons at Pānkān between 2014 and 2021, traditional archaeological documentation was systematically augmented with modern digital methods, including GNSS and total station-based geodetic surveys, drone-assisted aerial photography, and SfM photogrammetry.[338]

We acquired overlapping image sequences for photogrammetric processing by surveying the entire site with a Remotely Piloted Aircraft System (RPAS). The capabilities and limitations of such platforms for photogrammetric work are set out in the standard technical review of the field, and their specifically archaeological application has been surveyed separately.[339] Initially, data were collected in 2014 using a DJI Phantom 2 equipped with a GoPro camera, which was later upgraded to a DJI Phantom 3 Professional drone system for the 2015–2016 seasons. This aerial data, combined with photographs from terrestrial excavations, yielded tens of thousands of overlapping images.

Crucially, we prioritised the scale and geographic registration of these models from the outset. Geodetic control points were established using a Leica GS14 GNSS Base and Rover system with CS15 controllers and a Leica TS06 plus 2” total station with GPR111 prism. By incorporating these highly precise measurements, every 3D model was georeferenced to real-world coordinates, ensuring the photogrammetric reconstructions were generated at true-to-life scale and orientation that corresponded directly to the field conditions.[340]

3.3.3. Processing Pipeline and Software Integration

Successful photogrammetry requires deliberate decisions at every stage, from data collection to final visualisation and interpretation. To mitigate data loss, minimising data conversion and compression until the final stages is critical. Adobe Bridge and Lightroom were used to organise and process several thousand photographs, including RAW-to-JPEG batch conversion, without resizing the images or removing lens distortion.

[338]Campana 2017.
[339]Colomina and Molina 2014, 79–97, the standard review of unmanned aerial systems in photogrammetry and remote sensing; for archaeological applications specifically, Campana 2017.
[340]Bedford 2017; on the accuracy classes against which such georeferencing is assessed, ASPRS 2023.

The core photogrammetric processing was executed using Agisoft Metashape Professional (formerly PhotoScan Professional). This produced dense point clouds and textured surface models with detail beyond what manual drafting or standard orthophotography can provide, recording masonry, sedimentary layers, and smaller features such as hearths and postholes with sub-centimetre accuracy.[341] See Figure 9.

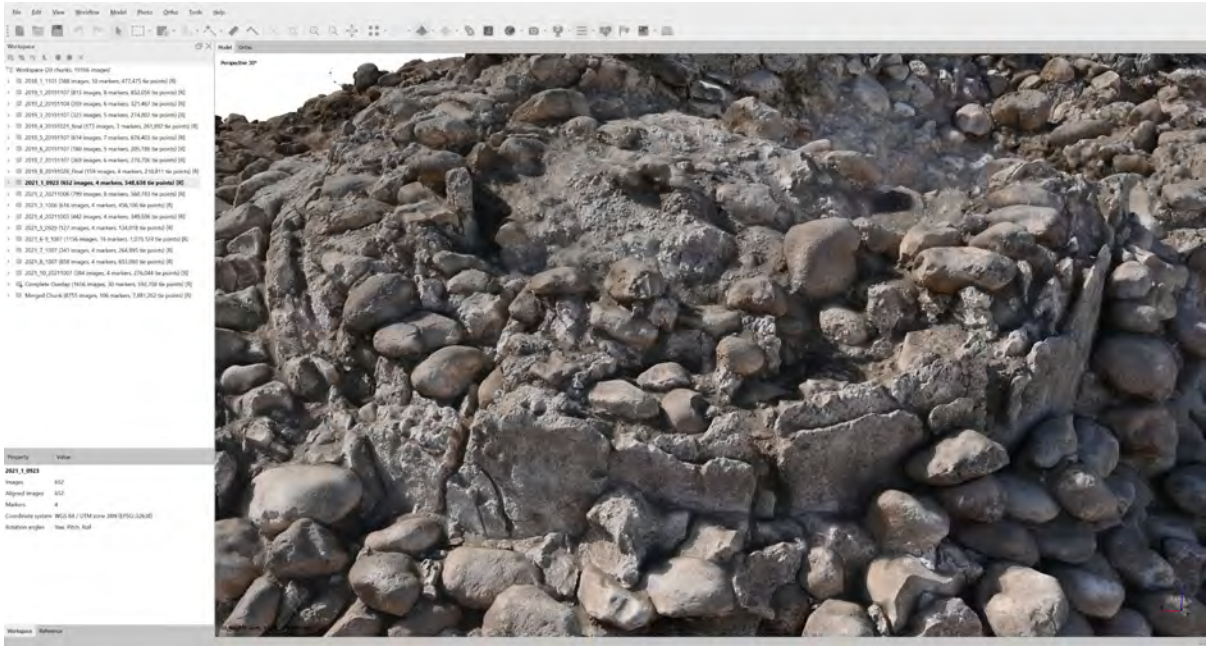

Figure 9. Close-up 3D Textured Model View of T7 inside Trench 2021/1 within Agisoft Metashape Professional

Over the course of the project, we completed 3D documentation and model reconstruction for nineteen individual excavation trenches. The photographic data for each season were initially processed separately, producing distinct sub-models of the exposed areas. These seasonal models were then integrated into a common coordinate system. Overlapping control points shared between excavation areas across seasons allowed the sub-models to merge into a single master model. This georeferenced master model encompasses the entire excavated complex and serves as a high-resolution, dimensionally accurate "3D snapshot" of the site as it appeared during fieldwork. The cumulative effect of recording at this density, and the questions it raises about what such records are for, have been reviewed synoptically.[342]

The survey and documentation efforts required an extensive ecosystem of software tools to manage, visualise, and analyse the spatial data:

[341]Bedford 2017, on processing workflow and the reporting of residuals.
[342]Opitz and Limp 2015, 347–364, for a synthesis of high-density survey and measurement and its implications for archaeological practice.

- **Agisoft Metashape Professional:** Utilised for SfM algorithmic processing, generating high-resolution point clouds and textured 3D models from both drone and terrestrial imagery.
- **CloudCompare:** This open-source software proved highly effective for the post-processing of massive 3D point clouds. It was instrumental in noise reduction, point cloud thinning, and isolating specific architectural features, while also enabling quantitative comparative analyses to detect subtle surface changes over time.
- **Autodesk ReCap Pro:** Crucial for bridging the gap between photogrammetry and architectural drafting, this software converted exported datasets into native .rcp formats for direct import into CAD environments.
- **Autodesk AutoCAD Map 3D:** Employed to process the terrain models and architectural remains into precise 2D vector plans and vertical cross-sections.
- **QGIS Desktop:** This geospatial software was used to embed the georeferenced 3D models into a broader cartographic environment, integrating them with satellite imagery and regional topography.

3.3.4. Spatial Analysis and Virtual Reconstruction

The final vector plans of Pānkān were compiled from datasets accumulated over nearly a decade of fieldwork. This multi-year approach produced the most detailed and accurate documentation obtainable at the time of each season. The reliability of the photogrammetric method was tested by comparing the SfM models against laser-scanned data from a second site approximately 2 km from Pānkān (Figures 10–14). The comparison supported the accuracy of the photogrammetry, which was accordingly adopted as the principal recording technique.[343] Such comparison against an independent reference dataset is the established means of assessing SfM performance, and published assessments of this kind have generally found image-based reconstruction to approach laser scanning closely enough for archaeological recording

[343] The same comparison has been made in a Near Eastern setting, with the same outcome: recording Dedan and Madāʾin Ṣāliḥ with a terrestrial laser scanner and with Structure from Motion from the ground and from a multirotor platform, Smith et al. 2014, 177–179, find the SfM point cloud of lower resolution than LiDAR but "much faster, easier to perform, and vastly more accurate than past archaeological methods". Their reason for flying is the one that applied at Pānkān: a terrestrial scanner cannot reach the small interior rooms, narrow trenches and other occlusive areas of a site, which "are easily viewed from the air", aerial recording capturing sites "as top-down architectural drawings" (177).

purposes, while differing markedly in cost and in the conditions under which it can be deployed.[344]



Figure 10. Top-down orthographic detail of the Textured 2016 3D survey model showing the surface remains of the architectural complex's southern entrance (future Trench 2019/1) in Agisoft Metashape Professional (created by Bendegúz Takáts)

[344]Green, Bevan, and Shapland 2014, 173–181, a comparative assessment of SfM implementations against reference data.

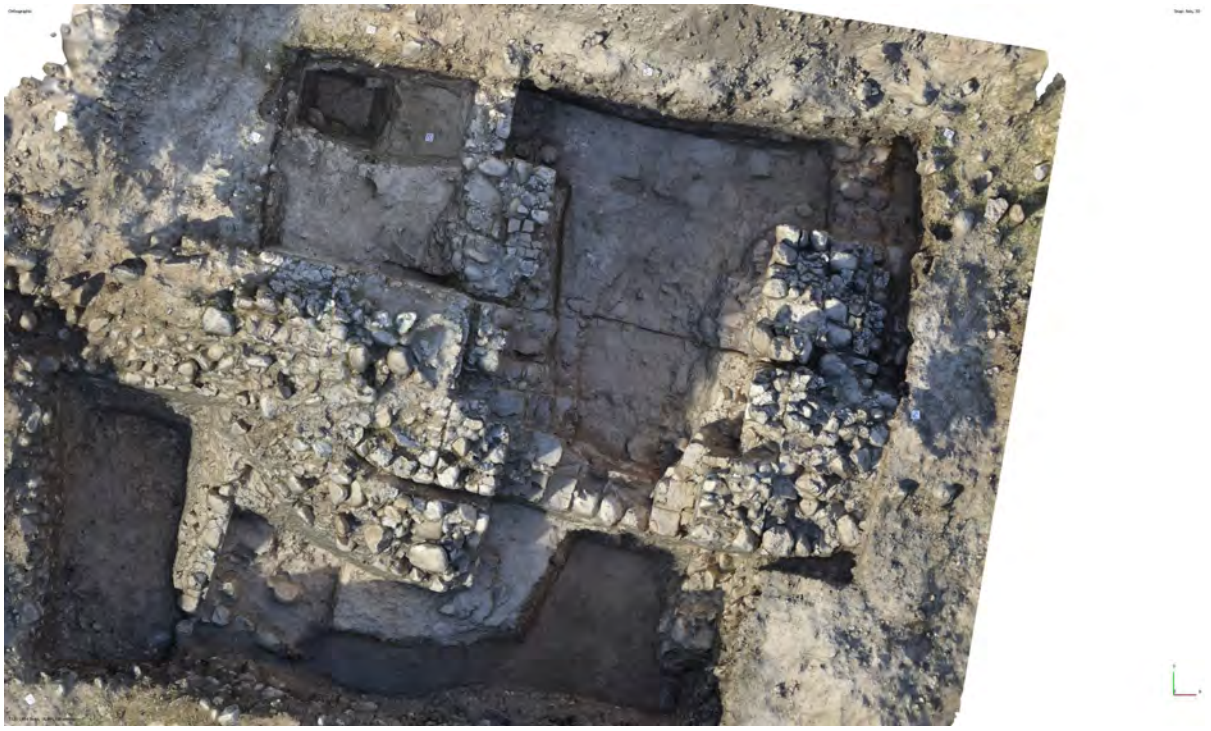

Figure 11. Textured 3D Model of the excavated state of the architectural complex's southern entrance (Trench 2019/1) in top-down orthographic view in Agisoft Metashape Professional (created by Bendegúz Takáts).

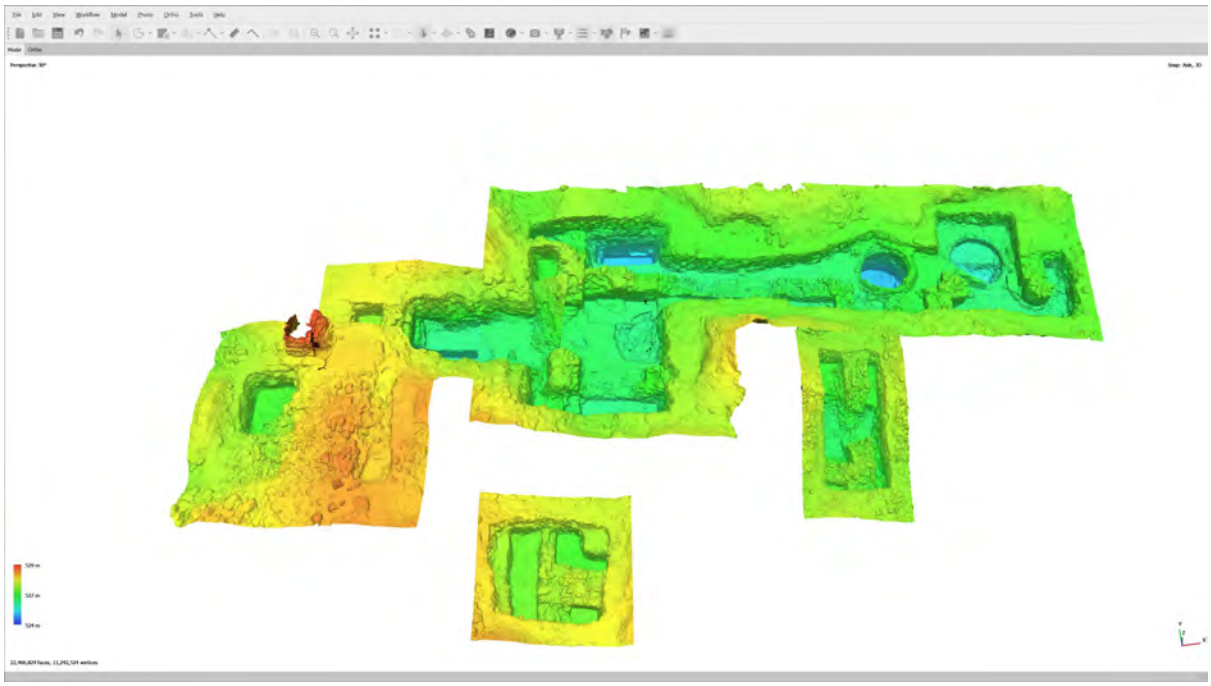

Figure 12. Combined 3D model of the northern trenches from the 2019 excavation in Agisoft Metashape Professional, with 3D elevation colouring (created by Bendegúz Takáts)

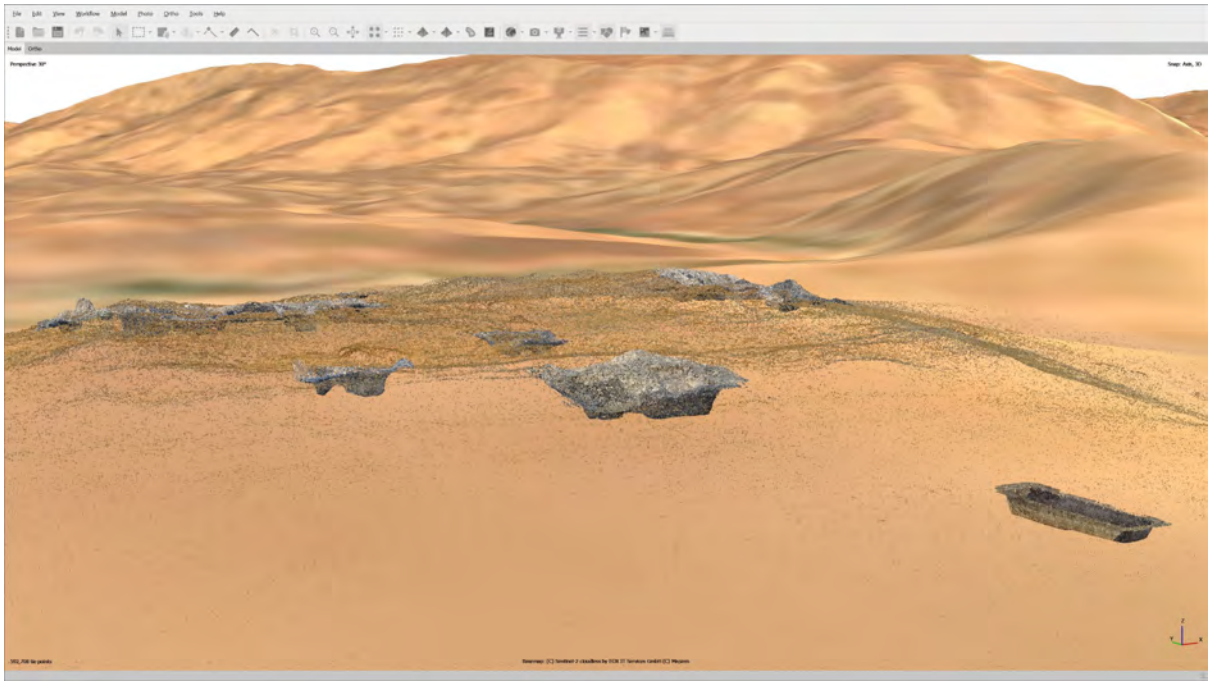

Figure 13. Combined master model 3D point cloud of the 2018–2021 excavation trenches in Agisoft Metashape Professional, viewed as a 3D terrain model (created by Bendegúz Takáts; BaseMap license; Sentinel-2 cloudless by EOX IT Services GmbH Mapzen).

The 3D models generated were not merely final visual products; they also served as the foundation for comprehensive geospatial analysis. Orthomosaic maps, digital terrain models (DTMs), and vertical cross-sections were extracted from the dense point clouds and textured surface models, supplementing the conventional archaeological record. By combining digital elevation models from broader aerial surveys with detailed 3D models of the excavated trenches, we achieved a complete virtual reconstruction of the site, including the unexcavated natural terrain.

Integrating these models into a Geographic Information System (GIS) environment enabled a far more nuanced interpretation of Pānkān.[345] By comparing the georeferenced models with satellite imagery and the DTM of the wider region, the site's topographical context—such as its strategic relationship to local water sources and mountain passes—could be accurately assessed (Fig. 3D model integrated with a 3D terrain model in Agisoft Metashape Professional). Most importantly, the digital "rebuilding" of the Pānkān complex facilitated the detailed analysis of architectural and functional transitions between the late Sasanian and early Islamic phases. Read together with the distribution of finds, this spatial record is consistent

[345] For the consolidation of fully three-dimensional GIS as archaeological practice, Dell'Unto and Landeschi 2022.

with the sequence argued in Chapter 5: a fortified military installation whose use shifted in the succeeding centuries towards civil and economic functions. See Figure 14.

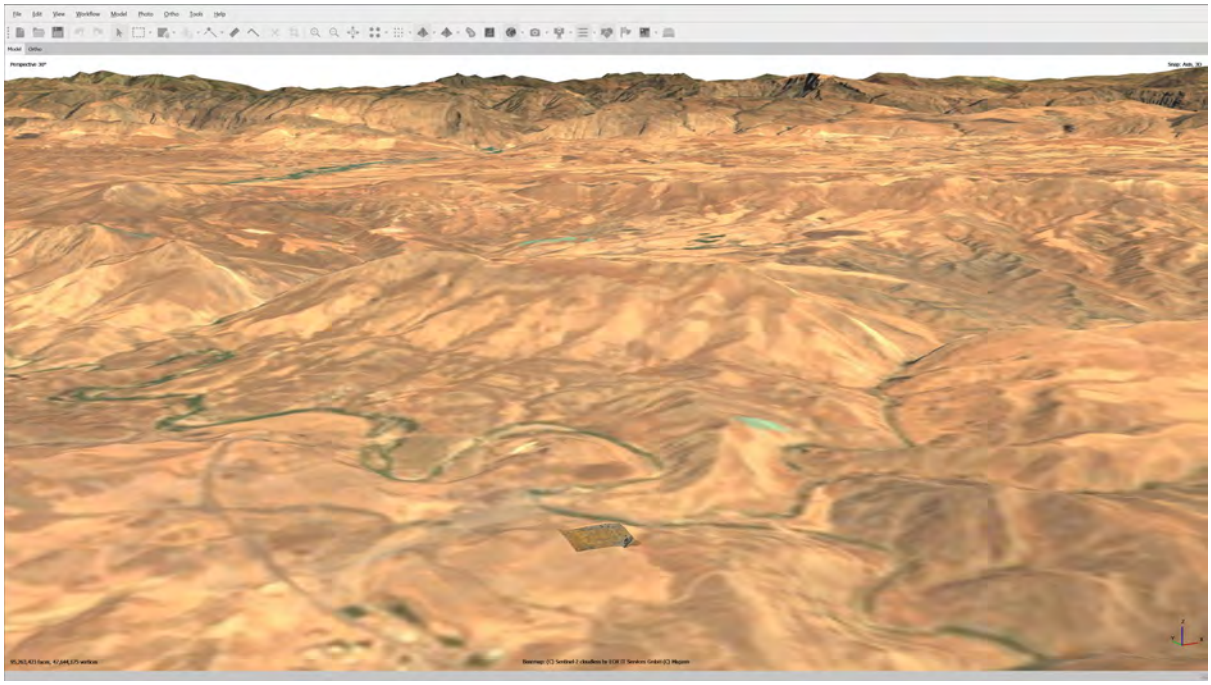

Figure 14. 3D model integrated with a 3D terrain model in Agisoft Metashape Professional (illustration: Bendegúz Takáts; BaseMap license; Sentinel-2 cloudless by EOX IT Services GmbH Mapzen).

The recording programme at Pānkān illustrates what photogrammetric methods can contribute in a Near Eastern field context. Systematic SfM documentation has supported analysis of the site's spatial and functional development and ensured that an endangered heritage site has the opportunity to survive for the future in a highly accurate digital form.

This qualitative assessment of Pānkān's command over the surrounding mountain passes could, in future work, be substantiated through the kind of quantitative viewshed methodology developed for comparable frontier fortification networks elsewhere in the Near East. In her GIS-based study of Urartian and Neo-Assyrian regional fortress networks, Earley-Spadoni measures visibility as the percentage of surrounding terrain visible from each site—distinguishing a single-point viewshed from point-to-point intervisibility and cumulative, multi-point analyses—benchmarked statistically against the mean and median visibility of some 150 randomly generated reference points within the same landscape, calculated at both a local, four-kilometre "human" scale and a wider, ten-kilometre regional scale.[346] Applied to her own study area, this method shows, for example, that in the Urmia basin of northwestern Iran—geographically and topographically the closest of her case studies to the Zagros frontier

[346]Earley-Spadoni 2025, 79–80.

discussed here—fully 58.3 per cent of surveyed fortified sites were “highly integrated” nodes commanding views of three or more neighbouring installations, a result substantially higher than chance would predict.[347] A parallel intervisibility analysis of the Lake Sevan basin, run using Social Network Analysis metrics and tested for statistical significance with Kolmogorov-Smirnov tests, found that twenty-seven Early Iron Age fortified sites generated 107 lines of sight among them, with 81 percent of sites connected to three or more neighbours—a network density and inclusivity value far exceeding that of randomly generated comparison networks, and one she takes as evidence of deliberate, coordinated site placement rather than incidental topographic advantage.[348] Applying an analogous random-point control methodology to Pānkān’s own digital terrain model—and, if warranted by the density of contemporary sites in its immediate hinterland, an equivalent intervisibility analysis—would allow its apparent strategic command of the adjacent mountain passes to be expressed as a statistically defensible value rather than a qualitative observation alone. It would additionally permit the question of whether Pānkān formed part of a wider signalling or communication network to be tested on the same quantitative footing.[349]

3.4.Magnetometer

Magnetometer prospection was applied at Pānkān in two campaigns, in 2014 and in 2021, and its results are more usefully stated as a whole than season by season. Within the enclosure, the method achieved very little. Archaeological anomalies were consistently weak — in the order of ±1–2 nT against a total field of some 47,500 nT — and the surface and near-surface stone that covers much of the interior masked what signal there was, so that no internal plan could be recovered from the magnetograms alone[350]. Outside the walls the method performed better, and three results follow from it: the identification in 2014 of a group of anomalies in the southern foreground that are not aligned with the enclosure and may therefore

[347]Earley-Spadoni 2025, 147.
[348]Earley-Spadoni 2025, 141–142.
[349] The critique literature that such an analysis would have to satisfy is summarised by Chapman 2006, 101–102. Two objections bear directly here: intervisibility between two points is no reason for the location of either without testing other locations that would give the same result (101) — the objection the random-point benchmark above is designed to meet — and the “edge effect” of viewsheds extending beyond the DEM (102), which at Pānkān would require a terrain model reaching well beyond the four- and ten-kilometre radii themselves. A third point tempers expectation: in the Danebury landscape the hillfort viewsheds proved positioned less for defence than “to maximise visual dominance over valleys and other smaller settlements” (101, on Lock and Harris 1996). Command of a route and command of a landscape are not the same measurement, and the analysis would have to be designed to distinguish them.
[350]The soil-magnetic reasons for a weak contrast in this kind of ground are set out below; the negative result is reported here as method-dependent rather than as evidence of absence.

precede it; the detection in 2021 of a two-room structure on the western side, subsequently confirmed by excavation in Trench 2021/4; and the definition of concentrations of collapsed building material to the north and east of the enclosure. The two campaigns are described below in turn, since their instruments, coverage and conditions differed.

3.4.1. 2014

Two magnetometer surveys were carried out around Pānkān in 2014, directed by Gábor Bertók and assisted by the present author. The objective was to identify features associated with the building complex or other archaeological phenomena from different periods.[351] The surveyed area covered 8,200 m², and the ploughed surface was scattered with numerous stones, presenting a challenge during the survey.[352] Given the limited time available, survey lines were spaced at 1 m to cover a larger area, with a sample interval of 0.25 m along each line. The surveys were performed using a GSM 19GW magnetometer manufactured by GEM Systems,[353] in a gradiometer setup with a 130 cm probe interval. The instrument was operated in "walking" mode with a sampling interval of 0.2 seconds.[354]

The field was essentially free from magnetic debris, which aided data clarity (Figures 15–16). The weakness of the archaeological signal recorded here is itself informative and consistent with what is known about the soil-magnetic basis of the method. Magnetic prospection depends on a contrast in magnetic susceptibility between a feature and its matrix. That contrast is generated principally by the pedogenic and microbial formation of fine-grained magnetite in the topsoil, and by the thermoremanent enhancement of fired material.[355] Where the buried structure is built of stone that is itself weakly magnetic, the contrast is not absent but inverted: provided the surrounding soil is magnetically enhanced, such foundations register as magnetic lows rather than highs, and the negative polarity of the wall anomalies recorded outside the enclosure in 2021, in Areas 3 and 7 below, is consistent with that mechanism. Fired

[351] Gaffney and Gater 2003 remains the standard general introduction; for magnetometry specifically, Aspinall, Gaffney, and Schmidt 2008. For ground-penetrating radar, the standard handbook is Conyers 2013.

[352] David, Linford, and Linford 2008, the standard published guidance on geophysical survey in archaeological evaluation.

[353] www.gemsys.ca

[354] The director of the 2014 survey has published his methodology for integrated non-invasive prospection elsewhere: Bertók, Gáti, and Simon 2015, on ten years of combined aerial photography, magnetometry, trial trenching, LiDAR and precision-agriculture datasets at a single site, and on the interpretative gain from analysing them together rather than in sequence.

[355] Fassbinder 2015, 85–95, on the soil-magnetic basis of magnetic prospection. His own position bears on how the negative result below is to be read: the enhancement of ferrimagnetic minerals in the topsoil is "a common property of almost all soils worldwide" (Fassbinder 2017, 502), and outside rare waterlogged situations "there exist no limiting geological factors precluding the application of magnetic prospecting" (499); the 2015 paper argues the point for steppe and desert soils specifically. The difficulty at Pānkān is therefore not that the method is inapplicable in a semi-arid landscape, and no such claim is made here.

features remain strongly detectable on the ordinary principle, which is why the clearest positive results obtained in both campaigns are the small anomalies interpreted as hearths, kilns or burnt deposits. Within the enclosure the obstacle is of a different order, and it is the one the survey reports themselves name: the ground surface is strewn with the same stone of which the buildings were made, so that the near-surface returns a contrast almost everywhere and no plan can be resolved beneath it.[356] However, a significant portion of the survey data was compromised by a metal pipeline running through the central part of the survey area. The average total magnetic field during the survey was 47,524.85 nT; however, most potential archaeological anomalies were extremely weak, with variations of only ±1-2 nT. In the western survey area, we detected no significant anomalies. We observed a few very weak signals, including two NE-SW-oriented stripes unlikely to be man-made and a narrow linear feature running N-S whose origin remains unclear. The absence of an internal plan in the magnetograms is therefore a property of the method in this ground rather than a statement about the site,[357] and it defines what a further campaign would have to do: use a technique that resolves the subsurface by depth, so that what lies beneath the stone cover can be separated from the stone cover itself.[358]

[356] The mechanism is set out by Fassbinder 2017, 505–506: the first cause of a negative magnetic anomaly is structural material of lower susceptibility than the adjacent topsoil — foundations of weakly magnetic limestone or sandstone in magnetic soil; at Qanṭīr the limestone and sandstone column bases of the palace of Ramesses II "were always visible as a negative anomaly" (506). The earliest recorded instance in the history of the method is of the same kind: at Sybaris the limestone wall registered "as a reverse anomaly compared to the surroundings" amid soil rich in volcanic material (Herbich 2015, 28–29, reporting Lerici 1962, 6).

[357] The condition is stated by Bevan and Smekalova 2013, 135: stones that are not magnetic can be detected "as long as the surrounding soil is rather magnetic", their foundations causing "distinctive magnetic lows" — in the Mediterranean the limestone bedrock is essentially nonmagnetic, the soil usually quite magnetic. Whether the second half of that condition is satisfied at Pānkān cannot be settled from the present data, since the magnetic susceptibility of the soil was not measured; what the two campaigns establish is that the resulting contrast, whatever its cause, was of the order of ±1–2 nT, and that within the enclosure it was in any case masked by the stone lying on and immediately below the surface. Conyers 2018, 7, makes the complementary point: in limestone landscapes magnetic contrasts are "mostly a function of human activity", whereas ground-penetrating radar in the same settings shows "significant reflection contrasts" around architecture of non-magnetic stone.

[358] The closest methodological parallel is a fort: at Newstead the foundations of the stone wall are clearly visible as high-resistance anomalies, including the towers of the eastern gate, while the same wall "creates only faint magnetic anomalies" (Schmidt 2013, 162–163) — the two datasets were combined for interpretation rather than used in the alternative. At Pancorbo Castle combined ground-penetrating radar and electrical resistivity tomography located anomalies that two subsequent excavations confirmed, yielding well-preserved stone wall plinths (Fernández-Álvarez et al. 2017, 86 and 92). Neither method was available to the present project; the point of recording them is to state what the negative magnetometry does and does not license, and what a further campaign should carry: profiles at 0.5 m spacing with an antenna in the 200–300 MHz range reaching 2–3 m where ground conditions allow (Manataki et al. 2015, 15) — a qualification that cuts both ways, since radar performs best on flat, clear, low-conductivity ground (ibid., 13–14), the Pānkān interior is neither flat nor clear, and radar is in any case no guarantee (Pîrnău et al. 2014, 24). What can be said is that the sequence proposed here — large-area magnetometry to define the ground, followed by targeted radar — is a documented working procedure: at Masseria Grasso the geomagnetic survey defined the first excavations and a detailed radar survey then resolved rooms and paved surfaces (Rizzo et al. 2018), and at San Pietro a Cellaria gradiometry and radar

To the east, near the southern end of the pipeline, a large anomaly with three peaks of approximately 90 nT was recorded, considerably weaker than the pipeline signal, which averaged ±300–400 nT. This anomaly was predominantly positive, with a faint negative ring and a flatter profile, which could suggest an intensely burned area, such as a kiln. However, a deeply buried, strongly metallic object cannot be ruled out. The most promising anomalies were detected in a grey, discoloured area south of the enclosure, featuring a substantial scatter of late Sasanian to early Islamic pottery on the surface. The anomalies in this section were primarily amorphous and likely represented pits backfilled with a mixture of materials. A more substantial linear feature, distinct from the enclosure's orientation, was also detected and may represent the foundation of a limestone wall or fence. Additional signals suggested internal divisions within the enclosure.

Based on these results, a small trial trench was planned over the identified features to determine their character and their relationship to the pottery scatter and the adjacent building complex. It was evident that continued fieldwork and extended magnetic surveys in the area could further enhance the interpretation of these features and clarify their archaeological significance. Comparable magnetometer prospection has since been applied to Sasanian fortified sites in the wider region, providing a methodological benchmark against which the Pānkān results can be read.[359,360] See Figures 15–16.

together identified structures "in an area where the architecture was virtually invisible", each method registering anomalies that the other did not (Leucci et al. 2015, 244–245).

[359] The methodological principle is set out by the editor of the standard recent volume on non-invasive survey: "only a real and strong integration of approaches and techniques can bring about the understanding of a complex site" (Corsi 2013, 5), with the caution that data acquisition and the generation of knowledge are to be kept distinct (4). For the region itself there is one published precedent for radar-based prospection at a comparable Iraqi site: Abdulrazzaq 2020 combines ALOS PALSAR imagery with a 250 MHz ground-penetrating radar survey at al-Ukhaydir, the Abbasid qaṣr cited in Chapter 4 above.

[360] Tamm et al. 2018, esp. 89–146, for magnetometer prospection at a Sasanian hinterland fortress in comparable terrain; Sauer, Nokandeh, and Rekavandi 2022, 76–82 and 387–404, for its systematic application, together with aerial survey, across a Sasanian fort corpus.

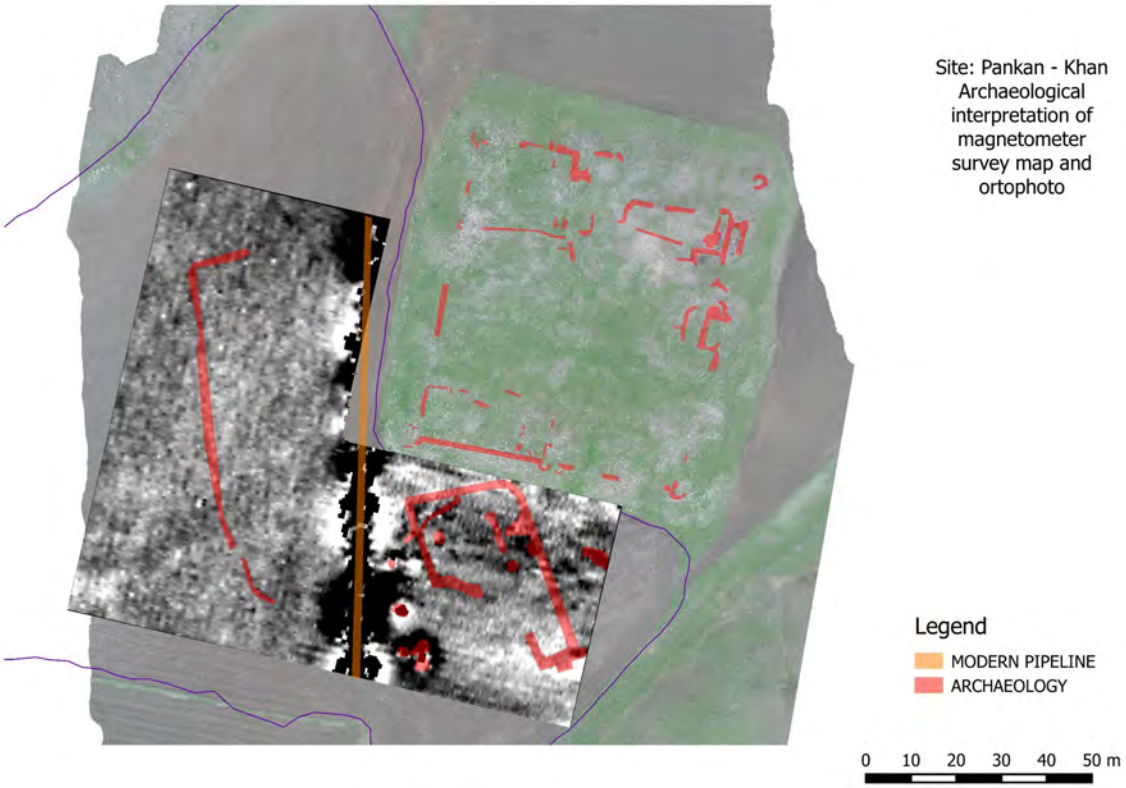

Figure 15. Interpreted Results of the 2014 Geomagnetic Survey with Magnetogram (Illustration by Dr Gábor Bertók)



Figure 16. Interpreted Results of the 2014 Geomagnetic Survey without Magnetogram (Illustration by Dr Gábor Bertók)

3.4.2. 2021

Eszter Lókiné Kis Szabó and the present author carried out a geomagnetic survey between 19 September and 6 October 2021, assisted by Keve Jámbor, covering ten separate areas selected based on site topography. The survey instrumentation consisted of a GemSys GSM-19 Overhauser magnetometer, which used a pair of probes and a base unit. In each case, the base unit was situated near the measurement site, synchronised with the measuring instrument. The probes were affixed 75 cm apart on a wooden structure to maintain a consistent row spacing. Measurements were conducted continuously in "walking mode," in which the instrument logged data at 0.5-second intervals. Data processing was carried out using the magnetometer's proprietary software (GemLink 5.4[361]) and the Surfer[362] 12.6.963 software suite.

Two primary factors complicated the demarcation of the measured areas: firstly, the terrain, which presented an extremely stony surface at the site itself and a highly uneven surface in the vicinity; secondly, the interference from a subsurface oil pipeline and a possibly recently installed overhead power line, both previously identified during the 2014 geomagnetic survey. The stony surface and anticipated rocky subsoil often obscured deeper archaeological features; thus, it was a matter of luck that on the second site, the walls of a structure became discernible and were subsequently confirmed through excavation. However, to avoid magnetic anomalies caused by the oil and power lines overpowering the weaker signals of potential archaeological features, a minimum distance of 15 meters had to be maintained, which consequently rendered certain western areas adjacent to the site non-surveyable by magnetometry, especially near the power line.

The ten measured areas are documented individually, each with its greyscale and colour plot (Figures 36–55), in the Appendix (Volume II); what follows here is what the areas established together.

The limitations encountered across the ten areas were environmental rather than technical, and they are worth stating together. Within the enclosure, surface and near-surface stone masked deeper features almost everywhere, which is why the courtyard areas returned so little. Along the northern edge of Areas 4, 6 and 8, a modern power line produced a strong shielding effect, which prompted the resurvey of that ground in Area 8. Uneven terrain constrained the shape and size of several grids. Against these constraints, the survey

[361]https://www.gemsys.ca/software/
[362]https://www.goldensoftware.com/products/surfer/

nonetheless recovered the two-room building on the western side, later confirmed in Trench 2021/4, and located both excavated graves and their surroundings (Figures 17).[363]

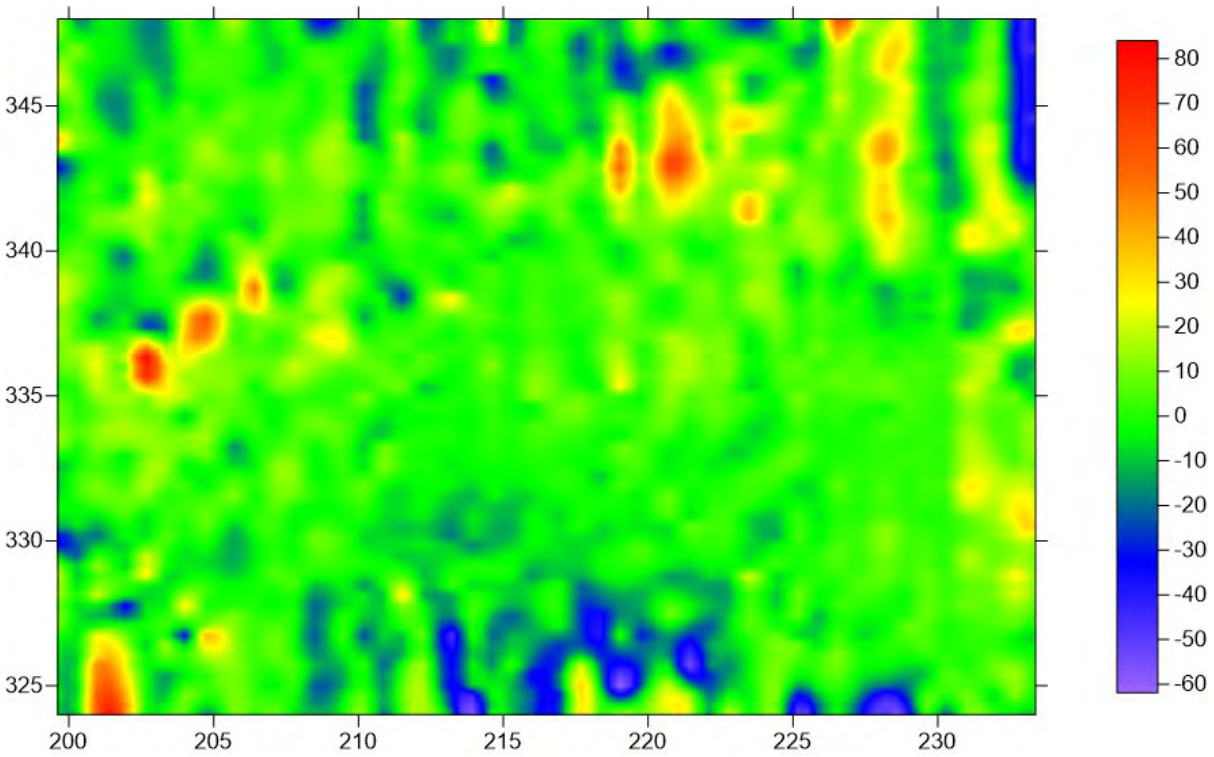

Figure 17. Results of the September 22nd Survey.

3.5.Metal Detector Survey

A systematic metal-detector survey produced most of the metal assemblage discussed in this dissertation, and almost all of its coinage; its principal results can be stated before the individual campaigns. Three findings matter for the argument. Coin loss is heavily concentrated outside the enclosure rather than within it[364], and within that exterior zone it is densest on the low rise west of the northern wall. The recovered coinage spans Byzantine, Sasanian, Umayyad and Abbasid issues, with Byzantine and Islamic copper occurring in almost

[363] That the silence of one method is not evidence of absence has been demonstrated directly, on these same techniques: at the Catholme Ceremonial Complex resistivity mapped the large ring ditch but not the Sunburst ditch, magnetometry the reverse, and radar mapped both (Watters 2009, 193, fig. 9) — "despite assumed performances based on geophysical principles, both of these geophysical methods did not map significant archaeological monuments" (197). Watters' two cautions govern how the present results are read: "it is very important not to oversell the potential results of geophysical surveys" (189), and method and ground must be matched at the planning stage (190). Neither resistivity nor radar was available to this project, and the interior of the enclosure is accordingly recorded here as unresolved by magnetometry rather than as empty.

[364] The warrant for arguing from a scatter of site finds is stated by Walmsley 1999, 327: collections from known contexts "provide statistically valid data on frequency and circulation — both possible indicators, if analysed with caution, of major political and economic developments". His study of Pella and Gerasa establishes a shared regional pattern culminating in an unexpected peak under Justin II (346–347), a peak that does not appear in the small Pānkān sample; whether that is a real difference or an artefact of sample size cannot be decided from twenty-three coins.

equal numbers among the scattered finds. A detector survey, rather than excavation, located Grave 2019/1 with its purse of forty silver coins, along with the second burial subsequently excavated in 2021. Each of these results is shaped by where the instrument was used and by what it can detect, and those constraints are set out before the campaigns are described[365].

3.5.1. Initial surveys

The initial metal detector surveys, conducted between 2014 and 2016, were designed to complement the systematic field walking and surface collection strategies employed at the site.[366] These preliminary prospections were instrumental in sampling the numismatic horizon and evaluating areas of disturbed stratigraphy across the complex (Figures 19–20).[367]

Two methodological qualifications should be entered before the resulting distributions are interpreted, since both bear on how this material is used in later chapters—the first concerns detection itself. Metal-detector recovery is not a neutral sample of what lies buried: detection probability varies with the size, shape, alloy, depth, and orientation of an object, and Cool and Baxter have shown, on a large body of comparative material, that these factors produce systematic differences in the representation of object types between detected and excavated assemblages[368]. Small, thin, or heavily corroded items, the categories to which many of the copper coins from the site belong, are among the least reliably detected. The quantities recovered are therefore minimum figures, and comparisons of density between areas are meaningful only where the same instruments, settings, and operators were used, as was the case within each survey season here. The second qualification concerns coverage. Systematic grid survey was applied to the exterior of the enclosure and its immediate surroundings, whereas the interior was investigated principally by excavation. Any contrast between a find-rich exterior and a find-poor interior is consequently shaped in part by where the detector was actually used, and this is taken into account in the discussion of the coin distribution below rather than treated as a direct reflection of ancient behaviour.

When reviewing the scatter of finds plotted on the 2016 spatial distribution map (Figure 18.), it becomes evident that the surface and near-surface metal artefacts reflect a pattern of continuous occupation.

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[365]The recovery-bias literature and its consequences are set out at 3.5.1 below and returned to at section 5.9.
[366]Banning 2002 is the standard manual; for the Near Eastern regional tradition within which this work sits, Wilkinson 2003.
[367]Gregory and Rogerson 1984, 179–184, the earliest sustained argument for the metal detector as an instrument of excavation rather than a threat to it.
[368]Cool and Baxter 2016, 1643–1653, showing that detection probability varies systematically with object morphology, so that metal-detected assemblages are not a neutral sample of what is buried.

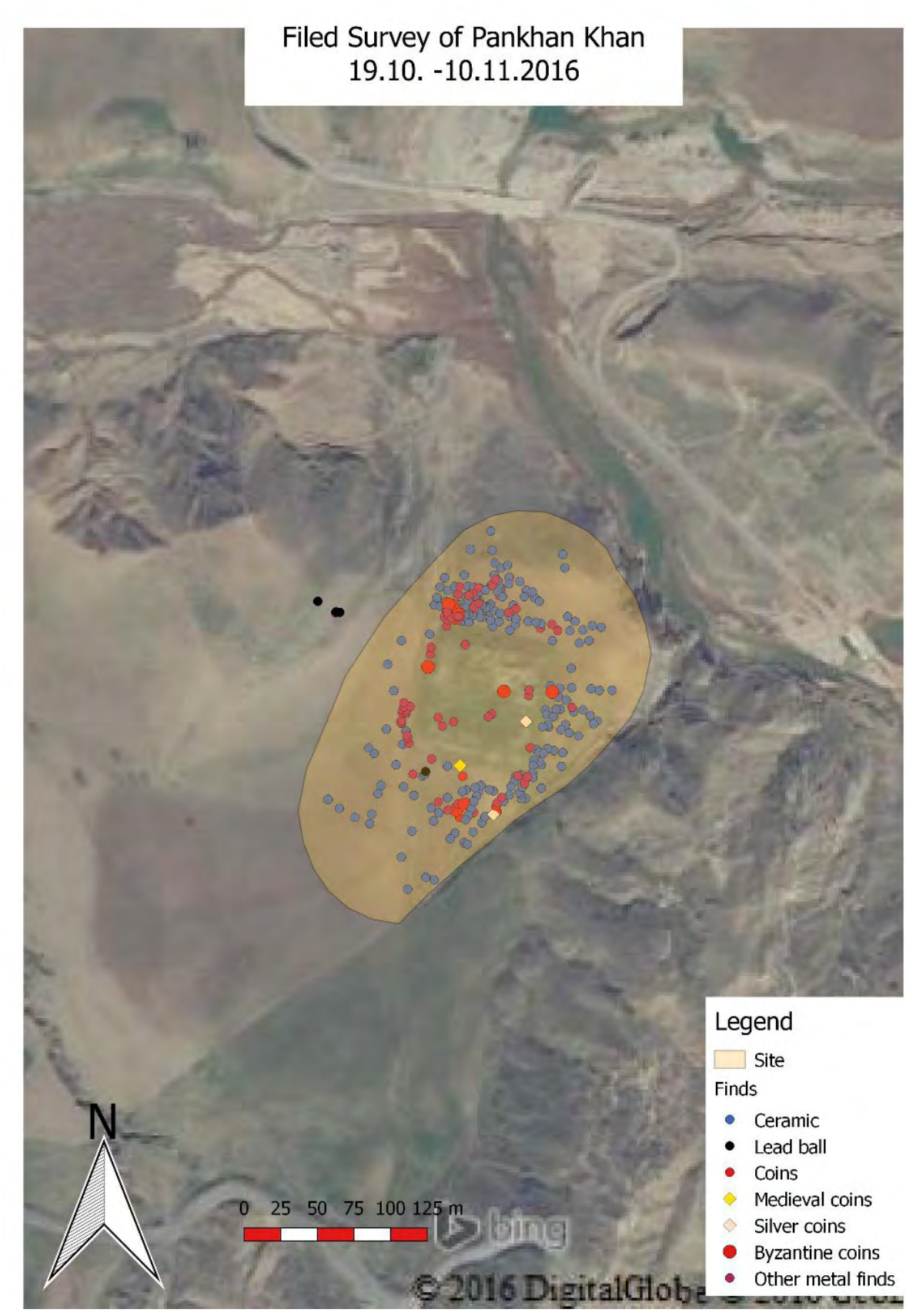

Figure 18. 2016 spatial distribution map. Illustration by Róbert Lóki.

3.5.2. Grid-based survey in 2018 and 2019

Building on the initial prospections, we conducted a rigorous, grid-based metal-detector survey in 2018. After laying out the grid, metal detector expert Tibor Nagy carried out the survey. The surface of the Pānkān enclosure was examined in its entirety using professional-grade XP Deus and Minelab Equinox 800 metal detectors. This systematic survey also extended to a 200-metre radius around the complex.[369] In addition to the surface prospection, the daily excavation surfaces and the resultant spoil heaps were continuously monitored.[370] This approach led to the discovery of a heavily corroded bronze coin situated merely 2 cm below the established floor level of the gate complex (STR 14), at a depth of 1.1 metres. Although the coin requires professional conservation to ascertain further details, preliminary assessments suggest it dates to the early Umayyad period (7th century AD).

The 2018 survey yielded several artefacts of particular archaeological interest. A silver pendant was located 20 metres east of the complex. In contrast, a solid-cast bronze pendant cross—identified as a *crux gemmata* and tentatively dated to the 5th–7th centuries AD—was discovered 150 metres to the south. A foot fragment of a bronze zoomorphic statuette representing a camel was recovered 30 metres north of the principal enclosure. See Figure 19.

[369]Wilkinson 2003; for the Erbil plain and its immediate hinterland, Ur 2016 and Kopanias and MacGinnis 2016.
[370]Gregory and Rogerson 1984, 179–184, on the monitoring of spoil as standard detector practice on excavation.

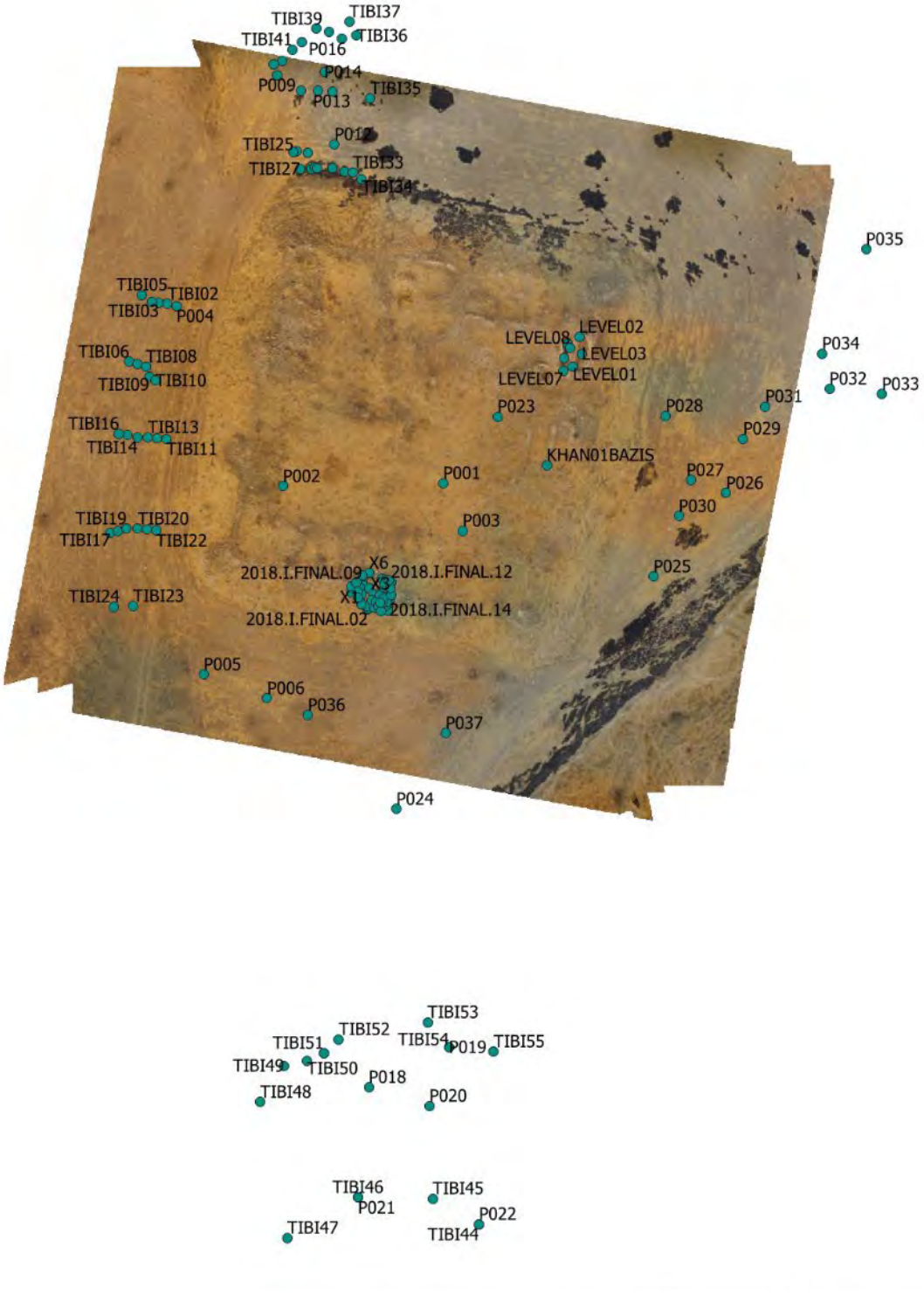

Figure 19. Recorded Finds of the 2018 Metal Detector Survey. Scale: 1:1000

The grid-based survey continued into the 2019 season, yielding further important data. The most significant result was the identification of a burial (Grave 2019/1) immediately south of the enclosure, containing a purse of forty silver coins. During excavation and documentation

of this context, a handheld pinpointer was used to record the exact stratigraphic position of the coins in the order of discovery.

During the broader grid survey of this sector, the team also identified human remains indicative of a second, nearby burial. This context was promptly recorded using precise GNSS coordinates and subsequently covered to ensure its protection. Unlike Grave 2019/1, this secondary burial exhibited no indications of metal grave furniture. Given its shallow depth just beneath the current topsoil and the challenging excavation conditions, it was not possible to establish whether the grave had been disturbed previously. The Appendix presents the findings. See Figure 20.

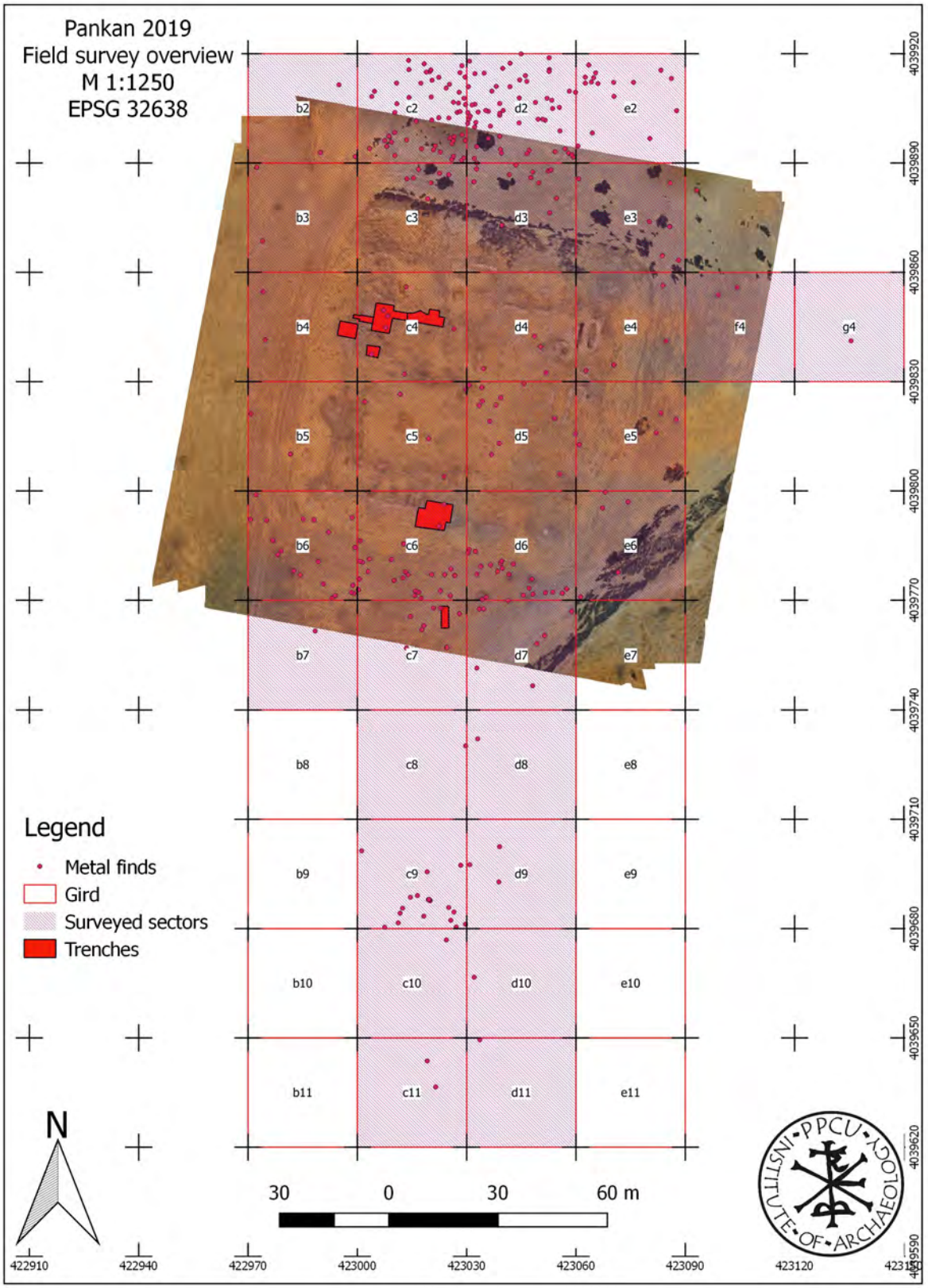

Figure 20. Overview of the 2019 Grid-based Survey

3.5.3. Final survey at the site of the burial area in 2021

The final metal detector survey campaign in 2021 was concentrated on the southern burial area.

This survey facilitated the formal documentation and excavation of the second burial (Grave 2), initially located in 2019. Situated in Trench 2021/5 at a depth of approximately 10 cm below the modern surface, the articulated skeleton extended beyond the confines of the 2 × 2 metre trench. Consistent with the preliminary observations, this burial contained no diagnostic grave goods or metal finds.

3.6.Radiocarbon Dating and Absolute Chronology

The absolute chronology of Pānkān rests on a small number of radiocarbon determinations. Because a good deal of the argument in this dissertation depends on them, the nature of the dated material should be stated exactly rather than left to be assumed. The material dated was charcoal recovered from the gypsum-lime mortar of the walls of the north-eastern range, rooms R100 and R101; the samples were submitted for AMS measurement, and the calibrated result reported for R100, 430–560 AD, is the foundation date used throughout[371]. A charcoal sample held within a construction mortar is not the same kind of sample as charcoal from an occupation deposit, and its evidential value differs accordingly. It cannot be intrusive, since the mortar set around it has not been disturbed; in that respect it is a more secure association than most. But what it dates is the growth of the wood, not the mixing of the mortar, and the interval between those two events is not directly measurable[372].

Two considerations bear on the probable size of that interval. In favour of a close relation between the date of the wood and the date of the wall, charcoal incorporated into a mortar at the moment of mixing is most likely to derive either from the fuel used in burning the lime or from debris lying about the building site. Both are contemporary with construction rather than residual from an earlier occupation of the ground. Against it, neither the species nor the part of the tree is recorded for these samples, and long-lived timber, heartwood, or reused structural wood can displace a determination by a century or more. On the evidence available, the determination is therefore best read as establishing that the north-eastern range cannot have been built before the fifth century, and as consistent with a foundation in the later part of the

[371] Major 2022, 563: charcoal from the mortar of the walls of R100 and R101 gave a construction date “between 430–560ce”. The determination is published without a laboratory code, a conventional radiocarbon age or a stated confidence interval, and the range should be used with that in mind.

[372]On the old-wood effect and the distinction between the age of the sampled material and the age of the event dated, see Bronk Ramsey 2009, 337–360.

calibrated range — which is also where the ceramic and numismatic evidence independently falls — rather than as fixing a construction date within it.

A further point should be entered, because it defines the limit of what these determinations can carry. They date charcoal held in the mortar; they do not date the mortar. A direct date on the binder is, in principle, obtainable, since lime takes up atmospheric carbon dioxide as it carbonates during setting and records the act of building itself, and the technique has developed considerably in the past decade[373]. It has not been applied at Pānkān, and it would not be straightforward here. The central difficulty is separating the binder fraction from carbon that does not derive from setting: geological carbonate surviving from incompletely burnt limestone or introduced with the aggregate, which carries no measurable radiocarbon and appears too old, and secondary calcite precipitated after construction, which has the opposite effect. Current preparation protocols are considered reliable for simple lime systems but not for hydraulic binders, and an inter-laboratory comparison has shown that identical samples can yield different results depending on how the binding fraction is separated[374]. The mortars at Pānkān are gypsum-rich and have not been characterised mineralogically for this purpose, so whether they would prove amenable cannot be stated in advance. What can be said is that the sampling already carried out satisfies the requirement that such material be taken from protected wall cores rather than from weathered or repointed surfaces, so that suitable samples exist should the attempt be made[375].

All determinations cited in this dissertation are reported as calibrated calendar ranges[376], and the same caution applies to the charcoal dated from the deeper deposits of the north-eastern block and to the earlier determinations from Dwīn. Two limitations should be acknowledged plainly. First, the range 430–560 AD is calibrated, not a construction year, and it is quoted as such throughout. Second, it derives from one building. It is used here as the foundation date of the complex because the north-eastern range is structurally integral to the enclosure and because nothing in the excavated sequence suggests that any part of the fort substantially precedes it, but that is an argument from the stratigraphy and the plan, not a second determination. The convergence of the radiocarbon result with the ceramic and numismatic evidence for a late fifth- to sixth-century foundation is accordingly treated here as mutual

[373]Urbanová, Boaretto, and Artioli 2020, 503–525.
[374]Urbanová, Boaretto, and Artioli 2020, 503–525, esp. on the inter-laboratory variation demonstrated by the MODIS comparison and on the unsuitability of current protocols for hydraulic binders.
[375]Daugbjerg et al. 2021, 1121–1140.
[376]Calibrated against IntCal20 (Reimer et al. 2020, 725–757); calibration performed in OxCal (Bronk Ramsey 2009, 337–360).

support between independent classes of evidence, not as confirmation of one technique by itself.[377]

4. The Fort of Pānkān

Distinguished by its location and relatively good preservation, the fort of Pānkān is a key addition to the corpus of late Sasanian hinterland fortifications, especially in the Empire's western provinces. See Figure 21.



Figure 21. The Plan of the Site

[377]Laboratory codes, δ13C values and the uncalibrated determinations are held in the mission archive and are not reproduced here.

Unlike larger frontier installations such as those along the Gorgān Wall,[378] Pānkān exemplifies a small-scale yet functionally complex outpost situated at a critical environmental and logistical crossroads. The fort stands at the threshold of the Mesopotamian alluvium and the Zagros foothills, about 37 km NNE of Erbil and 90 km ENE of Mosul, beside a spring-fed water source still used today as a modern reservoir. This advantageous setting provided both reliable water and wide observation, placing the fort at the junction of east–west and north–south communication routes, which seem to have been later incorporated into the Silk Road network. The deliberate juxtaposition of defensibility, water access, and route connectivity reveals a careful integration of military, environmental, and economic considerations.[379]

Before KHAM's work, Pānkān's ruins had been misidentified and variously named. Local Kurdish villagers refer to the site as *Khān Dīrūk* ("ancient caravanserai") or, sometimes, *Qalʿat al-Jinn* ("Castle of the Jinn"), reflecting a lore that the ruins are ancient or supernatural. Indeed, Iraqi inventories listed the site in the 1960s as an Ottoman-era khān (roadside inn) based on its surface appearance. A 2018 study[380] even proposed that Pānkān was the location of a 6th-century Christian monastery, *Dayr al-Juṣṣ*, suggesting that the fort's towers were 19th-century Ottoman additions to a monastic core. The ongoing excavations have refuted the latter interpretation. The discovery of Sasanian-period construction and associated artefacts (coins, ceramics, and charcoal radiocarbon-dated from the wall mortar) demonstrates that Pānkān was initially built in the late 5th or early 6th century as a fortified complex, rather than a later caravanserai or a purely monastic retreat. That said, the fort's function likely evolved; the abundance of trade-related items and its location along travel routes suggest it served as a caravanserai or waystation in early Islamic times, following its initial military role. To avoid ambiguity, this paper uses consistent nomenclature for Pānkān's features.

Within the broader landscape, Pānkān likely formed part of a chain of fortified sites that dotted the Zagros foothills and secured mountain routes. The sites of Gird-i Kazhaw and

[378] Sauer, Nokandeh, and Rekavandi 2022, 249, for small forts forming networks in interior territories, Iraqi Kurdistan among them.

[379] The architectural narrative in this chapter is primarily built on Balázs Major's synthesis of the 2014–2019 KHAM results (Major 2022), which first systematised the plan, the wall system and — above all — the phasing of the southern gate at Pānkān. The present account expands that framework with new documentation and the 2021 season's observations: the exposure of the eastern interval tower T12 with its curved outer segment (STR41), the springing of the northern interval tower T10, and additional interior walls and room features such as a clay oven and large storage pits. The chapter thus both corroborates and refines Major's working hypotheses and adds data that were unavailable or only conjectural at the time of his publication. B. Major and the present author jointly directed fieldwork at Pānkān during the period in question; for the 2021 additions see in particular sections 4.5 and 4.6 below.

[380] Badrī Tawfīq 2017.

Bāzyān, both far to the south-east in the Sharizor and the Bāzyān pass respectively[381], represent a network of military and monastic settlements from the late Sasanian period. Recent scholarship has proposed that these sites were coordinated to control movement through mountain passes, guard resources, and perhaps enforce taxation on trade caravans. Pānkān's position near a river gorge and in a transition zone between the plains and the hills fits this pattern: it could monitor traffic coming down out of the mountains, from the directions of Akre and Harir, and traffic along the Erbil plain. The water source at Pānkān was a further draw – any caravans or troops would need that spring. Pānkān's surroundings thus preserve both traces of local habitation and the evidence needed to situate the fort within a wider hinterland system.

4.1.The Complex in Outline

The account that follows is necessarily detailed, and it may be helpful to state at the outset, in plain terms, what kind of site Pānkān is and what survives of it. The remains consist of a single-walled enclosure of approximately square plan, some 0.46 hectares in extent, standing on the terrace above the gorge of the Kargh River in the western foothills of the Zagros, thirty-seven kilometres north-north-east of Erbil.[382] It was built of local river cobbles set in a thick gypsum mortar; it carried projecting towers at its four corners and at intervals along its curtains; it was entered through a single certain gate in the middle of its southern side, and probably through a second at the middle of the northern; and its interior was largely filled with ranges of barrel-vaulted rooms built against the inner face of the curtain. Beyond the walls, chiefly in the level ground before the southern gate, lay an unwalled settlement of mudbrick houses. The enclosure was founded in the late Sasanian period, remained in use through the Muslim conquest and the early Islamic centuries, and appears to have been abandoned by the end of the thirteenth century; thereafter the ruins were used only occasionally.

Very little of this is visible on the ground today. Except for two vaulted rooms in the north-eastern corner, which survive to their full ground-floor height because their floors lie about a metre below the general internal level of the fort and were exposed by clandestine

[381] The published locations are these. Gird-i Kazhaw lies at the north-western edge of the Sharizor plain, about 25 km from Sulaymaniyah and 7 km south-east of Arbat (Tamm 2020, 423); the Bāzyān fort lies near the modern town of Taqiyya, on the south side of the pass through the first western ridges of the Zagros, about fifty kilometres east of Kirkuk and forty kilometres north-west of Sulaymāniyya (Amin et al. 2023, § 2). Both therefore lie in the Sulaymaniyah region, and Bāzyān is the nearer of the two to Pānkān. Ḫirbat Dayr Sītūn lies on an old road about 40 km north-west of Mosul (Harrak 2023, § 50).

[382] For the geographical setting in detail see Chapter 2.1; the distances to Erbil and Mosul and the relation of the site to the Kargh gorge are given in Major 2022, 560–561. Major records no gate in the northern wall, observing that it "does not show any signs of a gate or other structures that would interrupt the sequence of interval towers observed in case of the other walls" (566); the possibility of a second entrance there is raised here on the evidence of the later seasons and is not his.

digging before the mission began work[383], the standing fabric has been reduced almost everywhere to a course or two above the modern surface, and along much of the northern and eastern sides to nothing more than lines of mortar-bonded stones and spreads of collapsed rubble. The description given below therefore rests on several converging classes of evidence: the mapping of in situ mortared masonry exposed at the surface, aerial photogrammetric survey and the terrain models derived from it, magnetometer prospection, and the nineteen excavation trenches opened between 2018 and 2021, together with the documentation carried out from 2014 onwards[384]. Throughout the chapter, the distinction is maintained between features recovered by excavation, features attested by surviving surface masonry, and features inferred from stone scatter, geophysical anomalies, or the spacing of known features.

The enclosure wall is the primary element. Its four sides measure 68.2 m on the north, 71.7 m on the east, 62.8 m on the south and 68.2 m on the west, so that the plan is close to, but not exactly, a square of about 70 m; the small deviations follow the fall of the ground rather than any irregularity of intention. The curtain was thin — a single metre, as the excavated segment on the western side established — and was set in a foundation trench no more than about 22 cm deep cut into the hard subsoil. On its outer face, a plastered, battered base, in effect a low glacis, ran out from the wall foot. Wall and towers alike were built by pouring rubble and gypsum mortar into timber formworks and casting each stretch as a discrete unit, the towers being added around the already hardened curtain in a second operation, a method still practised in the region in the nineteenth century.[385] A curtain of this thinness cannot have carried a free-standing wall-walk, and the vaulted ranges built against its inner face are best understood as the structural backing that made the defence possible; on the proportions observed at thicker Sasanian works, the wall may be restored at something like 6 m in height[386].

Thirteen tower positions are recognised in all: four at the corners and nine at intervals along the curtains. Eleven of these are attested by excavated or surviving masonry, and two — one on the northern and one on the eastern side — are inferred from the spacing of the rest and from surface stone scatters[387]. The corner towers are circular, solid at ground level, and about

[383]Major 2022, 575, for the floor level of the fort at 526.37 m above sea level and for the sunken position of R100 and R101 relative to it.

[384]The recording methods and their limitations are set out in Chapter 3; the trench-by-trench record is given in Appendix 9.1.

[385]Major 2022, 565, on the casting of walls and towers as discrete units within a single building campaign; the same technique was still in use in the region in the nineteenth century, as the nearby castle of Dwīn shows.

[386]The estimate follows the proportion observed on the Gorgān and Tammīsheh walls, where a curtain some 3 m thick stood an estimated 8–9 m high: Priestman 2013, 258; applied to Pānkān by Major 2022, 564.

[387]The corner towers are T3 (south-west), T6 (north-west), T7 (north-east) and T8 (south-east); the interval towers are T1 immediately west of the gate, T2 and T9 on the southern wall, T4 and T5 on the western, T10 on

5 m in diameter where measurements are possible; excavation at the south-western and north-eastern corners showed that each was built as a small circular core encased in one or more concentric shells of mortared rubble. The interval towers are smaller, roughly 3–4 m across, and U-shaped rather than fully round: the one excavated example projects about 3.4 m from the wall face, far enough to command the curtain on either side rather than merely to buttress it. The spacing between successive projections ranges from about 15 to 25 m throughout.

One gate is certain. It lies at the centre of the southern curtain, and its excavation produced the most closely datable structural sequence at the site. As first built, it was an opening 3.8 m wide between two masses shaped as quarter-segments of a circle; a pair of 40 cm-thick jamb walls was then added within it, reducing the passage to about 2.9 m and providing a face against which doors could close. The whole front was subsequently thickened, carrying the curtain here to 1.8 m and enlarging the flanking masses until they read as the base of a single rounded gate tower. The passage itself was floored in rubble set in mortar and covered by a brick barrel vault. All of this belongs to the original campaign, executed in stages. Long afterwards, the opening was narrowed to about 1.2 m by brick blocking of a visibly different fabric; a threshold was laid using a reused architrave and four Sasanian bricks; and a low bench was set against the eastern side of the passage[388]. A second, smaller entrance is possible at the middle of the northern wall, where a gap in the curtain with little collapse in it lies beside the mid-wall tower; such a gate would have given direct access to the perennial water source, which is otherwise reached only by leaving through the southern gate and walking around the western side of the complex.

The interior encloses about 4,663 m², and roughly three-quarters of it was built over. Ranges of rooms line all four curtains: some 10 m deep behind the southern wall and running its full length, about 6.5 m deep behind the western wall, and probably some 10 m deep behind the eastern. The northern half of the enclosure appears to have been built over almost entirely. When the peripheral ranges are subtracted, the principal open court amounts to no more than about 1,120 m², or a quarter of the whole[389]. Two blocks have been examined in detail. In the north-eastern quarter, a group of long, narrow, barrel-vaulted rooms — the best-preserved structures at the site — occupies a regular square of roughly 30 by 30 m; the vault of one of

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the northern — its springing exposed in Trench 2021/10 — and T12 on the eastern; T11 and T13 remain inferential. See section 4.5 below for the evidence in each case.

[388] The sequence is set out in detail in section 4.3; the phasing was first established by Major 2022, 567–572, on the basis of the 2018 and 2019 excavations.

[389] Major 2022, 573, for the calculation of the built and open areas from the mapped surface masonry and the photogrammetric terrain model.

them carried the brick floor of a room above, so that at least part of the complex stood two storeys high. In the north-western quarter, behind the western curtain, a continuous line of rooms about 4.7 m wide gives on to a mortar-paved open space, and beside it two stone-lined, bottle-shaped pits more than 2 m deep were sunk into the ground, one of which was later relined with clay and used as an oven. A kiln, hearths and repeatedly resurfaced floors were recorded elsewhere in the same half of the fort. The impression is not of a parade ground with barracks at its edges but of a densely occupied working interior with small courts inserted between the buildings.

Outside the walls, surface collection and detector survey define a settlement whose densest remains lie immediately south of the gate, where mudbrick debris, storage-jar sherds and domestic pottery are concentrated on the level approach; a lighter scatter continues along the western side. Coins behave quite differently inside and outside the enclosure: within the walls they are scarce even in excavated contexts, while outside them, and above all on the slight rise west of the northern wall, they are numerous. Two burials were excavated at the southern edge of this settlement, one containing a purse of forty silver coins spanning the late Sasanian and early Abbasid periods.

The sequence of use may be summarised in six stages. The first is construction. The enclosure, its towers, its gate and the first ranges of the interior were laid out and built as a single campaign carried out in successive stages, and an AMS determination on charcoal from the wall mortar of one of the north-eastern rooms places that work between 430 and 560 AD[390]. The second is the Sasanian occupation itself, during which further rooms were attached to those already standing—the north-eastern block grew room by room rather than as a single design—floors were relaid, and the earliest closely datable coins, issues of Khosrow II, were lost. The third is a period of neglect, registered most clearly in the gate passage, where more than 35 cm of silt and debris accumulated against the jambs, interleaved with short lenses of ash that read as casual fires rather than as destruction. The fourth is an early Islamic reoccupation, in which the gate was reduced to a narrow doorway, a new threshold and a bench were installed, one of the storage pits was converted to food preparation, and copper and silver of the Umayyad and Abbasid periods entered the ground; it is to the close of this stage that the purse burial belongs. The fifth begins with the collapse of the brick vault over the gate, above whose rubble simple pavements and the socket of a brick wall were found some 1.3 m higher than the original Sasanian floor; the latest medieval coin from the site is of the twelfth or thirteenth century, and

[390]Major 2022, 563, reporting the AMS determination on charcoal recovered from the wall mortar of R100.

the absence of glazed wares indicates that occupation had ceased by about 1300[391]. The sixth is post-medieval and episodic: an Ottoman silver coin, lead musket balls, two inscribed bronze bowls dropped into a storage pit already half filled, and a second, unfurnished burial. By the twentieth century the ruins were known locally as Khān Dīrūk and were recorded officially as the remains of an Ottoman caravanserai[392].

What the reader is asked to keep in view, then, is a small imperial garrison post of standard late Sasanian type, thinly walled but closely towered, built quickly and to a recognisable pattern at a point where a river gorge, a route and a spring meet; a post whose interior was filled with vaulted storage and accommodation rather than left open; which outlived the empire that built it and was adapted, with markedly less skill and expense, to the more modest purposes of a stopping place on the road between Erbil and the Great Zāb; and which was finally left to fall down. The remainder of this chapter documents each of these elements in turn, beginning with the soundings through which they were recovered.

4.2.Soundings

Investigation at Pānkān began with a non-invasive survey and selective soundings, which laid the groundwork for understanding the fort's layout. KHAM conducted its first field survey in 2014, documenting visible wall traces, conducting a geomagnetic survey, and taking initial aerial (RPAS) photographs. These early surveys indicated that Pānkān's enclosure was largely a single-phase construction with rounded corner towers and several interval towers on the southern and western sides. Pottery collected from the surface ranged in date from late Sasanian to early Islamic, suggesting continuous use of the site into the early Islamic period. Looters exposed two elongated rooms (designated R100 and R101) in the northeast corner down to their original floor level, revealing ~3 m of standing wall height and indicating substantial buried architecture (Figure 22). AMS radiocarbon measurement of charcoal recovered from the mortar of those walls dated the construction of Room R100 to approximately 430–560 AD, placing it in the late Sasanian period.

[391]Major 2022, 585–586, on the latest medieval coin and on the absence of glazed wares; for the ceramic argument, Kennet 2004, 80 and Kennet 2007, 92.

[392] Major 2022, 561, recording the local names Khān Dīrūk and Qalʿat al-Jinn and the entry of the ruins in the Iraqi archaeological inventory of the 1960s as an Ottoman caravanserai; for the identification of the site as the monastery of Dayr al-Juṣṣ, Badrī Tawfīq 2017, 339–347, at 340–341, an attribution discussed in Chapter 2.2.



Figure 22. The Looted Interior of R100 (Photo by Dr Balázs Major)

Following these surveys, targeted excavation trenches were opened in 2018 and 2019 on the principal architectural features. Trench 2018/1 explored the southern gateway (G1) and uncovered a complex, multi-phase entrance structure. In 2019, eight additional trenches (2019/1–2019/8) were excavated, including areas along the western enclosure wall and within the northwestern and northeastern interior clusters. These soundings substantially improved the site plan and clarified the construction sequence. A final, extensive season in 2021 opened ten new trenches across the site (2021/1-2021/10), confirming earlier hypotheses and providing new insights into the fort's design. The 2021 excavations exposed two previously hypothetical defensive structures: a northeastern tower (T7) and an eastern interval tower (T12). They also uncovered additional interior walls and rooms, as well as previously unknown features, such as a clay oven and large storage pits, within the complex. This phased research strategy, combining geophysical surveys, strategic soundings, and open-area excavations, has produced a comprehensive view of Pānkān's architecture. All architectural elements were catalogued with a unified nomenclature: walls (W), towers (T), rooms (R), spaces/courtyards (S), etc, each numbered for reference. This system (e.g. W222 for a newly uncovered wall segment, T12 for

an interval tower) allows a precise description of the fort's features discovered after the initial site plan was published (Figures 21 and 23).[393]

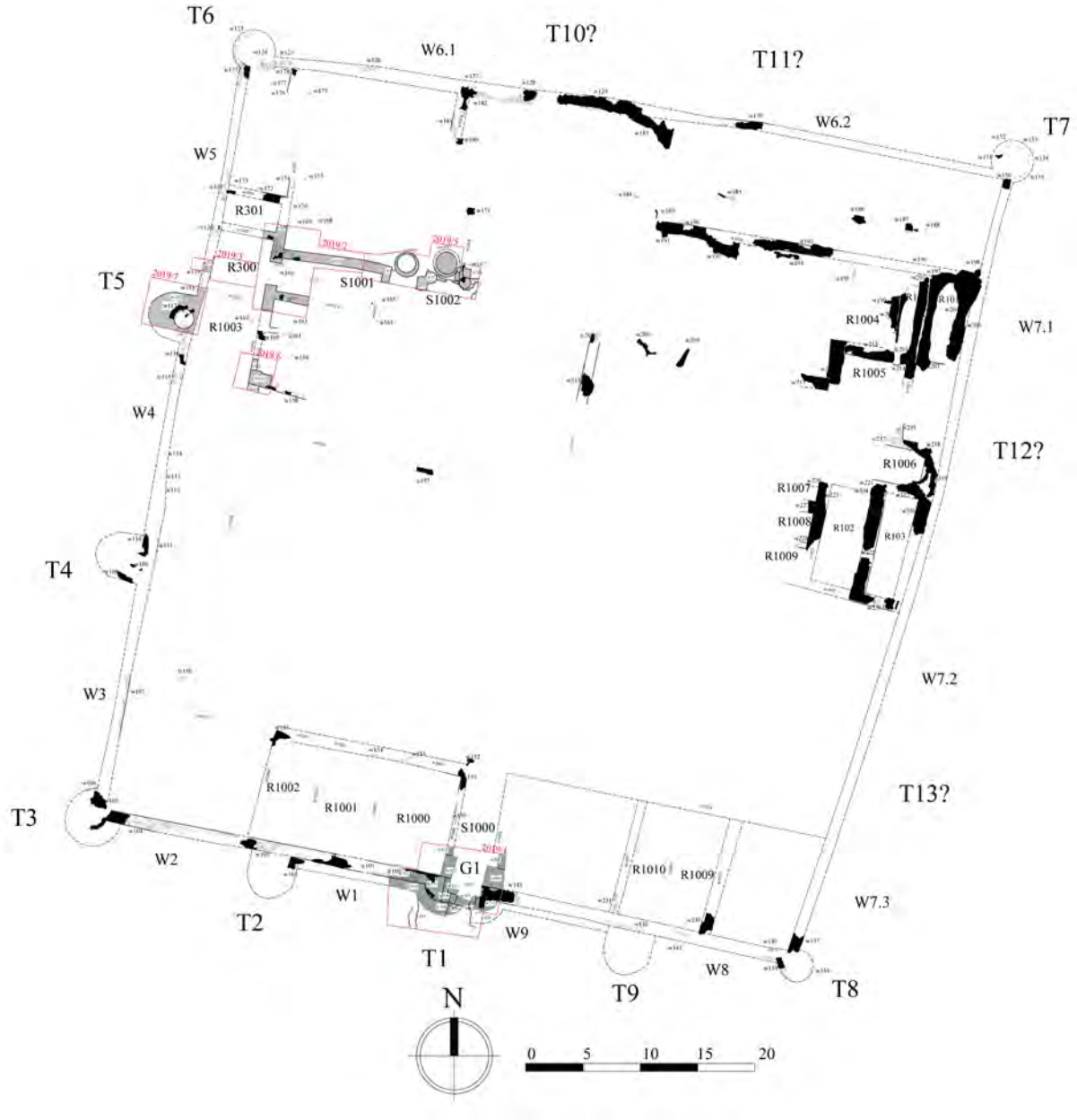

Figure 23. Nomenclature and Layout of the Site and the 2019 Excavation Trenches (Dr Balázs Major, Dr Carla Chlela, Bendegúz Takáts)

4.3.Fort Overview and Layout

In plan, Pānkān is a near-square enclosure measuring roughly 63–72 m per side (north wall, ~68.2 m; south wall, 62.8 m; east wall, 71.7 m; west wall, 68.2 m). The slightly irregular polygonal outline likely reflects adaptation to the local topography, deviating from a perfect

[393] Major 2022, 562–563, for the seasons through 2019; the 2021 season and the trench designations used here are reported for the first time in the present study.

rectangle by only a few meters. The fort's perimeter walls enclose an area of about 0.46 hectares and were constructed of local river cobbles set in a thick gypsum-lime mortar. Only a small fraction of this area has so far been excavated: the nineteen trenches opened between 2018 and 2021 sampled the gate complex, stretches of the curtain and its towers, and parts of the interior ranges, while the greater part of the interior remains unexcavated — a fact that bounds every statement made about the site in the chapters that follow.

The closest dimensional parallel yet published comes from the coast.[394] The early inner enclosure beneath the Great Mosque at Sīrāf consisted of a square fortification with sides measuring approximately 62 m, which is remarkably close to Pānkān's 63–72 m dimensions.[395] The Sīrāf fort also had 1.2 m-thick external walls and projecting horseshoe-shaped corner towers measuring 4.9 m across, dimensions that closely echo the 1 m-thick curtain walls and the 5–6 m-diameter corner towers of Pānkān. Just like Pānkān, Sīrāf had a single gateway on its southern side (2.1 m wide) protected by semi-circular entrance flanking towers (Figure 24).[396] A similarly planned, albeit smaller, Sasanian military installation was excavated at Fulayj in Oman, constructed between the early fifth and mid-sixth centuries.[397] Fulayj also featured projecting U-shaped corner towers and flanking towers at its single entrance.[398] The configuration is therefore attested at very different scales and on very different kinds of site; what it establishes is a shared repertoire of fortification instead of a template from which a date could be read.[399]

[394] The comparison should be stated with the caveat its author attaches to it. Priestman's chapter is a critical re-examination of the Sasanian attribution of Sīrāf, which he regards as "one of the least well-supported aspects of the interpretation" of the site and traces in part to the scholarly and political climate of Iran in the early 1970s (Priestman 2024, 38); the coin evidence establishes only that the pre-mosque enclosures antedate the early ninth century (ibid., 17). What is being compared here is therefore a plan and its dimensions, not a securely dated Sasanian building.

[395] Priestman 2024, 17.

[396] The qualification the excavator attaches should be carried with the comparison: "The inner enclosure clearly belongs to a high-status fortress or fortified palace" (Priestman 2024, 17). Nothing at Pānkān supports a reading of that order; what is shared is the configuration and the scale, not the standing of the building.

[397] Priestman 2024, 36.

[398] The difference in the curtain is the one that matters: at Fulayj "the walls are approximately 2.65m thick", with four solid U-shaped corner towers and a single narrow eastern entrance 1.62 m wide flanked by rounded buttress towers, the undressed stone carefully selected for flat faces and fine jointing — evidence, for the excavators, of "experienced builders and careful planning" (al-Jahwari et al. 2018, 728). A curtain of 2.65 m is between two and three times the Pānkān thickness, and it is that solidity which the excavators cite as evidence of military occupation. The shared configuration therefore holds at the level of plan, not of substance.

[399] Priestman 2024, 37, on the wide geographic and chronological distribution of the type, and on the parallel between Sīrāf and Fulayj, the latter dated by a series of AMS determinations to between the early fifth and the mid-sixth century and shown to have continued in use through the seventh, after the Islamic conquest, with internal modification and a possible change of function.

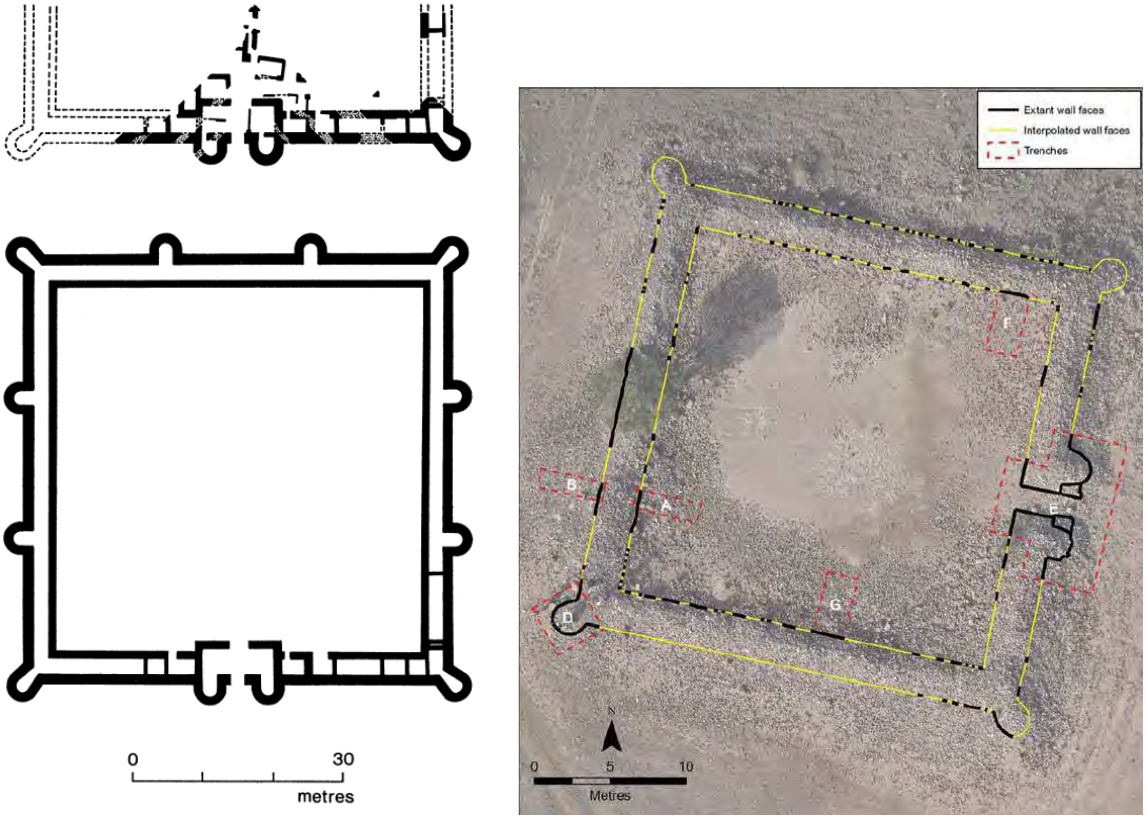

Figure 24.: Left: The Sasanian fort at Sīrāf a reconstruction of the plan after Whitehouse and Williamson 1973.[400] Right: Aerial view of the Fulayj fort (al-Jahwari, et al. 2018): 728.

While Pānkān represents a larger enclosure of roughly 70 by 70 meters, the Sasanian fort at Fulayj in Oman provides a scaled-down comparative model, measuring 30 by 30 meters[401]. Its excavators describe it as "the only securely dated example in Arabia, or indeed on the western shores of the Indian Ocean more generally", and it provides evidence of strategic Sasanian investment in territorial control in a region that was previously considered to have sparse archaeological evidence of their presence.[402] Despite the size difference, Fulayj shares core architectural traits with Pānkān, including four solid, U-shaped corner towers constructed of undressed stone bound with lime mortar and a single narrow, 1.62m-wide eastern entrance flanked by rounded buttress towers. The upper courses likely consisted of mudbrick. Its walls are significantly thicker, at approximately 2.65m.[403]

Unlike earlier forts in the region (like Ed-Dur or Mleiha) which were often associated with elite residences or settlements, Fulayj is isolated. Its robust construction and the absence

[400]Whitehouse and Williamson 1973, 34.
[401]Priestman et al. 2023, 293–294.
[402]Al-Jahwari et al. 2018, 724.
[403]Al-Jahwari et al. 2018, 728.

of domestic luxury items suggest it was built and manned by a professional Sasanian army rather than by a local leader.[404] Its excavators observe that it sits close to no route, settlement or resource, and that it is hard to see what military value it would have had in isolation;[405] they suggest instead that it belonged to a chain of forts screening the fertile coastal plain, on the analogy of the forts guarding the approaches to the Khandaq Shāpūr canal and the Euphrates.[406]

The internal organisation of the Fulayj fort appears to have evolved through distinct sub-phases. During the primary Sasanian military occupation (Phase 2), the interior remained largely open and empty, consistent with a specialised garrison designed for tactical efficiency.[407] It was only in the subsequent transitional phase (Phase 3, late 6th to early 8th century) that the space was modified with internal mud-brick room divisions and the installation of a large domestic oven (*tannūr*), suggesting a shift in the site's status and social function during the early Islamic period.

A further relevant structural parallel on the Iranian plateau is the Sasanian caravanserai of Dayr-i Gachīn (Dayr-i Kardashīr), located south of Ray.[408] Although its internal layout was heavily modified in the Islamic period, the footprint Shokoohy assigns to its original Sasanian phase—a massive square enclosure with circular corner towers and a gateway flanked by two semi-elliptical projecting towers—closely resembles the architecture observed at Pānkān.

In Sasanian defensive architecture, the choice of building materials depended heavily on available natural resources. Accordingly, stone was the most common building material in mountainous regions, whereas mudbrick and rammed earth (pisé) were predominantly used in the lowlands. These geographical conditions fundamentally influenced the form and structure of buildings in both highland and lowland areas.[409]

Construction evidence suggests that the builders used timber formwork to cast sections of wall in place (Figure 69). Rubble and mortar were poured in successive lifts; a technique identified in both the curtain walls and towers (Figures 25 and 82–84). Although much of the

[404] It is worth recording that the excavators of Fulayj read a sparse assemblage in the opposite direction to the inference sometimes drawn from one: "military occupation is suggested by its very thick, solid-stone, lime-mortared walls and few associated finds", in contrast to the earlier forts of the region, which lie within settlements and in two cases produced rich domestic assemblages (al-Jahwari et al. 2018, 737).
[405] Al-Jahwari et al. 2018, 737.
[406] Al-Jahwari et al. 2018, 737.
[407] Priestman et al. 2023, 294.
[408] Shokoohy 1983, 453: "The caravanserai is a fortified enclosure, square in plan with four round towers, one at each corner", with two further towers flanking the main entrance, "semi-elliptical in plan, a form especially characteristic of the Sasanian period" (the plan is fig. 3 at 450). The Sasanian attribution is argued, not assumed: it rests on the pre-Islamic name — Yāqūt gives the building as Dayr-i Kardashīr, which Minorsky read as kard Ardashīr, "Ardashir made it" (448) — and on the surviving architectural forms, and Shokoohy states it as a strong probability rather than a certainty (461).
[409] Labbaf-Khaniki 2020, 37–38.

enclosure wall is now razed to modern ground level, numerous in-situ bonded stones and mortar patches mark its course, enabling a reconstruction of the fort's footprint (Figure 21). Excavation of a western wall segment (Trench 2019/2) confirmed the curtain's thickness at only 1 m (Figures 63–66). This wall segment (W324) was founded in a shallow trench (~22 cm deep) dug into hard clay subsoil on the interior side (room R300), and it stood 1.9 m above the ancient floor level at the time of excavation. On the exterior of the wall, about 0.5 m below its preserved top, the remains of a plastered sloping base — effectively a low glacis — were recorded, extending some 1.4 m outward (Figure 65). This sloping revetment, composed of mortar and stones, likely encircled the fort at the base of the walls to strengthen them and deflect water or debris. The external glacis at Pānkān is not unique, but reflects a defensive technique documented elsewhere in the region. For instance, excavations at the nearby fortified site of Bāzyān revealed a strikingly similar defensive reinforcement: a sloping glacis of large limestone blocks set in lime mortar, built directly against the exterior of the curtain wall.[410,411] Beyond enhancing structural stability against the erosion typical of riverine valleys, the construction of a battered exterior glacis served a distinct tactical purpose. By artificially extending the base of the relatively thin curtain walls, the glacis could have effectively neutralised the threat of direct sapping or battering by irregular forces, a feature similarly observed in the fortification at Bāzyān, although there the glacis belongs to the site's early Islamic rather than to its Sasanian phases.[412]

This suggests a standardised engineering practice in the Zagros foothills to consolidate the foundations of relatively thin enclosure walls. Extrapolating from the thin 1 m wall, the original curtain height is estimated at around 5–6 m, based on thicker Sasanian fortifications like the Gorgān and Tammīsheh walls, which stood ~8–9 m high on 3 m-thick foundations. Given this relatively narrow width of approximately one metre, it is highly improbable that the free-standing curtain wall alone could have accommodated a substantial, functional wall-walk. This physical constraint strongly suggests an integrated structural design, in which the vaulted

[410]Déroche 2014, 39.

[411] The published dimensions make the difference of scale plain. At Bāzyān the glacis covers the curtain to a depth of a metre, is built of large limestone blocks in lime mortar, extends outward at a 20 per cent slope for at least 5 m, and carries an almond-shaped half-tower bonded into its masonry (Ali and Déroche 2016, 15; the two-phase sequence — plastered curtain founded on natural soil, glacis then laid against it — in detail in Déroche 2014, 39–40). Sasanian local pottery from the associated occupation levels, together with an ivory cross pendant, gives a terminus ante quem of about 637 for the construction of the fort (Déroche 2014, 40). The Pānkān revetment extends some 1.4 m.

[412] The parallel is worth stating : at Bāzyān too the glacis and the remodelling of the interior belong not to the original foundation but to the Umayyad and Abbasid phases (Ali and Déroche 2016, 18).

interior buildings were intentionally built against the perimeter to serve as load-bearing backing, while also providing the necessary platform for the garrison's circulation and defence.

In 2021, Trench 2021/1 fixed the northern enclosure line: an E–W mortared wall segment (STR28) was traced bonding into T7 at the NE corner, allowing the course of the north curtain to be plotted with confidence on the updated plan. Cleaning at T7 exposed the tower's cobble-and-mortar core (STR22), with patches of grey-white render and a buttressing casing (STR23); on 21–22 September the junction of STR23 with STR28 was observed and photographed in situ (Figures 82–84), confirming that the corner complex tied the north curtain into the fabric of the tower. According to the final STR register (Table STR Register in Appendix), STR28 runs E–W with a preserved north face of mortared river cobbles, while its upper and southern faces survive more eroded and earth-packed; despite its patchy mortar, the segment is securely interpreted as the fort's north wall. At the same time, the tower interior at ground level proved to be a compact mortar-and-cobble fill (STR25/STR71). Immediately south of the corner, an N–S wall (STR69) emerged beneath collapse (STR24), thereby fixing the bonding of the east curtain at the corner. The T7 corner ensemble (STR22/23/28/69) was georeferenced using TS10 targets and recorded in 3D prior to protection and backfill, providing plan-accurate control for the enclosure's northern line on the revised site plan. See Figure 25.

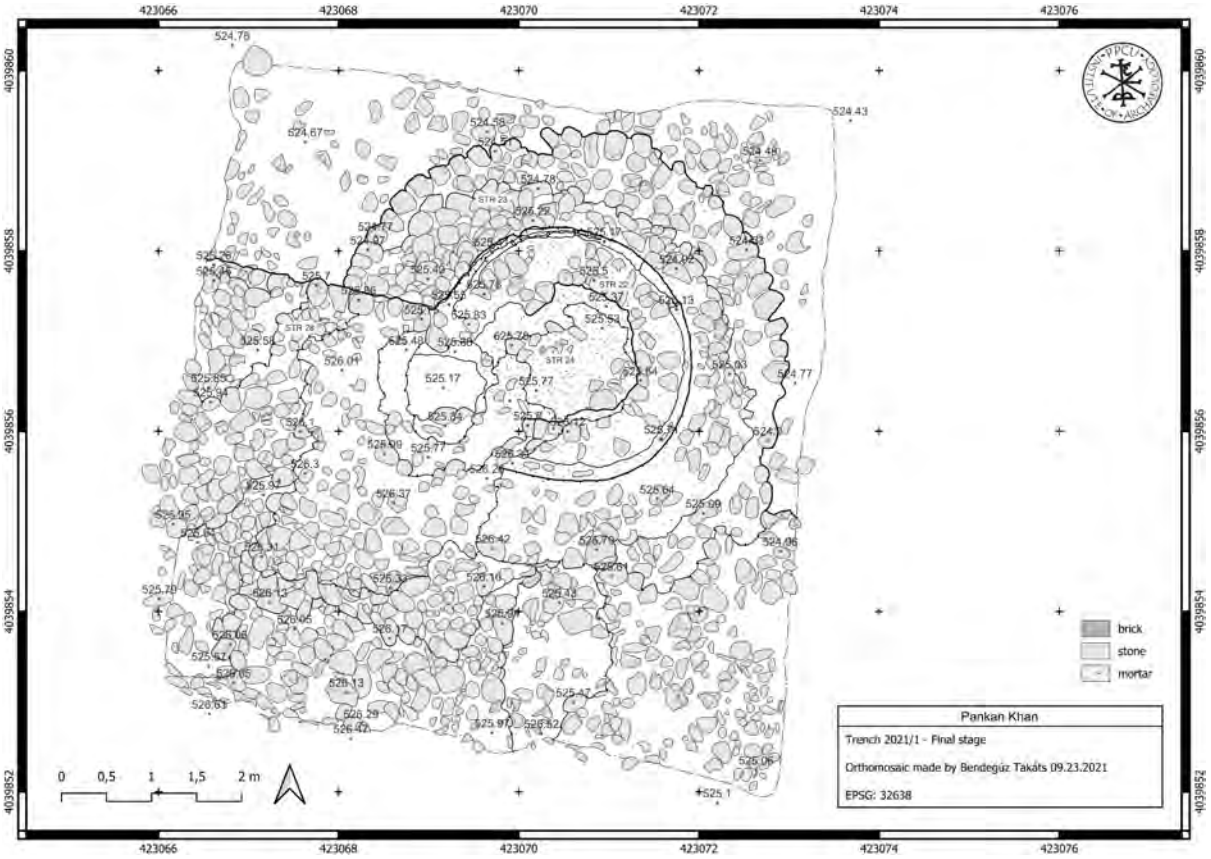

Figure 25. Trench 2021/1

The fort's towers emphasise its defensive intent. Pānkān had four rounded-corner towers (T3, T6, T7, T8) and multiple interval towers projecting from its enclosure walls: T1 (flanking the gate on the west), T2, T4, T5, T9, T10 and T12 are attested; T11 and T13 are inferred from spacing. The corner towers (at each vertex of the square) are circular in plan and were likely about 5–6 m in diameter when complete. Excavation at the southwest corner (Tower T3) revealed the method of tower construction: the builders first erected a solid circular core ~1.2 m in diameter, then added one or more concentric "crusts" of wall around it. In T3, a second shell of gypsum-mortared rubble 1.36 m thick was added around the core, yielding an exposed diameter of ~5.1 m for the tower's base (Figure 21). Similarly, the 2021 excavation of Tower T7 (in the northeast sector) revealed a core of large river cobbles in grey mortar (designated STR22) encased within a later casing wall (STR23) constructed from the same materials (Figures 9 and 82–84). The outer surface of T7's core still bore patches of a thick greyish-white plaster, into which thin stones had been pressed as a facing – a treatment likely applied to all the tower exteriors. T7's added outer layer (STR23) was constructed with the same technique and materials as the core, forming a buttressing shell around the tower's lower part. These findings confirm that Pānkān's towers were built in stages (perhaps within a single building campaign), using an 'agglutination' method common in the region even into late Ottoman times. In essence, towers and walls were cast as discrete units and later joined – a practice observed, for example, at the nearby 19th-century fort of Dwīn. The corner towers likely stood two or more stories tall, projecting above the curtain. Although their precise height is unknown, a reasonable reconstruction is a tower equal to or slightly taller than the curtain (perhaps 6–8 m high) to serve as a watchtower. Each corner tower would have commanded the approaches along two sides of the fort.

In addition to the corners, seven towers are attested along the curtains by surface remains or excavation (T1, which flanks the gate on the west, with T2, T4, T5, T9, T10 and T12), and two further positions (T11 and T13) are inferred from surface scatter and from the spacing of those already known. These mid-wall towers were semi-circular or U-shaped projections that provided flanking fields of fire along the curtains. Surface survey and excavation identified interval towers T4 and T5 along the western wall and T2 and T9 along the southern wall. It initially appeared that the northern and eastern intervals were fewer in number; the 2021 season, however, confirmed both: T12 on the eastern wall was established by excavation in Trench 2021/2, and the springing of T10 on the northern wall — at the position first indicated by magnetometry — was found in Trench 2021/10, indicating a similar distribution of interval towers on the north and east sides and allowing towers T11 and T13 to

be conjectured from the spacing. For example, the west wall (~68 m long) had two interval towers (T4, T5) spaced roughly evenly, whereas the longer east wall (~72 m) shows evidence of only one central tower (T12). Tower T12's existence was hypothesised from surface rubble and confirmed in 2021 when a curved masonry segment was unearthed east of wall W226 in Trench 2021/2. This short, curved wall segment (STR41), built of mortar and cobbles, was found attached to the continuation of W226 (identified as W219 to the north) and represents the outer curving wall of Tower T12. Once exposed, the junction of STR41 and W219 showed plastered exterior faces, indicating the tower's outer surface. The diameter of T12 cannot yet be fully measured, but its curvature suggests a size comparable to that of the other interval towers (approximately 3–4 m in diameter). Likewise, on the north side, the base of interval tower T10 was identified near the midpoint of the wall in Trench 2021/10 (STR72, bonding to W128), at the position first suggested by the geophysical anomalies; its full dimensions await further exposure. Together with the four corner towers, this yields eleven projections attested by masonry, and thirteen if the two inferred positions are included — a density of defensive projections consistent with the smaller fortified enclosures of the Sasanian period. The spacing of the towers was such that each curtain segment between towers was approximately 15–25 metres, allowing for overlapping archery coverage. This arrangement – corner bastions and intermediate towers – is a hallmark of late antique fort design, parallel to contemporary Byzantine forts and the smaller Sasanian castella. However, unlike some larger fortress complexes, Pānkān's towers were relatively small and integral to the enclosure rather than massive standalone bastions, befitting a small frontier outpost.

Further confirmation of the northern defences came from a small test at the presumed north gate area (Trench 2021/10). Here, a substantial N–S fortification wall (W218), built of large, rounded cobbles in compact white mortar, was exposed together with a north–south masonry segment (STR72) that bonds to W128 and is interpreted as the outer face of the mid-north interval tower T10. An empty strip immediately east of these elements likely marks the threshold of a northern entrance; the paucity of collapse within this gap suggests either outward failure of the superstructure or later robbing. These remains consolidate the line of the north curtain while indicating a controlled ingress roughly at mid-wall, consistent with the fort's balanced distribution of interval towers. A possible north gate would have provided a much easier access to the only source of perennial water, which could have been accessed from the north wall instead of exiting through G1 and going around the west of the building complex. See Figure 26.

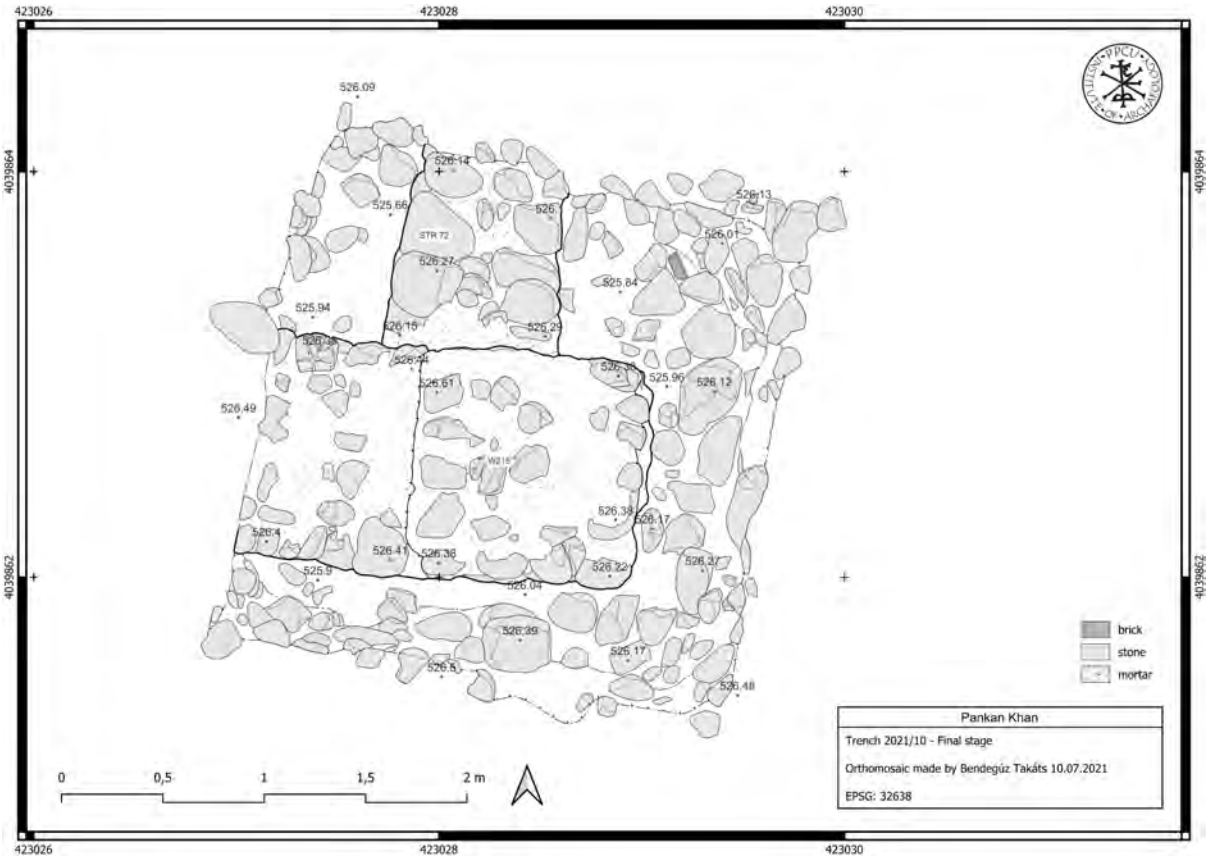

Figure 26. Trench 2021/10.

4.4.The Gate Complex

One of Pānkān's most informative features is its southern gate (Figures 27–28), which underwent multiple construction phases and repairs. The main gate is centrally located in the south wall, flanked by projecting towers (the western one numbered T1 on the site plan) and approached from the south by a probable track or road. A common architectural feature of Sasanian fortifications was a main gate flanked by two semicircular towers, as seen at the western gate of Ultan Qalasi in northwestern Iran.[413] Similarly, the Sasanian fort of Sīrāf on the Persian Gulf coast featured a rectangular ground plan with an entrance opening on the southern side, protected by two semi-circular towers.[414]

Excavations in 2018–2019 (Trenches 2018/1 and 2019/1) revealed a complicated stratigraphy of gate construction, indicating at least three major phases in the Sasanian period, followed by later alterations in the early Islamic period. The earliest phase (*Phase 1*) corresponds to the original construction of the fort's curtain and a pair of quarter-circular bastions framing the gate opening. These initial gate bastions were essentially buttress towers

[413]Labbaf-Khaniki 2020, 52.
[414]Priestman 2024.

protruding from the wall on each side of the entrance, forming quarter-circle segments. The excavated western buttress retains this shape, with its radius varying from approximately 1.0 m (on the side facing the gate passage) to 1.5 m (along the curtain wall side), due to slight deformation. Initially, the two quarter-towers would have appeared as shallow, round bulges flanking a roughly 3.8 m-wide gateway between them. This wide entryway may have accommodated pack animals or carts. However, closing such a broad gap with doors alone would be difficult, and evidence shows that even in the initial construction, the gate was soon narrowed. In what appears to be a continuation of the primary build (Phase 2), builders added a 0.4 m-thick masonry jamb wall on each side of the passage, effectively reducing the clear opening to about 2.9 m. These short walls curved inward at their ends, forming proper door jambs against which double doors could shut. The consistency of materials and technique suggests Phase 2 followed quickly on Phase 1, likely as part of the original plan to create a securable gate. As the narrowed passage formed jambs (indicated by STR6 and STR7, which are 2.25m apart, as shown in Fig. 12) for effective door utilisation, the gate could be closed with sturdy doors, likely a two-leaf wooden door pivoting on pins. See Figures 27–28.



Figure 27. The Main Gate (G1) - Trench 2019/1

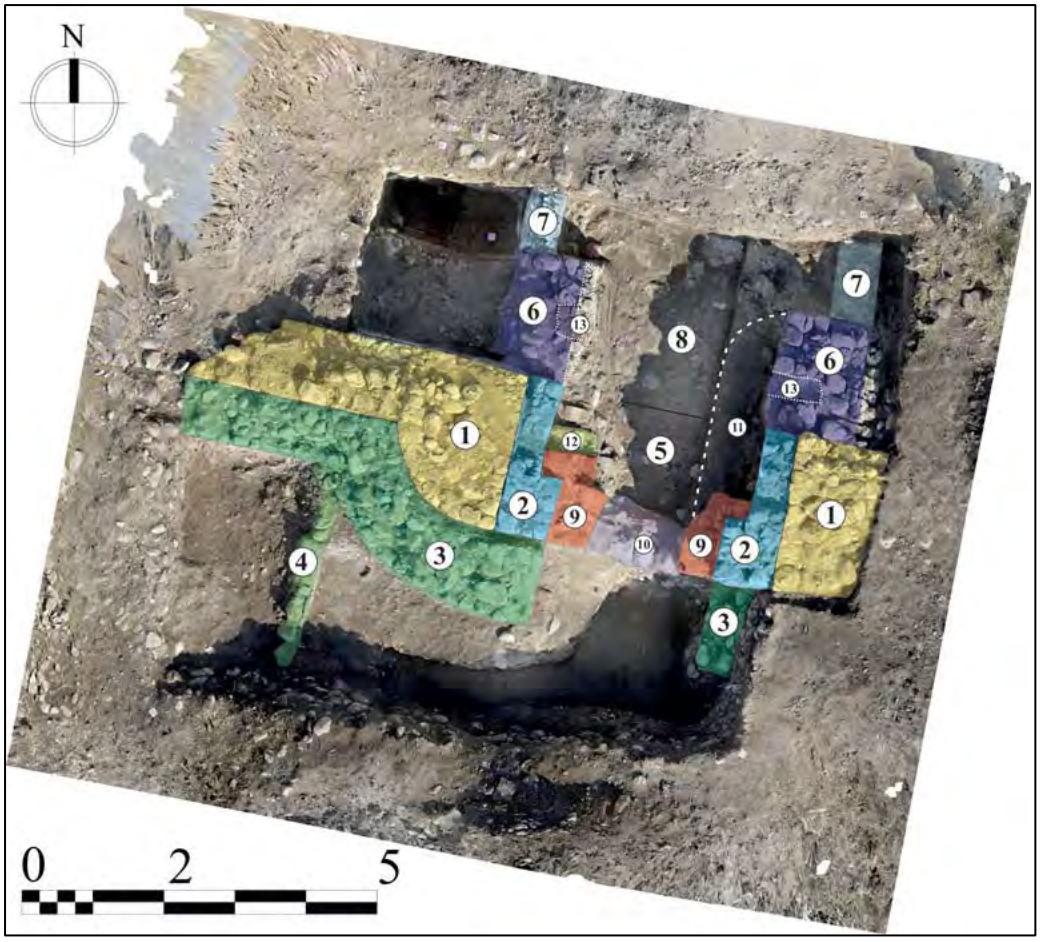

Figure 28. Gate G1's construction periods28 (after Major 2022, 569)

In Phase 3, the gate complex was substantially reinforced. The excavations uncovered an outer wall addition that thickened both the curtain and the flanking buttresses from the outside. A new layer of wall, ~0.8 m thick, was bonded onto the front of the south wall between the towers, bringing the total wall thickness at the gate to about 1.8 m. Likewise, the quarter-round buttresses received an additional 1.1–1.2 m of masonry shell on their exteriors, enlarging them into semi-circular forms about 3.4 m in diameter. After this addition, what began as two small quarter-towers now effectively merged into a single robust U-shaped gate tower spanning the gateway. The inner sides of the original buttresses remained aligned with the passage walls, implying that Phase 3 was not intended to create two separate towers but to form the base of one large horseshoe-shaped gate tower covering the entrance. The form has close parallels in the Umayyad quṣūr of the following two centuries. The paired quarter-round masses framing the gate of Qaṣr al-Kharāna in Jordan correspond to the arrangement of Phases 1–2 at Pānkān, and the same disposition recurs at the eastern qaṣr of Umm al-Walīd and the western qaṣr of Khān al-Zabīb; the single semicircular gate tower of the kind produced at Pānkān by the Phase

3 thickening is matched at the main qaṣr of Jabal Says.[415] That the Pānkān sequence is some two centuries earlier is relevant to the question of where the Umayyad gate type came from, though it is one site and the point should not be pressed beyond that. The type outlasted the Umayyad period, recurring in early Abbasid enclosure architecture and, on a smaller scale, in domestic and commercial buildings as far east as the Gulf[416]. The Phase 3 outer thickening also included a sloped foundation or glacis at the base, similar to the curtain walls, to bolster the structure. Excavation of Trench 2019/3 along the western flank of the gate revealed a perpendicular stub wall (Phase 4) abutting the outside of the west tower. This stub (only one stone thick, plastered on its inner face) likely served as a revetment wall or retaining curb demarcating a shallow ditch or approach causeway immediately in front of the gate. In essence, it formed a short wing wall extending south from the west side of the gate, possibly to channel entrants or support an entry ramp.

Inside the gate passage, successive floors correspond to the construction phases. The earliest floor segment (Phase 5) was laid only within the area of the initial gate tower (i.e. under the vaulted space; see below) and consisted of large flat stones embedded in thick white gypsum mortar. After the main gate structure was built and Phase 3 completed, two short side walls were constructed projecting inward (northward) from the gate threshold, one on each side of the passage (Phase 6). The western of these interior walls is ~1.0 m thick and 1.7 m long, while the eastern is thicker (1.3 m) but of similar length. Beyond their northern ends, both walls continue as much thinner partitions (only ~0.4 m thick) extending further into the fort (Phase 7). The drastic change in thickness strongly suggests that the Phase 6 walls were explicitly built to spring a vault over the gateway. In other words, the lower, thicker parts supported the springing of a barrel vault that ran north–south, covering the gate passage like a tunnel. At the same time, the upper, thinner continuations were likely curtain walls for antechambers or knee-walls above the vault. The final section of the floor (Phase 8) was then laid down to cover the extended passage once the interior walls were in place. A clear construction joint – a thick, straight mortar edge – is visible between the first-floor segment (Phase 5) under the original tower area and the later floor (Phase 8) that extends through the lengthened entry corridor, confirming the two were not contemporary. The completed Sasanian

[415]For the quarter-segment buttresses flanking a gate, the eastern qaṣr at Umm al-Walīd and the western qaṣr at Khān al-Zabīb: Genequand 2009, 139–140 and 147; for the fully developed semicircular gate tower, the main qaṣr at Jabal Says. The parallels are drawn by Major 2022, 568–569 and 587.
[416]Siegel 2009, 412, for the recurrence of the form in the early Abbasid "Nordostkomplex" at al-Raqqa; Qandil 2003, 318, for its appearance at Jumayra in domestic and caravanserai architecture of the ninth to eleventh centuries.

gate thus had a mortared flagstone floor throughout, sloping gently southward, and was enclosed by walls on all sides.

Abundant collapsed material testifies to the gate's vaulted roof. Within the passage, the excavation encountered heaps of large brick fragments — the remains of a fallen arch or vault. These bricks are of the typical late Sasanian type: measuring roughly 30×35 cm and ~6 cm thick, with distinctive finger-drawn diagonal grooves and occasional palm marks on their faces. The spread of vault bricks from the original gate tower area through the later extensions indicates that the entire entry passage was barrel-vaulted as a single, continuous structure. The vault would have spanned about 3 m in width (the narrowed gate) and perhaps 5–6 m in length and was likely sprung just above the level of the wall tops, creating a covered gateway akin to those seen in late antique fortifications across the Near East. The evidence strongly suggests that these multiple phases – buttress towers, jamb walls, outer tower thickening, vault support walls, vaults, and extended floors – were all part of a single, coherent construction program, carried out in planned stages. In other words, the Sasanian builders conceived a complex gate with sequential additions to strengthen and roof it, rather than fragmentary, ad hoc repairs. This is further supported by the fact that the Phase 3 vaulting of the widened gate tower would only make sense if a single large tower were envisioned above; the vault would support a second-story chamber or fighting platform within an integrated gatehouse.

After the fort's principal Sasanian phase, the gate shows evidence of post-conquest modification and eventual decline. A substantial period of disuse or slow decay followed the initial construction – indicated by over 35 cm of silty debris and ash that accumulated on the gate passage floor after the vault was built. Thin ash lenses within this deposit suggest intermittent campfire use inside the abandoned gate, rather than a single destruction event. Then, probably during the early Islamic period (perhaps the 8th–9th centuries), the gate was refitted on a smaller scale. Two brick sidewalls were erected at the inner (northern) end of the passage, further narrowing the entrance to only ~1.2 m wide (Phase 9). These later bricks are distinguishable by their coarser fabric, reddish colour, and lack of the common Sasanian groove marks. A new rubble-and-mortar threshold (Phase 10) was installed, incorporating a reused stone lintel or architrave block and a few Sasanian bricks set on edge. Just behind this threshold, on the eastern side of the passage, excavators discovered a bench-like platform of mortar and stones built against the wall (Phase 11), which survived at a height of 45 cm. This narrow bench aligns with the reduced width of the entry (1.2 m) and may have served as a step or seating area. Perhaps the gate was manned by guards or used as a checkpoint, where this bench was useful. An extension to the western narrowing wall was also added (Phase 12), likewise of

brick, possibly to secure the entrance better after the threshold was installed. These modifications suggest a late reuse of the fort's entrance, possibly when the complex was repurposed as a caravanserai or small garrison outpost under early Muslim rule. The reduction in width would only allow foot traffic or single pack animals, suggesting an effort to control access tightly – consistent with a need for security in unstable times. This narrowing of the passage has strong parallels with access-control measures found in other late Sasanian forts and early Islamic caravanserais, where restricted doorways may have helped manage trade, taxation, and security along frontier routes.

Finally, the gate ultimately collapsed and experienced sporadic squatter activity. The brick vault over the passage eventually gave way (perhaps from structural weakness or an earthquake), burying the floor in collapsed brick and rubble. Above the vault fall, thick layers of stone debris accumulated, likely from the disintegration of the upper walls. At the top of this rubble, traces of occasional occupation were found on the western half of the passage; a simple pavement of broken brick and debris was laid down, and on the east side, a 35 cm-wide straight incision was cut into the debris, perhaps as a foundation trench for a light brick wall (Phase 13). These ad hoc structures, approximately 1.3 m above the original floor, suggest that after the vault collapsed, people continued to utilise the ruin – possibly as a shelter, using the standing wall stubs for support. Such reuse might date to the late medieval period (12th–13th centuries) or even to the post-Mongol period, when the fort was long abandoned, but its shell offered refuge. In summary, the gate complex of Pānkān encapsulates the fort's history, from a well-engineered late Sasanian fortress entrance (with advanced features, such as a vaulted gate tower), through early Islamic adjustments as priorities shifted to controlling movement, to eventual collapse and minimal reuse. It stands as one of the best-known Sasanian fort gates, with clear parallels to broader Near Eastern fortification practices.

4.5.Defensive Walls and Towers

Apart from the gate, Pānkān's defensive system consists of the perimeter curtain walls and the towers (corner and interval) that have already been introduced. The curtain walls, roughly 1 m thick, encircle the site in a slightly irregular quadrangle. Their construction, utilising rubble and gypsum mortar, and the presence of a glacis footing, have been described above. In places, the walls do not form perfect straight lines – minor bends or adjustments were noted – but overall, they demonstrate the builders' intent for a rectilinear enclosure. The northern wall had been the least visible before excavation (much buried under debris), but the 2021 trenches finally confirmed its trace. Trench 2021/1, in the north-east, exposed a broad

wall segment with preserved faces, subsequently designated STR28 and interpreted as the north curtain of the fort. This segment, bonded to Tower T7, had the same masonry style as the west and south walls. The exposure of STR28 established the line of the north wall and resolved earlier uncertainty about the northern limit of the enclosure.

The use of a quadrangular ground plan and corner towers was widespread across the empire: the 3rd–4th century fortifications excavated at the coastal settlement of ed-Dur in Eastern Arabia were also rectangular in plan and featured four corner towers (both round and square).[417]

Each of the four corner towers (T3 in SW, T6 in NW, T7 in NE, T8 in SE) was placed to cover two exterior faces. Based on excavated examples (T3 and T7), these corners were solid at their base and likely had hollow interiors or access at higher levels. For instance, T7's interior was filled with compacted soil and collapse (STR25), which had to be removed. No internal staircase or entrance at ground level was found, implying that access to the towers may have been from the wall-walk or adjacent rooms rather than from an interior staircase. The towers' external surfaces were coated in a thick plaster (likely lime or gypsum-based) for weatherproofing. At T7 the plaster contained small stones set on edge, possibly a crude form of pebble-dash or an anchoring for a final render coat. A similar plaster coating was observed on parts of the excavated western interval tower (T5), suggesting a consistent finishing technique for all external faces of the fort. This plaster could also have been whitewashed, making the fort gleam in the sunlight – a common feature of late antique fortifications that increased visibility or reflected heat.

The 2021 excavation at the NE corner exposed the construction and later reinforcement of T7. The tower's core (STR22) consists of large river cobbles set in a grey, relatively poor mortar, arranged in a circular plan. Patches of thick greyish-white plaster survive on the core's exterior, with thin stones pressed into the plaster as a facing/roughcast. Around the lower part of the tower, masons added a casing/buttress shell (STR23) built of similar cobbles in mortar; this wrapping is preserved up to c. 1 m above the base. The western end of STR23 aligns with the outer face of STR28 (the north curtain), while on the east, it connects to a masonry element recorded as STR24.

Within the tower, the 2021 excavation removed the collapse and compact fill (STR25) and recorded a dense white mortar-and-cobble fill (STR71) retained by the core wall (STR22). To the south of the corner, an N–S wall (STR69) joins the tower area and is interpreted as the

[417]Labbaf-Khaniki 2020, 53–55.

northernmost segment of the east curtain; this segment lay beneath a collapse layer (STR24). Together, these contexts show the structural junction of the north curtain (STR28) and east curtain (STR69) at T7, with the casing (STR23) strengthening the tower's base at that corner. The surviving plaster on T7's exterior corroborates the presence of a weatherproof render across the defensive works; the pressed-stone finish may represent a coarse pebble-dash or an underlayer to receive a final coat.

By analogy with the excavated south-west corner (T3), the corner towers at Pānkān likely measured c. 5–6 m in diameter. Excavation at the SW corner (T3) documented a ~5.1 m base formed by a ~1.2 m solid core encased by a 1.36 m mortar-rubble shell. T7's exposed curvature and shell-over-core construction mirror this method; although T7's full diameter is not yet measurable, its build and curvature indicate a comparable size. This agglutinative ('core with added crusts') technique is characteristic of the complex and is paralleled at Bāzyān, where the glacis was laid as a second skin against the standing curtain.[418]

At the NE angle, the tower's junctions with both curtains were documented in detail. A north–south wall (STR69) of mortar-set river cobbles runs into T7 on its south side and most plausibly represents the northernmost preserved run of the east curtain; overlying it a thick rubble mantle (STR24) with roof-tile and brick fragments was recorded, while the tower's interior comprised a compact white mortar–cobble infill (STR71) encased by the circular shell (STR22/STR23). These contexts confirm a solid basal tower with exterior plaster and a later buttressing mantle, and they map the precise meeting of the north (STR28) and east (STR69) curtains at the corner.

The interval towers (also termed intermediate or curtain towers) provided flanking cover along the walls. On the west side, T4 and T5 divide the wall into three roughly equal segments. Sounding no. 2019/7 at tower T5 demonstrated that these interval towers were likely U-shaped (Figures 79–81). T5 featured a straight northern side wall projecting 2.2 m from the enclosure, with a semicircular western side projecting a further 1.2 m, resulting in a total projection of at least 3.4 m from the façade. With an estimated width of 5 m, it functioned as a 'real' flanking tower, capable of covering the adjacent curtain effectively, rather than a simple tower buttress. On the south, aside from the gate complex, at least two intervals are present: one between the SW corner and the gate (T2), and one between the gate and the SE corner (T9). The east side has now yielded T12 near the midpoint, and on the north side the springing

[418] Déroche 2014, 39–40, for the Bāzyān sequence — the curtain built and plastered first, the glacis then laid against it; see also Ali and Déroche 2016, 15.

of T10 was exposed in Trench 2021/10, in a similarly placed location; its exact dimensions await fuller exposure. These towers were likely semi-circular or three-quarter-round projections. The Phase 3 expansion at the gate demonstrates how a quarter-round could be expanded to a half-round; by analogy, the curtain towers may have been built as half-rounds from the start. The diameter of interval towers, approximately 3–4 m, is smaller than that of corner towers (c. 5–6 m), which is typical: corner towers often bear more structural weight and may have held more platforms. Excavation behind Tower T5 in 2019 revealed that its interior was directly connected to rooms within the fort (see R300 and R301 below), rather than being an isolated compartment.

On the east side, Trench 2021/2 refined the form and preservation of the interval tower T12. Its northern arc (STR41)—cobbles in mortar with a continuous plaster skin preserved up to c. 1 m—was found bonded to W219 on the north and to the south with W226; the tower's east- and south-facing lengths are degraded, exposing the inner stone core. Adjacent layers include a porous, lime-rich collapse (STR42) derived from W219/STR41 and a looser cobbly deposit (STR40) north of the tower; together they chart post-abandonment erosion downslope. The curvature indicates a diameter in the 3–4 m range, smaller than the c. 5–6 m corner towers, matching a standard mid-curtain projection at Pānkān.

At mid-north, Trench 2021/10 identified the base of interval tower T10 (STR72) abutting W128 and flanked to the west by the robust N–S wall W218. The spatial relationship between these two walls, together with the adjacent "empty" strip lacking heavy tumble, suggests a narrowed gate or passage controlled by the tower mass. Given the fragmentary state, whether the northern entry had a single- or double-towered arrangement remains open; however, the masonry and mortar are entirely consistent with the Sasanian curtain and tower fabric elsewhere on site.

In Trench 2021/2, a curved, mortared cobble wall (STR41) was exposed immediately east of W226, tying northward into W219. This curving segment represents the outer face of Tower T12 (Figures 29 and 85–88). Its plastered exterior is best preserved on the north face to a height of approximately 1 m, while the arc becomes progressively eroded downslope to the east. STR41 is built of rounded river cobbles set in mortar; where best preserved, continuous plaster traces survive, as on other towers (e.g., T7) and selected curtain segments. The plastered junction between STR41 and W219 confirms that the exposed surface is the tower's exterior face. Although the excavated arc is too short for a full reconstruction, the curvature implies a diameter of c. 3–4 m—consistent with mid-curtain interval towers at Pānkān and smaller than the corner towers (~5–6 m)—placing T12 among the half- or three-quarter-round projections.

The open-backed arrangement suggested at T5 provides the best analogy for how T12 likely interfaced with the interior.

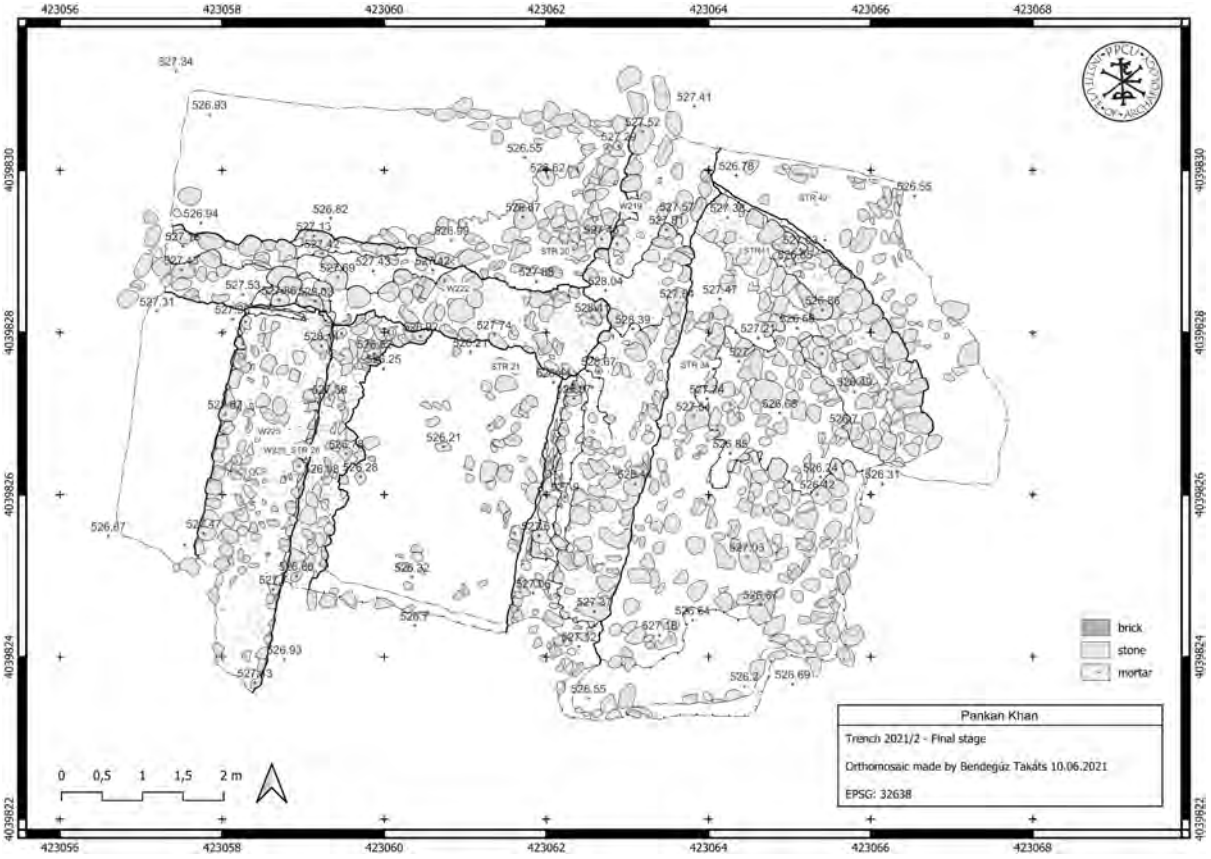

Figure 29. Trench 2021/2.

North of the arc lay a porous, lime-rich collapse with cobbles and large mortar lumps (STR42), locally overlain by a distinct burn layer; adjacent to this, a brown, cobbly layer (STR40) covered the area north of T12. These deposits indicate post-abandonment degradation and partial loss of the valley-facing arc. A cast-lead Ottoman-period musket ball recovered at the interface of a buttressing element (STR26) by W225 points to later activity—perhaps casual reuse or target practice—rather than formal refurbishment. No surviving evidence on the preserved ground floor levels might indicate rebuilding of the defensive circuit in the Islamic/Ottoman periods; apart from gate-area modifications, the Sasanian layout remained essentially intact. The relatively thin walls and small towers suggest a design intended to deter raids and control movement, rather than withstanding prolonged sieges by heavy artillery, mining or a full field army siege.

4.6.Internal Structures and Open Spaces

Excavation and survey within the enclosure indicate that roughly three-quarters of the interior was built up, leaving about one-quarter as open courtyards or passages. This

architectural concept of heavily overbuilt courtyards within a fortified enclosure is frequently seen at many Umayyad *quṣūr* in the Levant. However, strong parallels exist further east as well, such as at Tulūl al-Shuʿayba in Iraq or the fort of Akyrtash in Kazakhstan. Later, the early Abbasid *qaṣr* of Ukhaydir successfully combined these densely built barrack-like elements with open courtyards.[419]

In terms of dimensions, Pānkān appears to adhere to a formalised imperial building standard observed across late Sasanian and early Islamic frontier architecture. Stern (1946) argues that the ground plans of these outposts often followed a fixed unit derived from the Roman foot (pes), identifying a recurring modular scale in which 35 m corresponds to 100 feet and 70 m to 200 feet.[420] The near-square enclosure of Pānkān (c. 63–72 m per side) aligns significantly with the 200-foot paradigm exemplified by Qasr al-Tūba in Transjordan, which Stern defines as a doubling of the established 100-foot schematic seen at Qasr al-Kharāna.[421] This metrological consistency suggests that Pānkān was integrated into a state-sanctioned architectural programme that prioritised modular efficiency and standardised military engineering over *ad hoc* provincial construction.

This imperial standardisation extends beyond external dimensions to the fort's internal spatial logic. Several Umayyad residences, most notably at Mshattā and Qaṣr al-Tūba, clearly derive their interior distribution from Sasanian residential prototypes.[422] Stern (1946) identifies the *bayt*—a self-contained apartment consisting of a central longitudinal hall flanked by smaller auxiliary rooms—as a direct evolution of the Perso-Mesopotamian *īwān* system found in late 6th-century Sasanian palaces such as Qaṣr-i Shīrīn and Hawsh Kurī.[423] While the Sasanian model often featured twin tripartite units facing a private courtyard, early Islamic architects adapted it into a simplified, repeatable unit arranged around a common central court, as seen at Qaṣr al-Ḥayr al-Gharbī and al-Qasṭal (Figures 30–31).[424]

[419] Major 2022, 572, for the proportion built over, established from the orthomosaic plan and terrain models: "about three quarters of the interior area of the fort was covered by buildings". At ibid., 587 the same feature is given as "at least two-thirds"; the higher figure is the one derived from the survey data and is followed here.
[420] Stern 1946, 74.
[421] Stern 1946, 74–75.
[422] Stern 1946, 74–75.
[423] Stern 1946, 87.
[424] Stern 1946, 88–89.

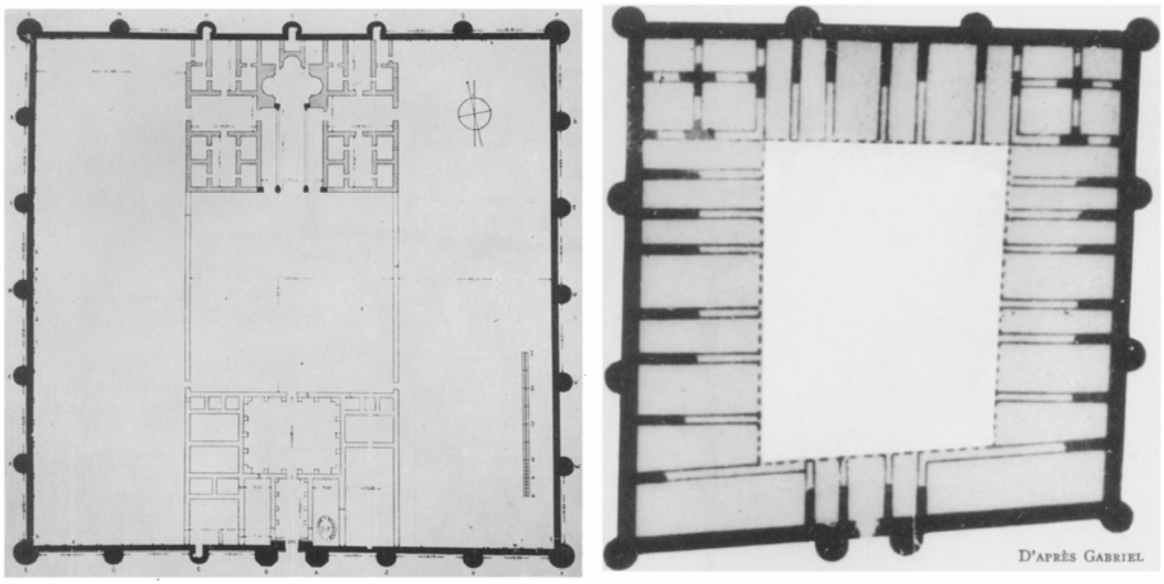

Figure 30. The Plans of Mshattā (left) and Qaṣr al-Ḥayr al-Sharqī (right)(Stern 1946)

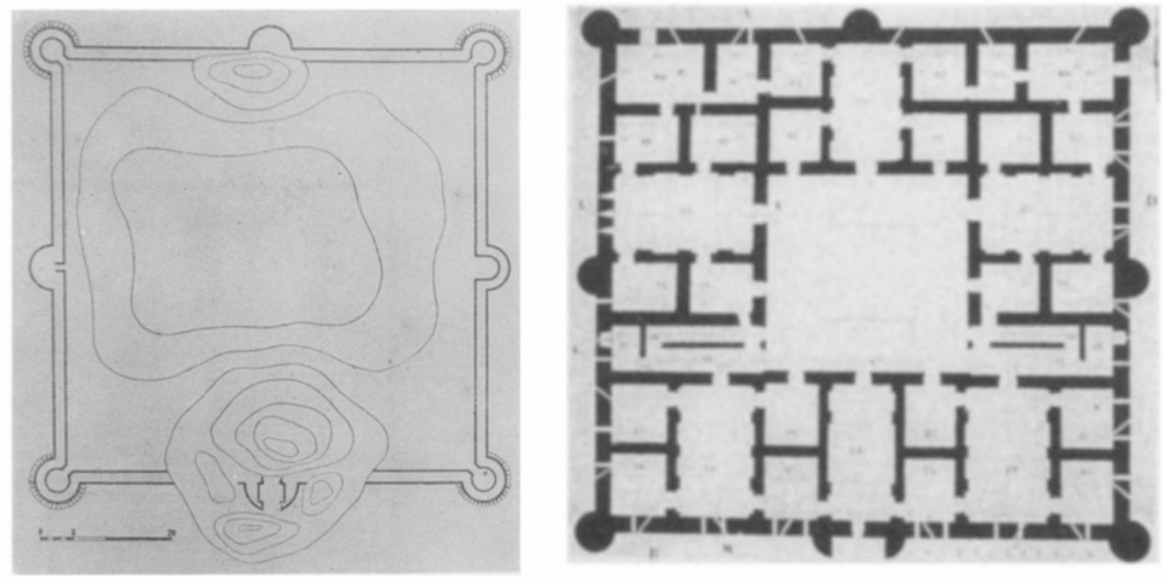

Figure 31. The Plans of Jabal Says (left) and Qasr al-Kharāna (right) (Stern 1946)

The point that deserves emphasis here is the continuity of elite residential logic already traced above through Stern's analysis of the bayt: in the passage from the Sasanian palaces to the Umayyad residences, the preference for enclosed, vaulted living spaces was preserved within the new Islamic architectural vernacular.

The internal spatial organisation of Pānkān also finds direct analogies in broader Sasanian military architecture. At Sīrāf, the fort's interior was accessed through a gatehouse that led directly into a cobbled courtyard, with rows of rooms arranged along the internal faces

of the external walls.[425] As the original excavators observed, the Sīrāf fort featured "a continuous range of rooms, evidently barracks or magazines" located "immediately inside the south and east walls".[426] This arrangement closely mirrors Pānkān's layout, where a heavily paved courtyard (S1001, Trench 2019/2, Trench 2021/4) was accessed near the gate, and continuous linear ranges of rooms were constructed directly against the interior faces of the western, eastern, and southern perimeter walls. This configuration appears to be a practical Sasanian design choice, intended to maximise secure interior space while structurally integrating the internal buildings with the relatively thin curtain walls.

The RPAS-based orthomosaics, combined with surface mapping of stone concentrations, reveal dense building remains, especially in the northern half of the fort (Figure 10). Virtually the entire north sector was built up with structures abutting one another. In contrast, the southern half featured a more open layout, with a row of rooms along the south wall (approximately 10 metres deep) and possibly a central courtyard space located north of them. Likewise, along the western wall, a strip of rooms about 6.5 m in width ran the length of the interior, and a similar band (maybe ~10 m wide) likely lined the eastern wall. Subtracting these peripheral rooms, the main open central courtyard can be estimated at only ~1120 m², about 24% of the total area – indicating a very high building density overall.

The interior spaces of Sasanian forts were frequently densely built up: the interior of the Sīrāf fort, for instance, was occupied by rows of rooms that served as barracks or storage magazines. In the case of the forts along the Gorgan Wall (such as Qal'eh Kharabeh), the rectangular rooms arranged in east-west rows likely served as military garrisons.[427]

This suggests that Pānkān's interior resembled a cramped caravanserai or fortified caravansary, with storerooms, barracks, or housing surrounding one or a few courtyards. It is possible that smaller internal courtyards existed embedded in the northern half, but if so, they have been obscured by destruction and later disturbance. Unfortunately, modern bulldozing in the north fort interior disturbed some areas, complicating the identification of small courtyards or alleys.

[425]Priestman 2024, 17.
[426] Whitehouse and Williamson 1973, 33: "immediately inside the south and east walls was a continuous range of rooms, evidently barracks or magazines, the roof of which presumably provided a fighting platform behind the outer wall." Their published plan is a reconstruction resting on three stated assumptions — a central southern entrance giving a side of 62 m, a square building, and interval towers on the remaining walls — and the interior had not then been investigated (ibid.). The cobbled courtyard entered through the gatehouse is reported by Priestman 2024, 17, from the excavation as a whole.
[427]Labbaf-Khaniki 2020, 46, for the barrack rows of the Gorgān Wall forts and for Qalʿeh Kharābeh; ibid., 52–53, for Sīrāf.

The density of the building inside the enclosure is not only a practical matter but a diagnostic one, and it is worth stating the contrast plainly. In the Roman and Byzantine forts of the eastern provinces the interior was as a rule kept substantially clear: ranges of barracks, stores and stables were set against the rear of the curtain, while the centre of the enclosure remained an open court crossed by the principal streets and holding the headquarters building. At Pānkān the reverse obtains. Something approaching three-quarters of the interior was occupied by structures; the whole northern half appears to have been built over, and what remained open was reduced to a court of about a quarter of the total area, with the possibility of smaller yards inserted between the blocks. Major has drawn attention to this as a feature that separates Pānkān from the Romano-Byzantine tradition and links it instead to the eastern one[428]. Heavily overbuilt enclosures of this kind recur across the Umayyad *quṣūr* of the Levant — at Bālis on the Euphrates and at Qaṣr al-Mushatta among the best known — and further east at Tulūl al-Shuʿayba in Iraq and at Akyrtash in Kazakhstan, before the early Abbasid qaṣr of Ukhaydir combined dense ranges with formal courts.[429,430] The overall dimensions point in the same direction: the roughly 70 m square of Pānkān falls close to the dimension that recurs among the Umayyad castles of the classic type.[431]

The inference usually drawn from this — that the Umayyad *qaṣr* inherited its plan from Sasanian rather than from late Roman models — is attractive, and the Pānkān evidence is consistent with it. It should nonetheless be advanced with some care, for two reasons. The first is that the sample of excavated small Sasanian forts remains very small, and it is not yet possible

[428] Major 2022, 587, where the contrast with Romano-Byzantine practice is drawn and the parallels are assembled; for the proportion built over, ibid., 572.

[429] A documented instance of the same transformation in the west: al-Bakhrāʾ, a Tetrarchic fort of 293–305 CE south of Palmyra, "was converted into a Muslim qaṣr" probably before 65/684 by the addition of a fortified zone (Milwright 2010, 666); the sixth-century Syrian fortified country residences — al-Andarīn, Iṣṭabl ʿAntar, probably Ḍumayr — are named as intermediaries in the evolution of the quṣūr, and "archaeological interpretations are increasingly focusing upon the roles played by the quṣūr in the cultivation of land and the maintenance of trade routes" (667, citing Genequand).

[430] For Bālis, Leisten 2009, 386–387; for Qaṣr al-Mushatta, Perlich 2016, 285–293; for Tulūl al-Shuʿayba — a rectangle of 58 by 69 m with half-round towers, four īwāns and single rooms around the courtyard — and for Akyrtash, Northedge 2009, 245–246, with the plans at ibid., 256; the four are cited together in this connection by Major 2022, 587, whose reference is to Northedge 2009, 256.

[431] Genequand 2006, 8, for the "square enclosure about 70 m long" common to the buildings first recognised as Umayyad castles; the coincidence with the dimensions of Pānkān is noted by Major 2022, 588. The coincidence should not be pressed further: recent research has brought to light a much wider range of Umayyad plans (Genequand 2006, 8), and Northedge 2009, 243 n. 4, objects that the square towered plan with a central courtyard "was used for different types of building", the ribāṭ among them. What distinguishes the Umayyad qaṣr is not its perimeter but its interior, organised in repeated apartments (bayt/buyūt) of a central room giving access to four or five smaller ones (Genequand 2006, 8) — the plan Northedge calls "a diagnostic marker of the Umayyad desert castle" (2009, 244). So far as the geophysical plan and the excavated trenches show, the interior of Pānkān carries continuous ranges of rooms set against the curtain rather than apartment units around a porticoed court, and on that criterion, it is not a qaṣr of the classic Umayyad type, whatever the agreement of its overall dimensions.

to say whether a densely built interior was the Sasanian norm or one option among several. Second, the one closely comparable excavated site argues against a simple reading: at Fulayj the interior of the primary Sasanian military phase was left largely empty, and the mudbrick room divisions and the domestic oven belong to the subsequent transitional phase[432]. If the same is true at Pānkān — and the interior blocks here demonstrably grew by accretion, one room being attached to the next rather than the whole being laid out at once — then part of the density visible on the plan may belong to the fort's later life rather than to its foundation, and the resemblance to the quṣūr would be a resemblance between two phases of long occupation rather than between two building traditions. Only excavation of the interior on a larger scale, with attention to the relative sequence of the blocks, will settle the point. What can be said on present evidence is that the built-up interior was in place by the early Islamic period at the latest, and that the plan of Pānkān as it then stood would not have looked unfamiliar to the builders of the quṣūr.

At the NE corner, excavation confirms that T7 was solid at its base, lacking any ground-level doorway; the tower's interior at that level comprised compacted collapse and mortar-cobble fills (STR25, STR71). On the available evidence the towers were entered from the wall-walk or from adjoining rooms, the ramparts being integrated into the interior fabric rather than standing as free-standing drums at ground level.

Room R103 (Trench 2021/2) preserves a precise sequence of resurfacing and use. Three superposed walking levels were recorded: an upper compact mortar-rich surface (STR45), a slightly lower, smoother mortar floor with discrete burn spots (STR46), and a still earlier mortar surface (STR52), underlain by another mortar pavement (STR57). Across the room's south half, a loose reddish ashy fill (STR43) extended between W225 and W226, yielding burnt sherds; in the SE corner, a paired surface of reddish clay (STR30) and grey ash (STR31) lay at one horizon. North of W222, a dense dark-brown occupation layer (STR29) covered the area of R1006. Together, these contexts show extended, episodic use, periodic resurfacing, and in-room firing/processing, consistent with mixed domestic and logistical activity.

South of the NE cluster, Trench 2021/3 (immediately S of STR27) exposed a clay-based kiln (STR33) backing the E–W wall (STR27), with kiln walls partly of mortared and partly of dry-laid stones; north of the wall, a reddish-brown clay walking surface (STR32) lay directly under the site-wide collapse (STR1). The southern half of the trench was sealed by a thick layer

[432]Priestman, Al-Jahwari, et al. 2023, 294, for the open interior of the primary Sasanian phase at Fulayj and its subdivision only in the transitional phase; the point is developed further below.

of collapsed brick vault (STR35), including large, mortared wall-block remnants and bricks measuring c. 35 × 26 × 6 cm; below this, an extremely compact brown layer (STR67) and a dense greyish-brown horizon (STR68) likely represent pre-collapse occupation or make-up. North of STR27, a sequence of grey clayey deposits (STR37 over STR39, with a compact grey-brown STR44 beneath) produced abundant Abbasid coarseware (notably large jars) and a bronze sheet fragment with punched decoration—evidence for sustained early Islamic activity in this quarter. On the south side, a broad rubble mantle (STR38) and a discrete burned, black ashy lens (STR56) complete the late formation package.

The functional trajectory observed at Pānkān plausibly reflects a broader pattern of phased occupation, a sequence recently documented at the Sasanian fort of Fulayj in Oman. Excavations at Fulayj have provided a valuable chronological analogue, suggesting that an initial military phase (Phase 2) with an open interior was subsequently followed by a distinct Early Islamic reoccupation (Phase 3). During this transitional period, builders erected new mud-brick partition walls to subdivide the internal space and installed a large domestic oven (tannūr).[433]

As the excavators of Fulayj conclude, the introduction of these internal room divisions and the domestic oven likely signal a significant change in the structural use of the space and the site's overall function in the early decades following the Islamic conversion.[434]

Crucially, this precise pattern of architectural adaptation appears to be mirrored in the archaeological record of Pānkān. The installation of the clay-lined oven (STR33) abutting an interior wall in Trench 2021/3, the secondary adaptation of likely Sasanian-era storage pits (such as the heavily burnt interior of Con101), and the dense subdivision of the internal spaces provide compelling parallels to the Early Islamic modifications seen at Fulayj. Given these developments, the robust stone shells of Sasanian forts such as Fulayj and Pānkān were likely not entirely abandoned after the Islamic conquest. Instead, their pragmatic architectural continuity suggests local populations or emerging administrative authorities strategically reappropriated them, possibly as secure waystations, caravanserais, or agricultural nodes within the newly integrated networks of the early Caliphate[435]. Evidence from the fortified

[433]Priestman et al. 2023, 294.
[434]Priestman et al. 2023, 294, 302.
[435] Pourshariati 2008, 420: the conquests' watershed status is an "artificial creation … precipitated by the discontinuity in our sources", and "not much had changed with the conquest of the regions in the period 640–650 and this remained the case throughout the Umayyad period". The mechanism is documented: the Arab treaty with Shahrvarāz at Darband promised no stationed armies and no jizya or kharāj, military service substituting for tribute (279–280), and after the conquest the dynastic families "were left free in the administration of their domains" (305). Spuler 2015, 497, makes the same point for the fortifications themselves: many dated back to Sasanid or even earlier times, and the Arabs "endeavoured to get as many of

complex of Bāzyān further corroborates this pattern of secondary domestic adaptation. There, excavators documented a similar phenomenon during its later phases of occupation, characterised by the progressive subdivision of earlier monumental spaces into smaller, utilitarian rooms and the widespread installation of domestic ovens (*tannūrs* or *tābūns*)[436]. The recurrence of such modest domestic installations across regional sites indicates a widespread shift toward the logistical and residential reuse of standing fortified structures during the Late Antiquity to Early Islamic transition. See Figure 32.

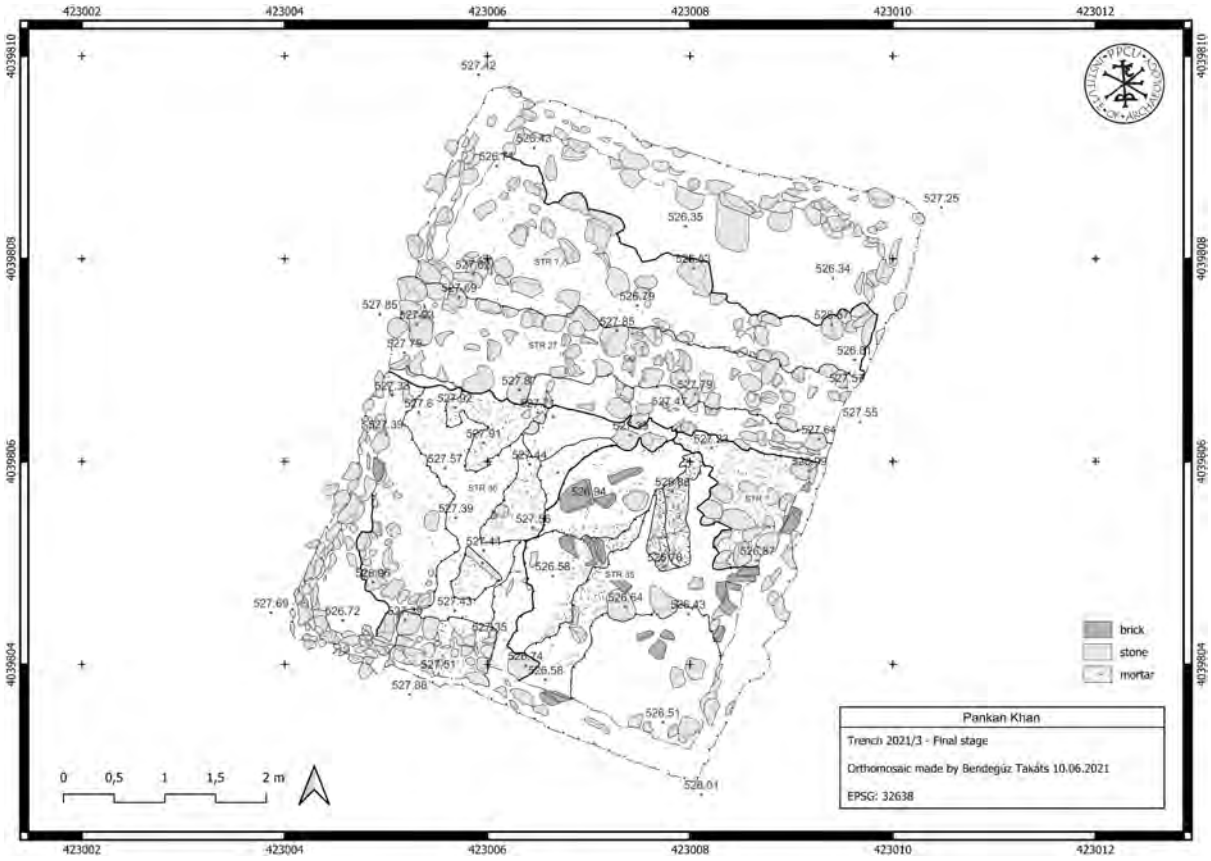

Figure 32. Trench 2021/3.

In the western interior (Trench 2021/4), two orthogonal cobble structures—STR50 (N–S) and STR51 (E–W)—emerged directly under the general collapse (STR1). STR51 survives in two courses (larger flat stones below, smaller above) and overlies a grey, cobble-rich collapse (STR53). In the west and southwest of the trench, compact, reddish fills (STR49, STR54) gave way to a reddened lens with orange firing marks (STR55). To the east a sequence of floor constructions was recorded: a cobble walking surface (STR59), a mortar-free cobble floor (STR60), and its compact clay foundation (STR61). The fabric and superpositions are

these places under their control". An arrangement of that kind leaves no destruction horizon and no change of garrison visible in the ground, which is what the Pānkān sequence shows.

[436]Déroche 2014, 41–42.

consistent with a service court or work yard furnished with durable stone pavements and later re-laid walking surfaces. See Figure 33.



Figure 33. Trench 2021/4.

Within R100 (Trench 2021/6), removal of the humus-rich rubble (STR47) revealed an in-situ mortar floor (STR48) that had suffered later disturbance; beneath it, deeper deposits included a charcoal-rich feature sampled for radiocarbon, implying multiple refurbishment episodes within a vaulted, narrow room of the NE block.

At the SE of the built matrix (Trench 2021/7), a heavily eroded N–S wall (STR58), interpreted as the continuation of W1021, was cleaned; its mortar had largely perished, leaving loose stone runs. A bonding E–W wall (W217) abutted this line, defining a small, enclosed space; the underlying compacted earth with stone fragments likely represents an occupation or construction surface predating final decay. See Figure 34.

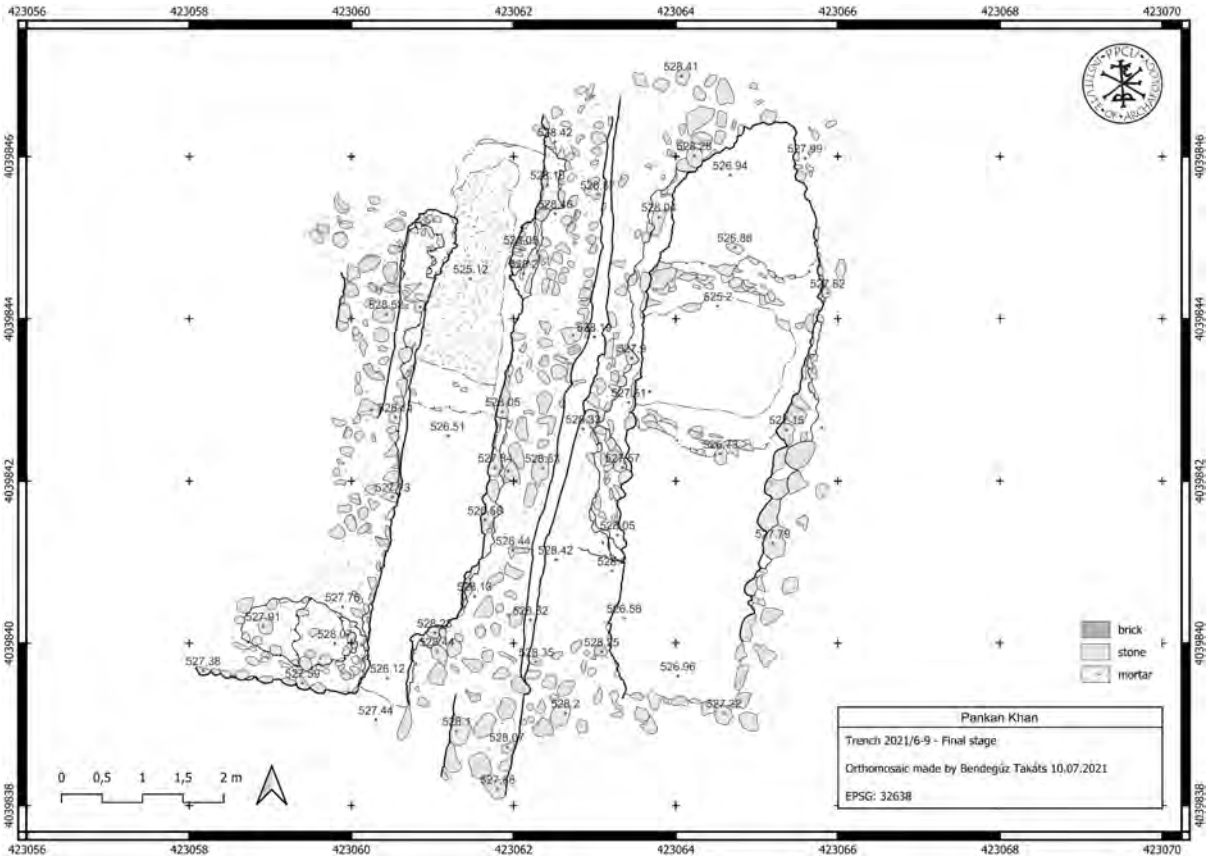

Figure 34. Trenches 2021/6-9.

In Trench 2021/8 (near W1013/W1014), a north–south wall (STR64) of large river cobbles in white mortar was found joined by an east–west return (STR65), creating an internal corner filled by a reddish-brown compact deposit (STR66). An opening in STR64 contained a short brick-paved threshold (STR73) from which a small glass fragment (Find 3176) was lifted—strong evidence of a doorway serving a room or magazine in this sector. A bronze earring (Find 3146) was also recovered from the STR64 area at 55 cm depth. See Figure 35.



Figure 35. Trench 2021/8.

Finally, Trench 2021/9 within the long, vaulted room R101 documented a collapsed vault package (STR62) over a looser, humus-rich fill (STR63) that included a small, white-glazed pipe fragment. Below lay a homogeneous, brown layer (STR70) with a polished sherd, indicating deep in-filling after the room's abandonment. The position of the broken vault against W207, together with comparable evidence in Trench 2021/6, suggests that the two soundings accessed different segments of the same covered passage or chamber.

The internal layout was neither regular nor symmetrical. Buildings along the west wall were oriented perpendicular to the wall (suggesting a row of rooms opening eastward). In contrast, along the east wall, structures ran parallel to the wall and appeared to be in two back-to-back rows. This asymmetry suggests that the fort's internal architecture evolved organically or was constructed in stages rather than following a single, unified blueprint. Standing remains and excavation also indicate that the interior structures were built in multiple phases, overlapping and butting against each other, rather than being constructed all at once in a single project. Walls were built with the same technique as the enclosure – rubble in thick gypsum mortar – often using formwork to cast each wall individually. Joins between walls are usually structurally bonded, but slight differences in alignment or thickness betray that one room was added onto the side of an earlier one, forming a honeycomb of attached units. The interior

façades were finished. Excavations in room R301 (behind the gate) revealed that the interior walls were coated with plaster and even whitewashed, giving the space a neat appearance that would otherwise be lacking in a rough rubble construction.

The mission has identified two main clusters of buildings by excavation: a Northeastern Cluster and a Northwestern Cluster, with additional structures in between and along the south.

4.6.1. Northeastern Cluster of Buildings

The northeastern quadrant of Pānkān contains the best-preserved architecture, with several rooms remaining partially standing above ground. Four rooms in particular (designated R100, R101, R102, R103) were sufficiently intact to measure their complete ground plan and even vertical profile. These rooms, along with adjacent wall fragments, form a contiguous block of structures in the NE corner, though not arranged in a perfectly symmetrical plan. At first glance, they suggest a linear arrangement, but closer analysis reveals offsets and additions that indicate a stepwise expansion.

Rooms R101 and R100 are the two looted rooms discovered early on, and they remain the most informative. Both are narrow, elongated rectangles oriented roughly north–south, and both were barrel-vaulted spaces. R101 measures about 7.3 m by 2.0 m internally. Its walls stand nearly to their original height of ~3 m at the crown of the vault. The vault has since collapsed, but the imprint of the vault's construction is still visible: along the top of the intact western wall of R101, one can see the imprint of brick paving that once lined the inside of the vault. In other words, the interior of R101's barrel vault was likely lined with flat bricks (approximately the same Sasanian type as found in the gate), which left their marks in the mortar. This is a rare find, indicating that the room was roofed with a masonry vault rather than a lightweight material. R101 had a narrow doorway at its north end (presumably an archway about 1 m wide) providing access. Additionally, a notable feature in R101 is an arched wall niche on its western wall. Near the southern end of that wall, an arched recess ~60×60 cm was found, and possibly others existed further north. Such niches, plastered smooth, are typical of Sasanian and Early Islamic architecture for holding lamps or storing small items. The presence of a niche suggests R101 might have served as a domestic or habitation room (niches often appear in living quarters or even chapels). However, given its narrow width and vault, R101 might also have been a corridor or storage space that was later adapted for sleeping or other uses.

Room R100, immediately west of R101, was built in a second phase abutting R101. R100 is even narrower – only ~1.25 m wide internally – and about 6.3 m long. Its original doorway was located at the south end, approximately 0.82 m wide. However, at some point,

the south door was blocked off with masonry from the outside. Subsequently, a new entrance was opened by breaking through one of the wall niches on the west side of R100. R100's west wall contains three evenly spaced arched niches, plus a smaller niche at the north end. It appears that the middle niche (second from the south) was later enlarged into a door-like opening to connect R100 to an adjacent space to the west. The fact that R100 had multiple niches suggests it may have functioned as a storage magazine – niches could hold jars or objects off the floor. The room was partially sunken (its floor is ~1 m below the average floor level of the fort), and there is no evidence of an upper storey above R100. The vault over R100 was somewhat unusual: the northern part of the room had a standard semi-circular barrel vault, but further south, the vault's profile became more pointed (steeper), with a noticeable change in curvature at a built-in step in the vault's springing. This may indicate the vault was constructed in two segments or was altered during construction. In any case, R100's vault did not support an upper floor as R101's did. Given its cramped dimensions, multiple niches, and sunken nature, R100 is interpreted as a storage room or cellar, possibly for valuables or provisions that needed to be kept cool and secure.

Further small rooms lay north of R100 and R101, designated R1004 and R1005 in the site nomenclature, forming part of the north-eastern block. Room R1004 ran parallel to R100 on its east (effectively creating a twin, adjacent to R101's west side). Little of R1004 was excavated, but it shares a wall with R100 and extends further north. R1005 lay north of R1004, sharing wall W213 as its north boundary. R1005's preserved portions suggest a size of about 5.5×2 m, with a doorway in the west wall and another in the north wall (the latter opening likely into yet another space). R1005 also appears to have had a vault roof, given the remnants atop its walls. These fragmentary rooms indicate that the NE cluster had a series of long, narrow vaulted chambers aligned roughly north–south, appended sequentially.

The rooms immediately south and west of R100–R101 show protracted resurfacing and occasional burning (see R103 above), while to the north-west, the area designated R1006 retains a dense, dark occupation level (STR29) north of W222. These layers, together with the mortar floors and later disturbances noted in R100 (STR48/STR47), indicate repeated use, reopening, and repair across the NE block from the late Sasanian to the early Islamic phases.

Immediately south of R100/R101, excavation exposed Rooms R103 and R102, together with evidence for further rooms west of R102. R103 is a rectangular room about 9 m by 2.5 m, with its long east wall built against the fort's east enclosure wall. R103's main entry was from the south, implying it opened onto an open space or courtyard to its south. A small connecting door in its west wall likely led into the neighbouring room R102. R102, attached on the west

side of R103, measures ~8.5 × 3.7 m internally. R102 was built after R103 (its east wall abuts R103's west wall). West of R102, three more rooms (R1006, R1007, R1008) were arranged perpendicularly, i.e. their long axis north–south abutting the long west wall of R102. These were likely smaller chambers filling out the block toward the west. North of this cluster, as mentioned, R1005 (and R1004, R100) completed the block. R1005 was perpendicular to the east wall (like R103), and its ~3 m width was also vaulted. R1005 appears to have been the first structure built in this cluster, with R103 added next to its south, then R102 to the west of R103, and finally the trio R1006–1008 added onto R102's west side. This sequence of construction is deduced from bonding and abutment relationships observed in the walls. It shows a clear pattern of incremental expansion, likely as needs grew or new functions were added to the fort.

When examining the plan of the NE block, there are hints of an overarching organisation despite the piecemeal growth. The northern end walls of rooms R100, R101, and R1004 line up in an east–west line, and they align with a series of wall fragments (w189-w192, w193, w196-197, etc.) that extend further west in the ruins. This suggests that the north edge of the NE building complex was defined by a straight wall line, possibly the northern wall of a range of rooms that covered the whole north fort interior. Similarly, the southern end of the cluster (rooms R103, R102, R1006–1008) appears to have shared a continuous south boundary aligning with walls w229 and w1023 to the east and west. If these inferences are correct, the NE cluster formed part of a larger rectilinear block of buildings ~30 m long (N–S) and ~30 m wide (E–W) occupying the northeast quadrant. The western limit of this block might be indicated by wall stubs w208 and w215 (and a hypothesised connection w1010) running north–south ~30 m west of the east wall. West of that, fragments w209 and w210 could belong to additional structures that filled the gap toward the west wall. In effect, the NE cluster was not an isolated "keep" or separate building – it was integrated with a continuum of rooms that formed the entire northern half of the building matrix. However, the concentration of preservation in the NE corner suggests that these rooms may have had special functions or been more durably constructed (they were deeply founded and vaulted, which aided their survival). Despite early speculation, no trace of a church or chapel was found within the NE cluster (or anywhere inside Pānkān), in contrast to sites like Bāzyān, which have a prominent church in the centre. The absence of explicitly religious architecture at Pānkān, despite its contemporary setting amid Christian communities, is notable. This utilitarian focus sets it apart from Christian monastic sites and from other Sasanian provincial seats alike. For instance, the fifth-century complex at Bandian in northern Khorasan prominently integrated a tetrastyle hall featuring a

stucco-decorated fire altar, highlighting that when Sasanian administrative nodes possessed a significant cultic function, this was clearly articulated in the architecture.[437] Pānkān's interior appears geared toward storage, habitation, and fort administration rather than worship. Though small shrines or crosses (as portable items) could have been present, nothing like Bāzyān's basilica is evident. This difference is discussed further in the functional interpretation.

4.6.2. Northwestern Cluster of Buildings

On the opposite side of the fort, the northwestern quadrant also contained a cluster of rooms, though none remained standing above grade. Our knowledge of the NW cluster is based on the 2019 and 2021 excavations (trenches 2019/2, 2019/3, 2019/5, 2019/6, 2019/7, 2021/8), continuous surface surveys, and aerial imagery. Immediately behind the northwestern corner tower (T6), a slightly smaller room appears to have been built, likely to accommodate the tower's interior curve. This situation – a corner tower intruding on an otherwise regular row of rooms – finds a parallel in Umayyad palatial architecture[438] (e.g. the small rooms tucked behind corner towers in Hisham's Palace at Rusafa[439]). Along the western wall of the fort, a continuous row of rooms ran adjacent to the curtain, with an internal width of about 4.7 m for most of the length. This regular arrangement is interrupted near the NW corner by the smaller chamber just mentioned but otherwise seems consistent. In trench 2019/2, one room designated R301 was partly uncovered, measuring 4.7 m (E–W) by 2.6 m (N–S) internally. Directly south of it was R300, which shares the same width (4.7 m) but extends further to the south beyond the trench limits. R300's length was at least 6 m (the excavated portion), and it likely continued until it met another cross-wall that was not reached in 2019. If R300 had a central doorway on its east side (as was found), that suggests its length might not have exceeded ~12 m; otherwise, the door would be off-centre. For now, R300 is understood to be a long hall or storage room running north–south behind Tower T5.

[437] Azarpay 1997, 193.

[438] In the Umayyad quṣūr the corner masses are frequently shallow buttresses rather than functional towers, interrupting an internal range without governing its plan: at Khirbat al-Karak and Bālis the small projecting corner towers were "probably more intended here to be buttresses like their semi-circular counterparts" (Genequand 2006, 10), and of Qaṣr al-Kharāna Northedge 2009, 244, writes that "the round towers are not more than buttresses for the walls", the building being "lightly fortified, to resist tribal raids in the desert".

[439] The arrangement at Pānkān — an enclosure with a single range of rooms set against the outer wall around a central court — is itself a documented type: Genequand 2006, 11, identifies a third group of Umayyad quṣūr consisting of "merely an enclosure with one row of rooms organised around the outer wall and a central courtyard" — "clearly not palaces … best described as residences" — instancing the three buildings at Maʿān, the two at Mushāsh, the secondary structures at Umm al-Walīd and the Abbasid family mansion at Ḥumayma. The comparison is offered for the plan, not for the function: nothing at Pānkān indicates a residence of that class.

A trench through R300 (2019/3) provided a vertical slice of its occupational history. R300 had no paved or plastered floor; instead, the occupants levelled the natural hard clay and used it as an earthen floor. Thick accumulations of mortar spill were recorded along the edges of the room against the east and west walls — surplus gypsum mortar that had run down or been discarded during construction. This indicates the room's walls were cast in place and the excess mortar slumped inward. Those irregular mounds were later covered with packed earth to create a flat usable surface across the room. In other words, the builders didn't bother to remove construction debris; they backfilled over it to form the floor. The lack of a formal floor finish in R300 (and presumably similar utilitarian rooms) contrasts with the stone-and-mortar paved gate passage floor and possible courtyards, which signal a difference in usage or importance. Over the earthen floor of R300, a thick burn layer (~10–18 cm) was found spread almost wall-to-wall. This charred layer suggests a phase of intensive burning – perhaps the building was used for industrial purposes (e.g., metalworking or large-scale cooking) or it burned down. Given that no kilns were found in situ, it is also possible that the accumulated hearth ashes resulted from periodic fire use. Mixed in this burn layer and along the walls were fragments of fallen wall plaster and mortar chunks, evidence of the gradual decay of the structure. Within the burn debris, a small circle of stones was noted, which appears to be the remains of a makeshift fireplace or fire pit constructed against the floor during that occupation phase. This suggests people were indeed living or working in R300 during or after the burning episodes – using the ruined room as shelter and making a hearth on the debris.

Above this burned horizon came the catastrophic end of R300: a ~50–60 cm thick layer of collapsed vault material covered the entire room. It contained numerous broken bricks identical to those from the gate vault, confirming that R300 (or its adjacent space) had been vaulted and the vault had fallen in. Impressions of bricks were also recorded on the interior of R300's west wall, similar to R101, implying that R300's vault might have had brick lining. The collapse layer also included fragments of the upper walls. Above the vault collapse was a final ~1 m of loose rubble from walls, sealing the stratigraphy.

One key architectural feature from the NW area is an open courtyard (S1001) onto which R300 opened. In the southeast corner of R300, a 2 m-wide doorway led eastward into an open space labelled S1001. This space, partly excavated, measures about 8.8 × 2.9 m in the area exposed. Crucially, S1001's floor was constructed differently from the rooms: it was made of large cobbles set in thick mortar, very much like the gate passage floor. Such a heavy cobble-mortar pavement is typical for courtyards or open-air surfaces (which need durability), in contrast to interior rooms where beaten earth sufficed. The presence of this pavement strongly

suggests that S1001 was an unroofed courtyard or, at the very least, an open workspace. It likely served as a small court around which rooms like R300 and others opened – in essence, a classic *bayt* arrangement (central courtyard with surrounding chambers) as known in Near Eastern domestic architecture. The NE cluster hints at similar arrangements: R103's door to the south implies a courtyard there, and the pattern of doorways in R100–R102 suggests some rooms opened off of others or small courts. Pānkān's interior may have comprised multiple courtyard units, providing light and air to the dense complex of rooms, rather than a single open plaza.

The 2021 soundings west of the centre (Trench 2021/4) clarify the character of the exterior ground surfaces in the north-western half. The orthogonal cobble lines (STR50/STR51) and the stack of stone floors (STR59/STR60 over STR61) plausibly represent resurfacing of a small service court or corridor that tied the R300 range to adjacent workspaces, matching the mortar-set courtyard pavement of S1001 but showing a different, mortar-light construction aimed at economy.

Adjacent to S1001 on its east, limited excavation (Trench 2019/5) uncovered two remarkable features: stone-lined circular pits sunk into the ancient ground. These are interpreted as underground storage silos, labelled Con100 and Con101. They lay about 1 m apart and were found in an area bounded by a curved wall segment (w332) and a round pier or pilaster base (w333), suggesting they were within a roofed room or corridor. The pits have a bottle-shaped profile: wide below and narrowing to a circular opening just above floor level. They were constructed by lining a dug cavity with small stones and pebbles mortared with lime. The western pit (Con100) is over 2 m deep and approximately 2 m in diameter at its base. The eastern pit (Con101) had a partially preserved brick rim or curb around its mouth, made of Sasanian-type bricks with diagonal grooving. Inside, Con101's stone lining was coated with an additional 5 mm of fine clay plaster, which showed intense burning on its interior surface. This suggests Con101 might have been used at some point as a large *tannūr*-like oven, whereas Con100 had only a lime plaster lining and showed no such inner clay layer. The fill of Con100 consisted of a uniform mixture of rubble and earth, with a thick ash layer at ~1.95 m depth, followed by a homogeneous fill above. Two well-preserved bronze bowls were recovered approximately 97 cm below the rim of Con100, one of which bears an inscription datable to the late Ottoman period. This indicates that Con100 was cleaned out and perhaps reused or filled in relatively recently (19th–20th century). By contrast, Con101's lower fill contained many animal bones and plain pottery fragments, increasing in abundance toward a depth of ~1

m,[440] suggesting usage for food processing or cooking in a later phase. The upper fill of Con101 is not fully excavated; however, evidence of burning and a baked-clay interior strongly suggests that it was converted into an oven in its final use. Initially, however, these pits most probably functioned as granaries or storage silos for the fort. Filling pits with grain and sealing them is a known practice for long-term storage in forts and caravanserais, protecting provisions from humidity and pests. The presence of two side-by-sides indicates modest storage capacity. They likely date back to the Sasanian occupation, given the brick curb and construction style. Their conversion or continued use in later periods demonstrates the adaptive reuse of space as the fort's role evolved.

Synthesising the evidence of the interior: Pānkān's inner structures appear to have supported a combination of logistical and residential functions. The prevalence of vaulted, narrow rooms with niches and storage pits points to large-scale storage of food and supplies (silos, magazines), as well as habitation for a small garrison or community (e.g. rooms with whitewashed plaster and hearths). Unlike the fortified monastic complex at Bāzyān, which centred on a church, Pānkān's architecture is more utilitarian. The finding of a clay oven (STR33) built against an interior wall in Trench 2021/3 indicates domestic activity: the clay-lined fire pit of this oven lay just south of wall STR27 (likely part of an interior building), complete with an ash layer and the upper stone of a hand-mill (quern) nearby. A Byzantine coin was even found just west of this oven, suggesting that such domestic installations could date back to the early Islamic or late Sasanian period, when Byzantine currency circulated on the frontier. In another area, layers of collapsed brick in a southern interior trench (2021/3) yielded numerous sherds of Abbasid-period ceramics, including green-glazed ware and large jar fragments, indicating occupation or dumping within the fort in the 8th–9th centuries. Thus, material culture from the interiors confirms that, after the Sasanian founding, the site remained occupied into the Islamic period, with shifts toward more domestic and perhaps industrial uses of space (ovens, workshops) rather than purely military storage.

4.7.Surroundings of the Fort

Pānkān was not an isolated structure in an empty landscape – evidence of ancillary settlement and activity around the fort has been documented, especially to the south. Field

[440]The faunal material from Con101 was recorded in the field but has not been submitted for zooarchaeological analysis, so neither the species represented nor the age and butchery profile can be stated. Identification of this assemblage would bear directly on the provisioning of the site and on its relationship with the surrounding countryside, and it is listed among the priorities for future work in section 7.2.

surveys covering the area outside the enclosure, particularly the southern approach, recovered a large quantity of ceramics spanning Late Antiquity to the early medieval period. The sherd assemblage is dominated by fine creamware typical of the late Sasanian–Early Islamic transition (plain or with incised/stamped geometric decoration). A significant component is also the so-called "honeycomb ware" – a reddish coarse ware with distinctive pitted decoration once thought to be Sasanian but now dated to the 8th century and later. The near-absence of glazed ceramics or Ottoman-era pipe fragments in the surface collection is telling. Unlike many tells or forts in Iraq that show occupation into the Ottoman period, Pānkān's surroundings yielded almost no later glazed wares or material from the 17th to 19th centuries. This indicates the site and its immediate settlement were abandoned mainly during the High Medieval or Ottoman times. The latest pottery dates to the early Islamic (Abbasid) era, supporting the hypothesis that the fort's active use waned by the 12th–13th century.

The surface debris around Pānkān includes numerous fragments of mud brick (adobe) and large storage jar sherds. These likely originate from structures outside the stone fort – perhaps a civilian settlement or a caravanserai suburb that developed in the fort's vicinity. The largest concentration of artefacts is immediately south of the fort, in front of the gate, which makes sense as the south side has level ground leading to the main route. Here, a scatter of bricks and domestic pottery suggests houses or support buildings once stood. Some of these could even predate the fort: a 2014 magnetometer survey identified sub-rectangular anomalies south of the fort that are not aligned with the fort's grid, hinting at earlier structures (possibly Late Sasanian village buildings or a small monastery) beneath the later settlement layer. Future soundings are planned to test these geophysical targets. In any case, the fort's establishment likely attracted a civilian population outside its walls – possibly traders and farmers, who benefited from the security and commerce at the site.

Rich evidence for this comes from the distribution of coins. Systematic metal-detecting surveys around Pānkān, with precise GNSS mapping, found that coin finds are far more numerous outside the fort than inside. A markedly high density of coins was recovered in the area west of the fort's north wall, on a slight rise. In contrast, even during excavation, few coins were found within the fort itself. This pattern suggests that economic or market activity – where coins are lost or dropped – was taking place outside the walls, perhaps a market or stopping area for travellers near the fort's northwest side. On the southern edge of the external settlement, a grave (2019/1) was found containing a purse of forty silver coins. Buried with the individual, this group runs from the later fifth century to the late eighth, from an issue of Pērōz to dirhams of the early Abbasid caliphate. It includes Sasanian drachms and early Islamic

dirhams, highlighting the long-term habitation and perhaps the wealth accumulated at Pānkān during those centuries. No directly comparable burial deposit could be identified in the published record for the region, and the find points to the importance of Pānkān's locale as a node of exchange, and to the fact that a person moving through it could be carrying two centuries' worth of accumulated silver. The presence of Byzantine copper coins and of crosses among the small finds points in the same direction: Byzantine currency circulated here beyond the imperial frontier, and Christian religious items appear alongside Sasanian administrative/secular objects and Islamic artefacts. Together, these finds suggest an environment of interaction and trade, consistent with a frontier caravan waystation or garrison town where diverse peoples met.

A second burial (Grave 2) was documented in 2021 (Trench 2021/5) just south of the building complex, at a depth of approximately 10 cm below the present surface. The articulated skeleton extended beyond the 2 × 2 m trench limits and lacked diagnostic grave goods. The absence of a clear cut in the highly compact, desiccated soil complicates phasing, but the find confirms repeated mortuary use of the southern forecourt area throughout the site's later history.

Both burials belong to a well-attested but under-published category of late Sasanian and early Islamic-period mortuary practice: the small, extramural, single inhumation situated at the edge of a rural or frontier settlement, without formal grave architecture. In St John Simpson's survey of funerary evidence from Sasanian and post-Sasanian Mesopotamia, the simple earth-cut grave lacking any built cist, brick lining, or superstructure constitutes the most common type of excavated Sasanian-period grave across the region, and the great majority of documented rural examples are, as at Pānkān, extramural inhumations associated with small sites or non-sedentary communities rather than formal urban cemeteries[441]. Read against this background, the shallow depth of both Pānkān graves, the absence of a discernible cut in the compacted, desiccated soil, and the lack of conventional grave furniture are not anomalies requiring special explanation, but conform closely to the regional norm for this class of burial.

The near-total absence of grave goods is, moreover, consistent with normative early Islamic-period practice rather than evidence against an Islamic-period date. At the mid-eighth-century cemetery of Tashbulak in highland Central Asia—itself a frontier community roughly contemporary with Pānkān's early Islamic phase—excavation of several dozen individually recorded graves, part of a cemetery of several hundred burials, recovered grave goods in only

[441]Simpson 2018, 429–430.

a single instance, a pattern the excavators read as evidence of the community's careful adherence to an Islamic doctrine that discourages material distinction between the dead[442]. On this comparative basis, Grave 2's complete lack of diagnostic finds should be read as typologically unremarkable rather than as an obstacle to dating or interpretation; Grave 2019/1 appears at first sight to be the exception, but the exception is narrower than it looks. The coins lay in a row across the waist of the skeleton, in the position a purse would occupy, and are therefore better understood as the personal effects of the deceased than as grave goods selected and deposited by mourners. On that reading the two Pānkān burials are not opposites — one furnished and one not — but two instances of the same unfurnished practice, in one of which the dead person was buried with what they were carrying.

One feature of Grave 2019/1 does, however, depart from the regional norm and merits comment: the individual was buried on the left side, with the body oriented away from Mecca. Burial orientation is widely treated as one of the most reliable archaeological markers of religious identity in this period: alignment 'is usually standardised…according to faith', with Christian burials customarily oriented so that the dead face east and Muslim burials oriented to face Mecca/qibla[443]. The strength of this convention, even at newly established Islamic-period frontier communities, is illustrated at Tashbulak, where qibla-facing orientation was maintained with remarkable consistency across the cemetery—a pattern its excavators attribute to a community actively maintaining correct Islamic burial knowledge rather than a superficial or nominal conversion[444]. Set against this evidence for the strength of qibla orientation as a communal norm even on the Islamic frontier, Grave 2019/1's non-conforming orientation is unlikely to reflect mere imprecision. It points instead either to a non-Muslim identity for the deceased—plausible at a site whose small-finds assemblage independently attests to a religiously mixed population, including Christian crosses alongside Zoroastrian and Islamic material—or to an irregular, non-communal act of interment inconsistent with formal burial ritual. The latter reading is not weakened by the silver. A purse of forty coins left in place on a body is more readily explained by an interment carried out privately, or in haste, than by a funeral conducted under the eyes of a community, and comparable departures from cemetery norms elsewhere in the early Islamic world have been linked to burials carried out under exceptional circumstances, away from the structures of ordinary communal ritual[445].

[442]Bullion et al. 2022, 637–638, 642.
[443]Simpson 2018, 433.
[444]Bullion et al. 2022, 638, 642.
[445]Srigyan et al. 2022.

However, the simultaneous presence of a domestic settlement and burials in the exact same location is highly improbable culturally. As regional stability deteriorated—perhaps during the disintegration of the Caliphate—the site likely shifted to a purely defensive posture. In such turbulent times, buildings directly in front of the gate would have obstructed defensive lines. The external settlement was either intentionally cleared or naturally abandoned, leaving it to decay rapidly (as is typical of mudbrick structures). Only after this settlement disappeared did the area become a burial ground.

That sequence has a further implication worth stating explicitly, because it bears on how the two graves should be understood. Both burials lie in the southern extramural zone, in the same broad area in which the structural and artefactual evidence for external occupation is densest, and Grave 2019/1 carries a terminus post quem in the late eighth century from its own coins. If the stratigraphic argument above is correct, and the area became available for burial only once the external settlement had gone out of use, then these interments postdate the site's period of most intense extramural activity and belong to its closing phases. They are not, on that reading, the cemetery of the community that used the waystation; they are what happened in that space afterwards. This is consistent with everything else about them: neither grave lies in anything resembling a formally organised burial ground, neither is furnished in the conventional sense, both are extremely shallow, and Grave 2019/1 is oriented in a way that does not conform to the dominant regional norm. An informal, non-normative, unfurnished interment placed in a decayed occupation zone, accompanied by concealed rather than displayed wealth, is not the signature of a functioning community burying its dead according to established custom. It is more readily explained as burial under irregular circumstances, at a point when the settlement that had once occupied the ground was already gone.

The evidence presented in this chapter establishes the constructional sequence of the Pānkān enclosure, from its Sasanian foundation between the reigns of Bahram V and Khosrow I through successive phases of repair, adaptation, and eventual early Islamic reuse. The following chapter interprets this evidence: it situates the fort's architecture, associated small finds, and numismatic record within the wider Sasanian, Byzantine, and early Islamic frontier context, and addresses how the site's function changed over time.

5. Interpretation of Pānkān: Function and Material Culture

5.1. The Comprehensive Archaeological and Spatial Framework

The culmination of the Kurdish-Hungarian Archaeological Mission's (KHAM) investigations at Pānkān between 2014 and 2021 represents a fundamental reassessment of the historical, architectural, and economic dynamics of the Zagros foothills during Late Antiquity and the early Islamic period. The overarching objective of this research has been to move beyond the superficial categorisations of earlier regional surveys—which frequently misidentified the standing ruins as a strictly Ottoman-era caravanserai or a purely monastic Christian enclave—and to establish a rigorous, empirically grounded narrative of the site's evolution. This was approached through an integrated, multi-scalar archaeological and digital spatial workflow, which provides the basis for the historical reconstruction that follows.

The methodological foundation of this research rested upon a robust geodetic framework. Absolute spatial control was established with survey-grade Leica GNSS receivers in base–rover configuration, corrected against the Continuously Operating Reference Station at Erbil (ISER) and combined with Leica total stations, giving sub-centimetric precision across the recorded datasets. This unified WGS 84/UTM zone 38N spatial environment allowed non-invasive prospection, aerial remote sensing, and localised stratigraphic excavation to be combined directly. The aerial documentation progressed through a sequence of increasingly sophisticated Remotely Piloted Aircraft System (RPAS) campaigns. Initial feasibility flights in 2014 gave way to systematic, tightly controlled surveys in 2015 and 2016, which utilised high-resolution nadir and oblique imagery to generate highly accurate orthomosaics and Digital Surface Models (DSMs). This aerial data was subsequently processed using Structure-from-Motion (SfM) photogrammetry, creating comprehensive three-dimensional digital twins of the standing architecture and the nineteen individual excavation trenches opened between 2018 and 2021.

This digital infrastructure was complemented by geophysical and metal-detector prospection. The magnetometer surveys of 2014 and 2021 worked against a stony matrix and modern interference, and inside the enclosure they resolved little, for the reasons set out in Chapter 3; outside the walls, however, they identified anomalies subsequently tested by excavation — among them the two-room building west of the enclosure confirmed in Trench 2021/4 — together with probable pits, burnt features and concentrations of collapsed building material. Systematic grid-based metal-detector survey was carried out in parallel across the site and its immediate surroundings. This survey proved indispensable, particularly in the low-

contrast soils of the southern approach, where it recovered most of the site's coinage and located the shallow mortuary contexts. The absolute chronology of the site was anchored by radiocarbon sampling, the dated material being charcoal recovered from the construction mortar of the primary wall cores, which placed the initial architectural phase in the later fifth or the sixth century AD. Together, these methods turn the dataset from a collection of structural fragments into a coherent, high-resolution record of a frontier settlement adapting to centuries of transition.

5.2. Late Antique Pānkān and the Foothills of the Zagros Mountains in the Sasanian Empire

To contextualise the architectural and functional evolution of Pānkān, it is imperative to situate the site within the broader geopolitical and environmental landscape of the Sasanian Empire. The region of Northern Mesopotamia, and specifically the transitional zone where the Erbil plain meets the rising ridges of the Zagros Mountains, functioned as a highly strategic and culturally porous frontier. Unlike the rigid, heavily garrisoned linear barriers designed to repel massive nomadic confederations—such as the monumental Gorgān Wall in northeastern Iran or the Ghilghilchay defensive lines in the Caucasus—the Sasanian defence doctrine in the Zagros hinterlands relied on a flexible, networked approach. This "overlap zone" was articulated by a capillary system of fortified corridors, mountain passes, and strategic waystations that facilitated imperial administration, suppressed internal unrest, and managed the lucrative flow of trans-continental trade.

Pānkān occupies a critical node within this landscape. Located approximately 37 kilometres north-northeast of Erbil (ancient Arbela) and adjacent to the Kargh River gorge, the site commands the southern foreground of the natural passages cutting through the Razwān Mountains. This positioning prioritises logistical connectivity and route surveillance over absolute, inaccessible defensibility. By monitoring the traffic descending from the highlands of Amida and Hakkari toward the Assyrian plains, Pānkān was integrated into the western trajectories of the Silk Roads. The environmental characteristics of this region further amplified its strategic value. As an ecological intersection, the Zagros foothills were well placed to support the breeding and maintenance of high-capacity transport animals, particularly hybridisations of the Bactrian camel and the Arabian dromedary. As pack-animal logistics largely superseded wheeled transport in Late Antiquity, fortified nodes situated near perennial water sources—such as the spring adjacent to Pānkān—became the decisive elements of the

imperial economy, sustaining both military supply chains and long-distance mercantile caravans.

This region of Adiabene and Assyria was also characterised by marked religious and cultural pluralism. The Sasanian state, while ideologically rooted in Zoroastrianism and the divine legitimacy (*xwarrah*) of the *Shahanshah*, exercised a pragmatic diplomacy of toleration in its western provinces. Here, the imperial administration operated in a "state of mixture," incorporating local Christian elites, Jewish populations, and indigenous mountain communities into the empire's fiscal and administrative frameworks. Pānkān, therefore, did not exist as an isolated martial outpost, but as a participant in a mixed frontier zone, negotiating the political, economic, and religious currents that swept between Ctesiphon, the Iranian plateau, and the Byzantine East.

However, the material transition at Pānkān should be interpreted within the broader framework of 'Long Late Antiquity', where political shifts did not immediately translate into ceramic or architectural transformations. As noted in recent scholarly debates, the Sasanian cultural substratum remained remarkably resilient, often persisting well into the Marwanid period despite the change in imperial administration.

5.3.Pānkān as a Fort: The Architecture of Imperial Control

The primary construction horizon at Pānkān represents a deliberate and highly organised deployment of Sasanian military engineering. On the AMS determination obtained from charcoal recovered in the wall mortar of the north-eastern range, read together with the stratigraphic relationships documented during excavation, the foundational layout of the complex was established between 430 and 560 AD, a range spanning the reigns from Bahram V to Khosrow I. This era was marked by escalating geopolitical friction with the Byzantine Empire, epitomised by the construction of the Roman fortress at Dara in 505 AD, which necessitated a reciprocal strengthening of Sasanian logistics and security in the hinterland.[446]

The architectural layout of Pānkān is military in character, though the enclosure alone does not establish that.[447] The site comprises a nearly square, rectilinear enclosure measuring

[446]Maksymiuk 2015, 22–23; the connection between the foundation of Pānkān and the strategic situation created by Dara is proposed by Major 2022, 583.

[447] The qualification is required by comparative measurement, and it is the first objection an assessor will raise. Bonnéric's survey of the monasteries of southern Iraq and the Gulf gives enclosed areas of 0.63–1.08 ha within walls running from under 0.70 m to 3 m thick, walls whose build suggests "une barrière symbolique" rather than defence (Bonnéric 2023, § 8). Pānkān's 0.46 ha and its curtain of about one metre fall inside that range on both measures, so size and wall thickness do not by themselves separate a fort from a monastic precinct; the military reading advanced here rests on the towers, the gate, the glacis, the interior arrangement, the arrowheads and the horse gear. The point cuts the other way as well: at Kona Qalʿa, in this same landscape, Nováček records a

approximately 68-72 meters per side, encompassing roughly 0.46 hectares. The perimeter was defined by continuous curtain walls constructed from locally sourced river cobbles bound in a highly resilient gypsum-lime mortar. While the thickness of the curtain wall—measured at approximately one meter in Trench 2019/2—suggests it was not designed to withstand heavy siege artillery or extensive mining operations,[448] it was structurally reinforced at its base by a sloped, plastered exterior glacis.[449] This revetment, a specialised defensive technique also documented at the nearby Sasanian fortification of Bāzyān, served to protect the foundations from hydrological erosion while disrupting direct infantry assault.

The defensive integrity of the enclosure was reinforced by its towers. The fort featured four solid-based, circular corner towers (T3, T6, T7, T8), each measuring 5-6 meters in diameter. Excavations at the southwest (T3) and northeast (T7) corners revealed that these structures were built using a distinct agglutinative method, in which an initial solid cobble core was encased by thick, concentric shells of mortared rubble. These corner bastions were complemented by U-shaped or semi-circular interval towers along the curtains — seven attested (T1 at the gate, T2, T4, T5, T9, T10 and T12) and two further positions (T11, T13) inferred — each projecting some 3 to 4 metres to provide overlapping fields of flanking fire. This arrangement — a rectangular footprint defended by corner and mid-wall towers — corresponds closely to the Sasanian coastal and hinterland fort types, with direct architectural parallels in the contemporary installations at Sīrāf and Fulayj.

The evolution of the southern main gate (G1) provides the most compelling evidence for the site's strategic importance and its continuous architectural refinement during the Sasanian period. The extensive excavations across Trenches 2018/1 and 2019/1 documented a complex, multi-phased sequence of military engineering.

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square towered enclosure of 55 × 55 m in undressed limestone and lime mortar, dated by surface pottery to the eighth to twelfth centuries and classed as "a fortified residence – qasr" (Nováček 2023, §§ 21–22). A square, towered enclosure of that size in this region is read as secular; that is the null hypothesis against which Pānkān has to be argued, and it is the one adopted here.

[448] The category is a recognised one in this family of buildings. Of Qaṣr al-Kharāna, Northedge 2009, 244: "the round towers are not more than buttresses for the walls, and the arrow slits only openings to let in light and air. The building can be described as lightly fortified, to resist tribal raids in the desert." Of the Karakum waystations Wordsworth 2024, 299, makes the complementary point that "the weapons of raiders or small enemy bands were unlikely to have been substantial enough to breach even a modest wall". A curtain of the Pānkān order is adequate against the threat such a site would actually have faced, and its thinness is therefore not evidence against a protective function, only against a siege one.

[449] Wordsworth 2024 is the only recent study of a waystation corpus examined as a landscape rather than as a set of monuments; of the Karakum outposts, "whether labelled as caravanserais, ribāṭs, or simply outposts", he concludes that a defensive purpose "was unlikely to be the primary concern in constructing these buildings" (300). Corner buttresses there are "somewhat diminutive" beside the hollow circular towers of Iranian caravanserais, and external walls of 1.5 to 2.5 m, though they could be read as defensive, are matched in an urban khān at Merv (298–299). A wall of the Pānkān order is therefore consistent with a protective function without being evidence of a military one.

The interior organisation of Pānkān further emphasises its initial role as a logistical depot and garrison. The internal space was exceptionally dense, with approximately three-quarters of the enclosure occupied by contiguous ranges of barrel-vaulted rooms built directly against the interior faces of the curtain walls. In the Northeastern Cluster, highly preserved, narrow rectangular magazines (such as R100 and R101) featured heavy brick-lined vaults and plastered internal wall niches, strongly indicating bulk storage capabilities. The Northwestern Cluster (Trench 2019/5) yielded massive, stone-lined subterranean silos (Con100 and Con101), which originally appear to have functioned as secure granaries for long-term provisioning. This dense, barrack-like configuration, surrounding small, heavily paved utility courtyards (such as S1001), confirms that Pānkān operated as a critical supply base, capable of independently sustaining troops and securing the movement of state resources through the Zagros hinterland.

This deployment (a compact, heavily garrisoned strongpoint positioned to dominate a single constrained corridor of movement) reflects a structural logic documented widely among pre-modern frontier polities that relied on control of route junctions rather than continuous linear barriers. Working from a comparable model of Iron Age fortification in the Urartian and Neo-Assyrian highlands, Earley-Spadoni observes that, in a landscape with only a limited number of entry and exit points, "monitoring control points means effective control of the territory," since, as she puts it, "[c]hanneling or limiting movement is a clear expression of political authority in a landscape."[450] She reaches an equivalent conclusion from the opposite direction of her own GIS-based settlement analysis: whereas Early Iron Age centres in the same highland zone were placed to maximise broad, 360-degree visual coverage of their surroundings, the subsequent Urartian occupation shows "a strategic emphasis on controlling key intersections and routes," a shift she reads directly from the quantitative viewshed data rather than from the historical sources alone.[451] Urartu's own multitier regional fortification system, comprising fortresses, forts, towers, and wall segments, was explicitly "organized… around control points such as places where routes entered or exited valleys," the topographic logic of a valley-mouth or pass-guarding installation such as Pānkān.[452] In several of the highland basins she surveys in northwestern Iran—a region geographically and topographically proximate to the Zagros frontier discussed here—this same principle recurs at the scale of an individual valley: fortified installations are oriented toward "the limited number of roads that

[450]Earley-Spadoni 2025, 190.
[451]Earley-Spadoni 2025, 104.
[452]Earley-Spadoni 2025, 161.

enter and exit the plain," rather than toward the plain's interior.[453] As she concludes in general terms, "particularly in mountainous and riverine environments, where travel is constrained to predictable channels," such fortified networks "were exceedingly effective at controlling routes, transmitting information, and surveilling travelers."[454] While the Urartian and Neo-Assyrian evidence is chronologically and culturally remote from Sasanian Iraq, the underlying spatial logic it illustrates—repeatedly confirmed across multiple, independently surveyed highland regions rather than asserted from a single case—offers a robust comparative framework for Pānkān's own function as a modest, single fort guarding the wider approach to the Zagros foothills.

5.4.The Garrison: Size, Character, and the Limits of the Evidence

If Pānkān was built as a military installation, three questions remain that the account so far has not addressed: how many men it could hold, whether it was ever attacked, and what kind of troops were likely stationed there. None of the three can be answered with the confidence that the architectural evidence permits for the plan, but each can be bounded, and stating the bounds is more useful than leaving the questions open.

Garrison size is the most tractable and the most easily overstated. The method used for Sasanian installations elsewhere counts identified barrack blocks and their rooms and multiplies by an assumed occupation density; applied to the Gorgān Wall it produced a figure for the whole system somewhere between fifteen and thirty thousand men, and its authors, working from intramural area as well as indoor space, came to prefer the higher end while stressing that no such estimate can be certain.[455] That method cannot yet be applied at Pānkān, because no room at the site has been demonstrated to be a barrack. What can be done is to establish a ceiling. The interior measures about 4,663 m², of which roughly three quarters was built over, giving in the order of 3,500 m² of structural footprint; if walls of the observed thickness are allowed to consume something between a quarter and a third of that, the covered floor area lies somewhere near 2,300 to 2,600 m²[456]. A substantial share of that floor was not accommodation. The two best-preserved rooms in the north-eastern block are long, narrow,

[453]Earley-Spadoni 2025, 99.
[454]Earley-Spadoni 2025, 246–247.
[455] The method and the figures are those of Sauer, Nokandeh, and Rekavandi 2022, 785 n. 98, who give a range of about 15,000 to 30,000 men for the Gorgān system, derived from intramural area and indoor space rather than from barrack counts alone, and who conclude that "our higher estimates of c. 30,000 are likely to be closer to the truth than the lowest of c. 15,000 men, at least after annexe construction", while emphasising "that there can never be any certainty as to the accuracy of such estimates"; cf. ibid., 761.
[456]Interior area after Major 2022, 573. The proportions used here are given as explicit assumptions and not as measurements; the calculation is presented so that the reader may substitute other values.

niched and partly sunken, and are interpreted here as storage; the north-western block contained two stone-lined pits more than two metres deep, interpreted as granaries[457]. On any reasonable division of the covered area between men and materiel, an installation of this size accommodated a garrison numbered in the low hundreds at most, and quite possibly in the tens. No more precise figure is offered here, because none could be defended.

The balance between accommodation and storage is itself the more interesting result, and it points away from the image of a fort packed with soldiers. Pānkān has two large granaries, extensive narrow vaulted storage, and, on present evidence, no identified barrack. The comparison with Fulayj is instructive here, since that fort is smaller by a factor of five, was built to a similar architectural formula, and had its interior left substantially open during its primary military phase[458]. Pānkān is the opposite case: a larger enclosure whose interior was filled substantially with provision. An installation of that shape is better understood as a depot with a resident detachment than as a barracks: a place designed to hold supplies, animals and shelter for numbers considerably greater than those permanently stationed in it, which is what a post on a route requires and what a purely defensive strongpoint does not.

Whether the fort was ever attacked can be answered more directly, and the answer is that no evidence of assault has been found. The excavated sequence contains no destruction horizon: the gate passage silted up gradually over a long period, its ash lenses short and localised and interpreted as casual fires rather than as the burning of the structure, and the collapse of the brick vault belongs to a later stage still[459]. No arrowheads were recovered from the curtain wall or its exterior in a distribution suggesting an attack, no burnt destruction layer was identified against the walls, and the seven arrowheads from the site as a whole are scattered finds consistent with practice, hunting, or ordinary loss. This is a negative result, and negative results in a partially excavated site are weak; but it is consistent, and it agrees with what the architecture implies. A curtain one metre thick, without a ditch, and with towers of three to five metres diameter is not a work built to withstand a siege. It is built to be secure against raiding and against opportunistic attack, and to be visible.

The wider defensive context is easier to describe than to demonstrate. Pānkān is one of a group of fortified sites along the Zagros front that includes the hinterland fortress of Gird-i

[457]R100 is interpreted as a storage space in section 4.6.1 on the grounds of its width, its niches and its sunken floor; the two stone-lined pits in the north-western block are interpreted as granaries in section 4.6.2.
[458]Al-Jahwari et al. 2018, 724–741; Priestman, Al-Jahwari, et al. 2023, 293–294.
[459]The gate sequence is set out in section 4.4: the passage silted up gradually to a depth of more than 35 cm, with short ash lenses interpreted as casual fires rather than as burning of the structure, and the vault collapsed only afterwards. The burnt horizon in R300 (section 4.6.2) is confined to that room.

Kazhaw in the Sharizor plain, the fortified enclosure at Bāzyān, the mountain site of Merquly, and, further west, the linear work known as the Gawri Wall[460]. It is tempting to describe these as a system, and the term has been used in the regional literature. Two cautions are owed. No linear barrier of the Gorgān type is known in this landscape, so whatever coordination existed was between dispersed points rather than along a line;[461] and intervisibility between these sites has not been tested, so the signalling network that a coordinated system would imply remains an assumption rather than a finding. What can be said is that the sites are of comparable date and comparable form, that they occupy comparable positions in relation to routes and water,[462] and that a state which built one of them is likely to have built the others for related reasons[463].

The character of the troops is the least recoverable of the three questions, and the honest answer is that the excavation cannot supply one. The Sasanian army of the fifth and sixth centuries is known principally from narrative and administrative sources rather than from the archaeology of its installations[464], and nothing in the Pānkān assemblage identifies a unit, a rank, or a mode of fighting: there is no armour, no identifiable weapon beyond the arrowheads, and the two pieces of horse gear are too few to indicate mounted troops rather than transport animals. The installation itself implies a small permanent detachment with a logistical rather than a tactical role—men who held a gate, guarded a store, and provided the security within

[460]Gird-i Kazhaw: Tamm 2020; Tamm et al. 2018. Bāzyān: Ali and Déroche 2016, 11–18. Merquly: Altaweel 2014; Brown, Raheem, and Abdullah 2022. For the linear works of the western Zagros, Alibaigi 2019.

[461] The absence is worth weighing against the older model of Sasanian frontier defence, which made linear works the empire's characteristic instrument. Frye 1977, 7–8, argued that the walls belonged to "an overall Sasanian plan of enclosing Iranshahr within secure defenses", and his account of their purpose explains why no such work should be expected here: long walls "were effective against horsemen who travelled without heavy baggage", built "to keep out the nomads", so that they "demarcated the steppe from the sown". The Zagros front faced neither a steppe frontier nor an irrigated plain, and the response there was evidently a different one. Frye also records, from Balādhurī, Arab garrisons granted tax-exempt land by Shāpūr II to hold the frontier at the springs of al-Ṭaff (10).

[462] The only measured spacing for a comparable group is that adduced by Tamm et al. 2018, 136, who name as the closest available comparison for the installations around the Sharizor plain the series of small fortifications recorded in Fars by Hartnell and Asadi 2010, 224: they lie 10 to 15 km apart and are associated with the surveillance of particular routes and with securing the water supply. No equivalent figure can yet be given for the Zagros group, whose members are too few and too unevenly recorded.

[463] Lawrence and Wilkinson 2017, 119, apply to the Sasanian frontier the idea of the network empire, taken from Liverani's work on Assyria and from Smith: urban centres and forts as nodes, canals and linear barriers as connecting corridors, in contrast with the territorial empire, whose control is manifested by "a network whose mesh thickens". Applied to the Zagros front the model predicts exactly what is observed: dispersed installations at chokepoints, with no linear work and no evidence of a thickened rural mesh behind them. Their comparative conclusion explains an absence rather than excusing it: linear barriers appear where the Sasanians faced tribal or nomadic confederations, and are absent from northern Syria, "where the Sasanians faced an enemy of similar strength and military organisation to themselves" (118).

[464]For the campaigns themselves, Howard-Johnston 2021 and Maksymiuk 2015; for the empire's military posture between Rome and the steppe, Sauer 2017; for fortification as an instrument of policy, Alizadeh 2014, 93–115, and Labbaf-Khaniki 2020, 37–59.

which a route functioned.[465] Whether such a detachment also operated offensively, as the raiding parties attested in the frontier warfare of the period, cannot be established from the site, and is not claimed here.

5.5.The Ecclesiastical Hypothesis and Why It Is Not Sustained

The conclusion of this section should be stated before the evidence for it, because the hypothesis it examines has attracted more attention than its evidential basis warrants. No archaeological evidence currently shows that Pānkān was an ecclesiastical foundation. No church has been identified, no building of ecclesiastical plan has been excavated, and the objects that have been invoked in support of the idea (two crosses recovered by detector survey outside the enclosure, and a bronze vessel whose identification is disputed) cannot bear it. The hypothesis is set out here because the regional pattern of monastic reuse of disused fortifications makes it a reasonable thing to have tested, and because stating why it fails is more useful to a future excavator than passing over it; it is not among the conclusions of this dissertation[466].

Given the Church of the East's deep entrenchment in northern Mesopotamia during Late Antiquity and the frequent conversion or dual use of fortified spaces by religious communities, the hypothesis that Pānkān may have functioned as an ecclesiastical centre warrants rigorous examination. The Sasanian policy of "negotiated coexistence" allowed Christian bishoprics and monastic institutions to thrive, accumulate land, and exercise significant administrative authority in provinces like Adiabene, provided they remained politically loyal to Ctesiphon. In this context, fortified enclosures could house monastic communities, as the nearby site of Bāzyān shows — although its most recent excavators hold that the enclosure wall and the church were built together, so that Bāzyān documents coexistence within a fortification rather than the conversion of a disused fort.

At Bāzyān, the fortified enclosure was dominated by highly specialised, unmistakable ecclesiastical architecture. The interior space was defined by a three-naved basilical church equipped with a central *bema* (exedra), a *shqaquna* corridor leading to the sanctuary, and a *beth*

[465] Sauer, Nokandeh, and Rekavandi 2022, 273–274 and 277: Buraq Tappeh, the closest published comparison in scale (4,847 m² intramural, against the c. 4,663 m² enclosed at Pānkān), is assigned "a holding capacity of c. 400–450 … once occupation was confined to a single storey, and perhaps as many as 800–900 initially", with a floor of 200–450 armed personnel. The figures indicate the order of magnitude a fort of this size could hold and are higher than the ceiling proposed here; no comparable calculation is attempted for Pānkān, since its internal layout is not known in the detail such a calculation requires.

[466]The hypothesis is retained in the dissertation because it has been raised in discussion of the site and because the regional pattern makes it worth stating and testing; it is not advanced as a finding, and the reader should not take the presence of this section as an indication that the case is strong.

sahade (relic chapel) featuring a horseshoe-shaped apse. Massive rubble-stone columns further highlighted the monumentality, while the material culture included limestone plaques explicitly carved and painted with Nestorian crosses.

By contrast, the spatial and architectural analysis of Pānkān — within the limits of what has so far been excavated — has yielded no evidence of specialised ritual or liturgical spaces. The site's layout—dominated by subterranean storage pits, cramped vaulted magazines, a defensive glacis, and a single narrow, controlled gate—remains secular and utilitarian. Pānkān was built for logistics, storage, and defence, not for congregational worship or monastic isolation.

However, the absence of monumental church architecture does not preclude religious observance among the site's inhabitants. The material culture documented in the Appendix reveals that Christian identity was actively expressed and maintained within the secular confines of this commercial and military node. This is indicated most directly by the recovery of religiously inflected small finds that underwent detailed morphometric and comparative analyses.

Foremost among these is a solid cast bronze pectoral cross. The object is fully intact, featuring an integral suspension loop oriented perpendicular to the cross's plane, indicating that it was intended for personal wear. Morphologically, the cross displays a distinct asymmetry, with a trapezoidal upper arm that widens noticeably toward the top, while the lateral and lower arms remain rectangular. The obverse is decorated with five punched ring-and-dot motifs—one at the central intersection and one on each arm—a decorative scheme that likely emulates the jewel settings of more opulent *crux gemmata* designs prevalent in Late Antiquity. While the widening of the upper arm might be interpreted as a localised provincial idiosyncrasy or perhaps a subtle nod to East Syriac aesthetics, its primary significance lies in its context. What an object of this class establishes is that someone at the site owned or carried a cross; a congregation, still less an institution, does not follow from it, and the caution stated in 2.4.2 applies here in full. Taken with the other Christian material from the site, it is consistent with the religious pluralism that the written and excavated record independently attests for this landscape, and it is at that level that it is used here.[467]

Equally significant is the discovery of a cast bronze cross-shaped fibula. The presence of this distinctly Byzantine-style cross fibula deep within the Zagros foothills is a striking

[467] Simpson 2005, 287, who reads the frequency of Late Sasanian stamped pottery bearing the cross at Nineveh as an index of the integration of Christians in late Sasanian society, since vessels of this class are unlikely to have been made by or for a single religious group.

indicator of a trans-regional aesthetic *koine*. It reflects that Pānkān was connected to a vast network of cultural and material exchange, where individuals traversing the Silk Roads adopted and transported symbols of Christian identity across imperial borders without restriction.

5.6.Pānkān as a Commercial Station: The Economic Transition

The political transformations initiated by the Arab-Muslim conquests of the 630s did not violently rupture or abandon Pānkān; instead, they seem to have catalysed its evolution from a state-sponsored military garrison into a highly active, commercially oriented waystation. The robust Sasanian infrastructure was pragmatically reappropriated to serve the expanding economic demands of the Umayyad and Abbasid caliphates, facilitating the lucrative movement of goods, merchants, and pastoralists through the Zagros corridors.

This functional metamorphosis is permanently recorded in the site's architectural modifications. The monumental Sasanian gateway (G1), initially vaulted to support a military superstructure, was drastically restricted. During the early Islamic period (Phase 9), coarse-brick sidewalls were inserted into the passage, narrowing the entrance to a 1.2-meter bottleneck. A new threshold and a low masonry bench were installed within this constricted space. The shift from a wide vaulted passage to a narrow, controlled doorway marks a shift from access to control[468], and control of a gateway is compatible with several purposes: the inspection or certification of goods, the levying of a due, or simply the security of a reduced occupation.[469] The narrowing on its own does not distinguish between them, and the reading

[468] The historical tradition for the neighbouring pass runs the other way, and is worth recording as such: Ali and Déroche 2016, 12, reporting Tofiq Wahbi's reading of the sources for the Darband-i Bāzyān, hold that "military forts were constructed on these routes, as were customs posts for the collection of dues on goods in transit". The statement rests on textual and toponymic evidence, not on excavation, and does not alter the archaeological position set out here.

[469] Cross-frontier trade between the two empires was regulated by treaty, and the regulation worked by confining exchange to a very small number of named places: Nisibis, Kallinikos and Artaxata in 408/9, reaffirmed by edict in 422 and carried into the treaty of 562, by which time Dvīn had replaced Artaxata and the fortress of Dārā had acquired the same status; merchants approaching by other roads required a permit, and customs fraud was actionable (Dignas and Winter 2007, 145–146 and 205–206). Restricting trade to a few centres was "an important step towards securing the shared border" (205). The designated posts were major cities under direct imperial administration, and nothing in the treaty framework suggests dues levied at installations of the size considered here — a further reason for reading the narrowing of the gate as evidence of control rather than of taxation.

of the gate as a toll or customs post — advanced in earlier accounts of the site, including the present author's — is an assumption from plan rather than a demonstrated function[470,471,472]

At the same time, the vast, formal magazines of the Sasanian interior were subdivided and adapted for localised domestic and light industrial use. Excavations in Trench 2021/3 revealed a clay-lined domestic oven (*tannūr*, STR33) constructed directly against an older interior partition, accompanied by dense layers of firing ash and grinding stones. The massive Sasanian subterranean silo (Con101) showed evidence of intense secondary burning and internal clay plastering, indicating its conversion from a cold-storage granary into a large-scale processing oven. The insertion of domestic infrastructure of this kind parallels the sequence observed at the Islamic reoccupation of Fulayj, and it has been read as showing that Pānkān had become a civilian-operated caravanserai. That reading is examined, and substantially qualified, in the following section.

The detailed analysis of the small finds documented in the Appendix further supports this commercial and domestic liveliness. The recovery of a finely made bronze cosmetic mortar, together with the handle of a second, indicates that vessels designed for the preparation of pigments and medicinal ointments were in use at the site. Close typological parallels, including tripod- and flat-based variants, are housed in late Abbasid collections in the Erbil and Sulaymaniyah museums, placing the material culture of Pānkān within the broader Islamic urban traditions of Northern Mesopotamia. The discovery of finely cast bronze camel leg fragments, which likely served as the zoomorphic supports for an elaborate incense burner, is of interest for the same reason. The camel was the principal means of long-distance overland transport in this period, and its representation on metalwork of some quality is consistent with, though it does not by itself demonstrate, the site's involvement in caravan traffic.

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[470] The same restriction is stated by Garsoïan 1983, 571: contacts across the frontier were "normally reduced to a few frontier cities in which the customs bureaus were located and duty collected: Callinicum on the Roman side, Nisibis in Mesopotamia and Artaxata of Armenia for the Persian territory, and merchants were forbidden to circulate elsewhere for security reasons". Whatever was levied at a site like Pānkān was therefore internal traffic, not cross-frontier trade, and the two should not be confused.

[471] For the same reading argued from a documented corpus, Wordsworth 2024, 314–316: tolls "were most often collected directly from merchants and were unofficial in the sense of Islamic law", so their scale cannot be gauged (315), but equal weight falls on surveillance — a fugitive intercepted through the watch kept on the roads, and by a tax collector — so that "the evidence thus points towards the formalization of routes and waystations as an attempt to control the desert" (315); several outposts were sited on high ground or made platforms so as "to dominate the tracks that run beside them" (316), the relationship of Pānkān to its own corridor.

[472]Comparable narrowing of an entrance has been argued elsewhere to reflect control of access rather than defence, but no excavated Sasanian or early Islamic road station is known to the present author in which a toll or customs function has been demonstrated archaeologically rather than inferred from the plan. The sealings are treated in section 6.9 as the strongest available material support, and they support inspection or certification rather than taxation specifically.

5.7. Testing the Case for a Change of Function

The argument set out in the preceding section — that Pānkān passed from a garrison to a commercially oriented way-station — has been put to a series of objections, and it is worth answering them in order, both because each is well founded and because the argument as usually stated does not survive them intact[473]. Four points are at issue: whether the architectural and material changes exclude a continuing military function; whether they are better explained by a change of occupants than by a change of purpose; whether Sasanian forts were in any case without commercial or hospitality functions; and whether the conversion of a granary into an oven indicates anything about the site's function at all.

The first objection is the most serious, and it must be conceded. Nothing in the narrowing of the gate, the subdivision of the interior, or the character of the later small finds excludes a continuing military presence. A gate reduced to a doorway of 1.2 m is easier for a small detachment to hold than an opening of 3.8 m, and the reduction is at least as consistent with a diminished garrison as with a civilian one. A bench in a gate passage is a guard's seat as readily as a gatekeeper's. Domestic subdivision within a fortified enclosure is documented in military contexts across late antiquity. The proposition that the site ceased to be military is therefore not supported by the architecture, and it is not asserted here. What the evidence supports is a narrower claim: that the balance of activity at the site shifted. That claim rests not on the architecture but on the material — on the quantity of low-value coin lost outside the walls over a long period, on the twenty-one candidate sealings, and on the smallness of the military component within the assemblage as a whole — and it is a claim about proportion, not about exclusion.

The second objection is that the change is better explained by new occupants than by a new purpose, the new occupants being the Arab conquerors. This is very likely correct, and the two explanations are not alternatives. The blocking that narrows the gate is built of a visibly different brick, redder and coarser than the Sasanian fabric and without the finger-drawn surface marking and bonded in a mortar of poorer quality; the threshold laid at the same time reuses an architrave fragment and four Sasanian bricks taken from the ruin. The numismatic sequence turns Islamic across the same interval[474]. The most economical reading of the

[473] The objections summarised here were put to the present author in the examiners' reports on an earlier version of this dissertation. They are set out and answered in full because each of them is well founded, and because the argument advanced above is weaker than it appeared until they are met.

[474] The brick fabric and mortar of the blocking are described in section 4.4; the numismatic sequence in section 5.9.

sequence is therefore that the changes at Pānkān are the work of people who took over a standing Sasanian building rather than of the people who built it, and who adapted it to what they needed. That is a change of occupants and a change of use at once, and the dissertation should say so rather than presenting an impersonal 'transition'.

The third objection removes the contrast on which the argument has often been made to rest. Sasanian forts were not devoid of commercial or hospitality functions, and it would be surprising if they had been. The caravanserai of Dayr-i Gachīn is a Sasanian foundation on a road; the fortified way-station with a residential character is an institution of long standing in the Near East, attested administratively well before the Sasanian period[475]; and the provision of secure lodging along routes is the sort of function an imperial state has reason to combine with military control of the same routes. If that is granted, the change at Pānkān cannot be described as the appearance of a road-service function where none existed. It must be described as a change in the relative weight of functions that were present, in some measure, from the beginning — and the evidence for that change is the coin loss, which is heavily concentrated in the centuries after the conquest and outside the walls, rather than any architectural novelty.

The fourth objection concerns the granary converted into an oven, and it is well taken. A *tannūr* indicates that bread was baked; it does not indicate who baked it, and a garrison eats cooked food as readily as a merchant does[476]. The conversion of Con101 accordingly says nothing whatever about a shift from military to civilian occupation, and where the argument has been made to rest on it, it has rested on nothing. What the conversion does record is narrower and more useful: that a pit built to hold bulk grain ceased to be used for that purpose. Read together with the other pit, which was filled with rubble at some point before the two Ottoman bronze bowls were dropped into it, this indicates a reduction in the site's capacity for bulk storage — that is, a reduction in the scale of provision the installation was maintained to hold. For a place whose original interior was given over so substantially to storage, that is a real change, and it is the change the evidence will bear.

Together, these four points leave the interpretation advanced here intact but considerably more modest than it has often been stated. Pānkān was founded as an imperial installation with a strong logistical component; it continued in use after the conquest under new

[475] For Sasanian forts with a demonstrable road-service dimension, Shokoohy 1983, 446 and 453, on Dayr-i Gachīn, where Iṣṭakhrī reports that the Sulṭān's guards lived in a building that was at the same time "a stage for travellers"; for the earlier Near Eastern tradition of the fortified way-station, the discussion of the bēt mardēti in section 5.9 below.

[476] The conversion of Con101 is described in section 4.6.2. A tannūr is a normal fixture of any settled community in this region, military or civilian, and the identification of one carries no implication about the status of its users.

occupants who adapted the standing fabric to smaller-scale needs; the weight of activity recorded in the material shifted, over the following centuries, towards the exchange and service functions documented outside the walls; and its capacity for bulk provision declined. Whether a military detachment remained through those centuries is not determinable from the present evidence, and the possibility should be left open rather than argued away.

5.8.Pānkān on the Road: Connection and Disconnection

The commercial interpretation advanced above rests on the character of the assemblage. It is worth setting out separately how that interpretation relates to the site's position, since position is the weakest of the arguments available and is easily made to carry more than it can. Pānkān does not lie within the mountains. It stands on the terrace at the point where the Erbil plain gives out against the Zagros front, about two kilometres below the gorge through which the Kargh breaks out of the Razwān range, and some ten kilometres above the confluence of that river with the Great Zāb[477]. It is therefore on the plain-side approach to a crossing rather than inside a valley. This position serves traffic moving along the foot of the range between Erbil and the Zāb, and beyond it Mosul, as much as traffic passing through the gorge into the highlands. That distinction matters, because the two kinds of position generate different expectations. A fort commanding a mountain valley is well placed to control a specific passage and its inhabitants; a station at the foot of a range on a plainward road is well placed to service movement along it.[478] One further feature of the position is worth recording, since it is checkable rather than impressionistic. Pānkān lies thirty-seven kilometres from Erbil.[479] That is close to the interval at which way-stations are spaced on pre-modern road systems in this region — a single day's travel for a loaded animal — and it places the site at the first stage out of the plain's principal centre on the road towards the Great Zāb. The coincidence proves nothing on its own; it is, however, the distance one would predict for a station of this kind, and it is consistent with the interpretation argued below.

[477] For the position of the site in relation to the gorge, the Kargh and the confluence with the Great Zāb, see Chapter 2.1 and Major 2022, 560–561, who gives 37 km to Erbil, 90 km to Mosul, 2 km below the gorge and 10 km above the confluence.

[478] The settlement hierarchy of the region was flatter than the ecclesiastical sources imply: Payne 2015, 160, records "a series of middling settlements only marginally smaller than Nineveh or Shahrabad" serving administrative functions, survey in the eastern Jazira revealing "a landscape of roughly equivalent settlements". A modest installation on a route between Arbela and the Zāb need not, on this reading, have been peripheral to anything.

[479] The distance is measured to the citadel of Erbil; see Chapter 2.1. For the spacing of way-stations at intervals of roughly a day's march, and for the Neo-Assyrian bēt mardēti in particular, see the discussion in section 5.9 below.

The strongest available test of which of these Pānkān was is a comparative one, and the most useful comparison is a negative case. Németh's study of the Rania Plain, discussed in the literature review above, examines a microregion whose position on the map is at least as promising as Pānkān's — a plain on the Ottoman–Safavid frontier, commanding a route between Mesopotamia and the Iranian plateau — and concludes on several converging grounds that it was not, in practice, a corridor[480]. The criteria are worth stating explicitly, because they can be applied here. They are: whether the area appears in the route itineraries and cartography of its period; whether travellers, officials and armies used it or went around it; whether the material culture of its sites is locally produced or contains a significant imported component; whether coinage and other instruments of exchange are present in quantity; and whether the settlement pattern suggests communities oriented outward or inward. On the first two criteria the Rania Plain fails, and on the third and fourth it fails decisively: production is local, objects of distant origin are so rare that plunder is as good an explanation as commerce, and the picture is of a self-sustaining upland economy[481].

Applied to Pānkān the same criteria return a different answer, and they do so on the material rather than on the map. Eighty-seven coins are individually catalogued from a site of half a hectare. Byzantine copper and Islamic copper occur in almost equal numbers among the scattered finds, which is to say that two monetary systems were in everyday use in the same place, and the wear on the *folles* indicates that they remained in use over a long period rather than arriving and being lost at once. Twenty-one lead sealings were recovered, a quantity that outnumbers the site's weapons by three to one and which implies goods arriving under seal and being opened. The small finds include metalwork of non-local manufacture and, in the camel imagery discussed above, a motif belonging to the iconography of long-distance carriage rather than to local husbandry. The settlement outside the southern gate, and the concentration of coin loss on the rise outside the walls rather than within them, describe a place where transactions were conducted in the open by people who did not live inside the enclosure. None of these features is present at Rania; all of them are present here.

Two qualifications must be entered. The first is that the comparison is structural and not chronological. The Rania evidence belongs to the sixteenth to twentieth centuries and the Pānkān evidence to the sixth to thirteenth, and what is being compared is the archaeological

[480]Németh 2024, 440–441, setting out the criteria on which the judgement rests: settlement clustering, the absence of the region from Ottoman maps and route itineraries, the predominance of local production, the rarity of long-distance goods, and the avoidance of the area by travellers, officials and armies.
[481]Németh 2024, 441.

signature of a connected and of an unconnected node, not two contemporary situations[482]. The second is that connection is not a property a place simply has. Németh's own conclusion is that the same landscape connected and separated at the same time, according to who was moving through it — a barrier to imperial officials and long-distance merchants, a dense network for the population that lived in it[483]. The same is likely to have been true here, and the evidence from Pānkān speaks to only one side of it. The coins, sealings and imports record the traffic that passed and stopped; they say almost nothing about the movement of the population of the surrounding foothills, which would have left a far fainter trace.

Within those limits a reasonably specific conclusion is possible, and it is more modest than the term commonly applied to sites of this kind would suggest. The assemblage at Pānkān is not that of a place where high-value consignments changed hands. There is no gold from the site — neither solidus nor dinar, nor any gold object — and no silver in the scattered material beyond three pieces; what there is, in quantity, is worn copper of low denomination, the currency of lodging, fodder, food and small purchases. Read together with the storage capacity of the interior and the provision for animals implied by the gate, this describes a place that serviced movement rather than one that generated or redirected it: a station on a route of regional importance, running along the foot of the Zagros between Erbil and the crossing of the Great Zāb, which carried a share of longer-distance traffic without being a stage on a trans-Eurasian artery in any meaningful sense. That is a smaller claim than 'Silk Road station', and it is also a more defensible one. It has the further merit of being the kind of evidence that the historiographical survey in Chapter 1 identified as lacking for this stretch of the network: not another restatement of the corridor's importance, but a measured account of what one node within it actually looks like on the ground.

5.9.Money, Politics, and the Commercial Network

The most closely datable evidence for Pānkān's integration into the wider economic networks of Late Antiquity and the early Middle Ages derives from its numismatic corpus. Because coins often bear specific mint marks, regnal years, and the names of issuing authorities, they provide the firmest chronological anchor available for the site's commercial

[482]The two bodies of evidence are separated by several centuries, so what is compared is the archaeological signature of a connected and of an unconnected node rather than two contemporary situations. The force of the comparison depends on the assumption that the material correlates of a serviced route — coin in quantity, sealings, goods of non-local manufacture — are reasonably stable across the pre-modern period, an assumption the caravanserai literature surveyed in Chapter 1 supports but does not establish.
[483]Németh 2024, 441, whose conclusion is that the same landscape connected and separated simultaneously, according to who was moving through it.

activity. The recovery of scattered Byzantine copper *folles* (discussed by reign in detail below) alongside Sasanian issues indicates that during the 6th and 7th centuries, the frontier operated as an absorbent economic zone where foreign petty cash was readily accepted for daily transactions regardless of imperial hostilities.

Beyond the coins concealed in Grave 2019/1, the wider excavation and metal-detector survey recovered twenty-three individually catalogued Byzantine coins scattered across the site (one entry, Cat. no. 2271, preserves no further descriptive data), overwhelmingly *folles* and half-*folles* rather than higher-value silver. Where preservation allows a specific attribution, the identifiable examples cluster tightly between the reign of Justinian I (527–565) and that of Constans II (641–668): several *folles* carry legible traces of Justinian I's Constantinopolitan issues (Cat. nos. 2214, 2310, 3017, and KHANFIND037, with 20161101_FIND306 and KHANFIND043 attributed more tentatively to the same reign or one immediately preceding it), one is attributable to Phocas, struck at Cyzicus (602–610, Cat. no. 2254), and two further pieces are confidently identified as strikes of Constans II (Cat. nos. 2222, 2228). This span—covering the last full century of direct Byzantine rule in the region and its immediate aftermath—refines the broader range previously proposed for this assemblage: on the coins that can actually be attributed to a specific reign, none predates Justinian I, and the latest confidently identified issues belong to Constans II, already some years into Muslim rule of the region. The remaining pieces are too corroded or fragmentary for a ruler-level attribution and are recorded only as *folles*, or possible *folles*, of general Byzantine type. Before these attributions are pressed further, the shape of the sample should be stated plainly, because it constrains everything that can be said from it. Eighty-seven coins are individually catalogued from Pānkān. Forty of them — nearly half the entire numismatic record of the site — come from a single deposit in a single grave[484]. The remaining forty-seven are scattered site finds, and of these, twenty-three are Byzantine, twenty-three Islamic, and exactly one is a possible Sasanian fragment[485]. Two consequences follow. The first is that the hoard is not a sample of what circulated at Pānkān; it is one person's savings, selected once, and it should not be averaged together with the site finds. The second is that the scattered material, which is the only real evidence for what money was actually used at the site from day to day, is evenly divided between Byzantine and Islamic issues and contains almost no Sasanian coinage at all.

[484]Forty of the eighty-seven catalogued coins, or forty-six per cent.
[485]One possible Sasanian fragment (Cat. no. KHANFIND000) among forty-seven scattered coins.

Two entries merit individual comment. Cat. no. 2260, a probable *follis*, was secondarily pierced for suspension, its perforation smoothed by wear—evidence of reuse as a pendant or amulet rather than of the coin's original date of loss as currency. More significant is Cat. no. KHANFIND011, a copper *decanummium* showing a standing imperial figure beside the denomination mark 'I', which the excavation record itself flags as a possible Umayyad imitation of Constans II's coinage rather than an official Constantinopolitan issue. Locally produced 'pseudo-Byzantine' *folles*[486] imitating this standing-emperor type of Constans II are a well-documented phenomenon of the early Umayyad Levant and Jazira,[487] struck to sustain everyday small-change circulation once official Byzantine minting ceased to reach the newly conquered provinces.[488,489] If KHANFIND011 is correctly identified, it is among the most chronologically precise small finds at Pānkān for the moment of transition itself: a physical token of the currency system bridging Byzantine and early Islamic administration of the site.[490]

Scattered Sasanian coinage, by contrast, is almost entirely absent from the site outside Grave 2019/1.[491] The sole candidate is Cat. no. KHANFIND000, two small, non-conjoining silver fragments recovered close together and provisionally described in the record as possibly belonging to a late Sasanian drachm of Khosrow II type—though the surviving fragments are

[486] The terminology is used in its agreed sense, the categories being defined by appearance and not by supposed date (SICA 1, generally followed since): a Pseudo-Byzantine coin copies a Byzantine predecessor but lacks meaningful legends; an Umayyad Imperial Image coin bears Byzantine-style images with meaningful legends in Greek and/or Arabic, usually including a mint name; a Standing Caliph coin carries the caliph's image and Arabic legends naming ʿAbd al-Malik (Goodwin 2012, 1–2); the older term "Arab imitations" was abandoned as implying too much about the producers (1). Cat. no. KHANFIND011 is too worn for a legend to be read, so on these criteria it falls in the first category by default rather than by demonstration, and the description "Umayyad imitation" in the excavation record should be understood as a working note rather than an attribution.

[487] The distinction is Heidemann's: an imitation copies "a well reputed coin type in circulation by an authority or an individual not entitled to use that specific image", and differs from a counterfeit in being "not produced in order to deceive the public but only to set money in circulation" (Heidemann 1998, 107 n. 16); he reads the imitation of Byzantine copper in Syria as "an indication of a shortage of copper coins" (107), which is the likeliest reason for such a piece to be circulating at Pānkān as well.

[488] Heidemann 2010, 653: the minting of imitation coppers in the former Byzantine territories began after 636 CE, supplementing the circulating stock and following the Byzantine weight reductions; "we do not know who the regulating authorities were" — garrison, city, money changers and merchants are all possible. He cites Pottier, Schulze and Schulze 2008 for the classification and dating of the series.

[489]Pottier, Schulze, and Schulze 2008, 105.

[490] Published parallels show what such an identification rests on: Schindel 2000, 52, presents six countermarked coppers — two genuine folles of Constans II, four imitative — where the ground for calling a piece a copy is stylistic, from the rendering of the head, not epigraphic: the same order of judgement as the excavation record makes for KHANFIND011. All six carry small Arabic countermarks of 5–7 mm (ṭayyib, lillāhi, once perhaps the mint name Ludd). No countermark is recorded on any of the Pānkān coppers, though a mark of that size would not necessarily survive the wear these coins have.

[491] The point bears on the fort rather than on the purse. Heidemann 2010, 652–653: the Sasanian empire fell "while at its apogee" in administration, cash-paid army and monetary economy, silver being "the backbone of the fiscal cycle" and available in enormous quantities; the late drahm of about 4.2 g was struck under Khosrow II in some thirty-four mints. A garrison in this landscape would have been paid in drachms; the near-absence of casual Sasanian coin loss inside the enclosure is therefore a fact about deposition and recovery rather than about whether soldiers were present.

too incomplete to distinguish a genuine Sasanian issue from an early Umayyad dirham imitating Sasanian coin types, itself a reminder of how closely early Islamic silver coinage in the region continued Sasanian numismatic conventions rather than replacing them outright. This near-total absence of casual Sasanian coin loss, set against both the abundance of scattered Byzantine *folles* discussed above and the forty Sasanian and Abbasid silver coins buried together in Grave 2019/1, is itself an interpretively useful pattern: it suggests that Sasanian coinage circulating at or through Pānkān was treated principally as a store of value to be kept — which is what a purse of silver carried on the person represents — rather than as small change lost casually in the course of everyday transactions, a role that scattered Byzantine, and later Islamic, copper coinage appear to have filled instead.

The remaining Islamic coin finds—twenty-two individual pieces beyond KHANFIND011, already discussed above—are dominated by small, heavily worn bronze coins, generically identifiable only as *fulūs* (low-value copper coinage struck for everyday transactions, as distinct from the higher-value silver dirham) rather than attributable to a specific issuing authority or mint: seventeen pieces preserve only worn or partial Arabic inscriptions insufficient for closer identification[492] (Cat. nos. 2008, 2015, 2036, 2037, 2129, 2215, 2289, 2290, 2293, 2303, 2305, 2314, 3014, 3015, 3051, KHANFIND008, and KHANFIND018). This pattern of poorly preserved, generic Islamic copper is consistent with just the kind of everyday small-denomination transactional currency that regional mints—including those of the Jazira, the northern Mesopotamian region immediately relevant to Pānkān's own location—produced in quantity to supply ordinary local, and reportedly also military, small change in the decades following the conquest.[493] Three further pieces are silver dirhams, representing higher-value transactions or savings rather than petty cash[494]: Cat. no. 2073, an Early Abbasid dirham fragment; Cat. no. KHANFIND007, an Abbasid dirham

[492] One possibility the catalogue as it stands cannot settle should be entered here. Cast imitations of Umayyad copper types occur with some frequency in Syria, dated by Ilisch to the second half of the second century AH — the period of the Grave 2019/1 purse — and are, as Schindel remarks of six published pieces, unsightly and often hard to identify (Schindel 2000, 53). In the condition described for the Pānkān pieces, coins of that class would not be separable from worn regular issues without re-examination for casting seams and flan character. No cast piece is claimed here; the point is that seventeen coins identifiable only as fulūs may include some, and that if they did, the reading offered below — a site that needed small change and obtained it where it could — would be strengthened rather than weakened.

[493] Schulze and Schulze 2010, 348.

[494] The mechanism by which coined money reached provincial hands in this period is fiscal rather than commercial: the early Islamic state "was the only post-late antique polity which preserved a structure of public taxation, collected in coined money", tax being collected and the Arabs of the garrison cities paid in the same coin, Mosul among the cities to which revenues were brought and "dispensed to the conquerors as cash wages" (Kennedy 2022, 180–181). A purse of dirhams and a scatter of fulūs at a site in the Mosul–Erbil hinterland are consistent with that circuit. The chapter is new to the fourth edition and has no counterpart in the third, cited elsewhere in this study as Kennedy 2016.

fragment; and Cat. no. KHANFIND012, a creased Early Islamic quarter-dirham of less precise date. At the chronological margins of the assemblage, two pieces stand apart from the Sasanian-through-early-Abbasid horizon that otherwise defines the site's main occupation sequence: Cat. no. 2013, tentatively identified as Artuqid or Zangid and dated to the twelfth or thirteenth century, and Cat. no. 2226, a silver Ottoman akçe of the fifteenth to seventeenth century. Both, like the lead musket balls and miscast ammunition discussed elsewhere in this dissertation, attest to sporadic, low-intensity use of the site well after its commercial heyday as a formal caravanserai.[495]

Three further characteristics of the scattered assemblage carry interpretive weight and have not so far been drawn out. The first is metal. With the single doubtful Sasanian fragment and three Islamic silver pieces excepted, every scattered coin from Pānkān is copper.[496] This matters because copper and silver behave quite differently in circulation: a low-denomination copper coin is worth less than the cost of carrying it any distance, so it tends to circulate locally and to be lost where it was spent, whereas silver travels, is hoarded, and can arrive from far away without anyone having transacted with it on the spot. The abundance of worn copper *folles* and *fulūs* at Pānkān is therefore better evidence for the site's economic character than the more exotic silver[497]: it indicates not that goods passed through, but that small everyday transactions were actually being conducted at the site, in coin, over a long period, by people who needed change.

The size of the Byzantine component invites a historical explanation, and one has been proposed. Byzantine copper is not what one expects to dominate the small change of a site well inside Sasanian territory, and the concentration of *folles* here — nineteen, with seven further bronze pieces of probable *follis* type[498] — has been connected with the only occasion on which

[495] The end of occupation at Pānkān falls inside a horizon that is regional rather than local. Nováček 2023, § 27: Christian settlement in the catchment of the Bēt Garmai centres "continues at least until the 8th century", when flat agricultural settlements and monasteries were abandoned — "part of a large-scale transformation of the cultural landscape in northeastern Mesopotamia, the causes of which have yet to be clarified". The conquest itself is not the break: "the change of power had such slight impact that it is almost undetectable archaeologically" (Bonnéric, Amin, and Couturaud 2023, 23).

[496] This is also the reason for not pressing the weights recorded in the catalogue for the copper: the fals had no fixed standard — Schindel notes considerable regional and chronological variation, a metrology of Umayyad copper remaining a desideratum (Schindel 1999a, 53). Nothing about mint or date can therefore be recovered from the weights of the Pānkān fulūs, which are reported in the Appendix as description and not as argument.

[497] The same division between silver that is kept and copper that is lost is visible in the neighbouring province, and from single finds rather than hoards: Sears and Ariel 2000, 141–142, found single finds of Khosrow II the most numerous in historical Palestine, credited "small trade" with the importation, and add that "hoards from northern Mesopotamia bear a similar character … They probably belonged to merchants involved in the long-distance trade passing through northern Mesopotamia across the Caucasus into eastern Europe". Pānkān lies on that route.

[498] Major 2022, 583 and 585, reporting nineteen folles and seven further bronze coins of probable follis type, among them about half a dozen early folles of Justinian and a possible half follis of Phocas struck at Kyzikos.

Byzantine troops are known to have been physically present in this district. In the late autumn of 627 Heraclius, having crossed the Zagros, spent the second half of November in the country east of Mosul before engaging the Sasanian army under Rhahzadh near Nineveh[499]. An army wintering or marching through a district disperses low-value coin into it[500], and on this reading the Byzantine copper at Pānkān would be a residue of that passage.

The proposal is attractive and cannot be excluded, but the assemblage as it now stands does not require it, and two features of the material argue for caution. The first is the chronological spread. If a single event in 627 were responsible, one would expect the issues to cluster in the decades immediately preceding it; instead the identifiable coins run from Justinian I through to Constans II, that is from the 520s to the 640s and beyond, which is the profile of accumulation rather than of deposition at one moment. The second is the condition of the coins, discussed immediately below: the *folles* are worn to a degree that implies long circulation, so that the date of striking is a poor guide to the date of loss. Together these point to Byzantine copper reaching Pānkān gradually, through the ordinary movement of people and small transactions across a permeable frontier, and remaining in use there for a considerable time after it arrived. The events of 627 may have contributed to that stock; they are unlikely to account for it. The distinction matters for the character of the site, since a coin assemblage formed by a passing campaign would say little about Pānkān itself, whereas one formed by prolonged low-value exchange says a great deal.

The second is wear. The catalogue describes the Byzantine *folles* as heavily worn with striking monotony, several to the point where only a denomination mark survives. Wear of that order is not acquired quickly; it is the product of prolonged circulation. This has a consequence for chronology that the assemblage's conventional reading obscures: a coin's date of striking is not its date of loss, and a Justinianic *follis* worn smooth may well have been dropped a

[499] Major 2022, 585, raising the possibility. Howard-Johnston 2021, 307, establishes the campaign and the geography: from the Dasht-i-Harir an easy route led into Adiabene, to the "large, fertile, and interlinked plains" between the Lesser and Great Zab, where Heraclius "probably spent the second half of November causing as much damage as possible … sending out raiding forays in all directions". Pānkān lies within that radius. Two qualifications are owed. Howard-Johnston places the engagement of 12 December 627 not at Nineveh but most likely in the small plain of modern Dohuk, noting Kaegi's argument for Nineveh itself (308); and his account of the army's portable wealth tells against the inference rather than for it — soldiers were not to be parted from their rewards, and the state "had a pressing need for bullion" (325) — an army that carries its valuables away is not obviously an army that leaves its small change behind. The proposal is therefore recorded here as the one historical occasion that would fit, not as an explanation the evidence establishes.

[500] Howard-Johnston 2021, 310 and 321: in December 627 the Lesser Zab bridges were seized and "the Persian garrisons in the forts commanding them were taken prisoner, apparently without a fight"; the following spring a Roman party crossed the Zagros "aided by men and animals recruited from the garrisons of forts guarding the pass". Small Sasanian posts in this landscape were therefore manned in 627–628, were taken without resistance where they lay on the Roman line of march, and continued to function where they did not.

century or more after it was minted. The scattered Byzantine coinage should accordingly be read as evidence that Byzantine copper remained in use at Pānkān well after imperial issue had ceased to reach the region — which is what the possible pseudo-Byzantine imitation discussed above independently implies — rather than as dating the contexts in which it was found. The third characteristic is an absence: there is no gold from Pānkān, neither solidus nor dinar, and no gold object of any kind. In an assemblage of eighty-seven coins this is unlikely to be accidental. It suggests that the transactions leaving a trace at the site were those of provisioning, lodging, and modest exchange, not of high-value wholesale commerce, and it argues against interpreting Pānkān as a place where large consignments changed hands rather than merely passed through and were serviced.

Finally, the spatial pattern deserves more caution than it has been given. The metal-detector survey established that coins are markedly more numerous outside the walls than within, with a pronounced concentration on the low rise west of the north wall, and this has reasonably been read as marking an extramural market or halting area. The inference is plausible and is supported independently by the architectural and structural evidence for extramural occupation. It must nevertheless be recorded that the two zones were not investigated by the same means: the exterior was covered by systematic grid-based metal detection, the interior sampled by a limited number of excavation trenches, and these methods differ by an order of magnitude in their probability of recovering a small corroded copper coin. Part of the contrast between a coin-rich exterior and a coin-poor interior is therefore certainly method-generated. The pattern is unlikely to be wholly an artefact — the difference is large, and the tight concentration on a single rise is not the kind of distribution that survey coverage alone would produce — but its strength cannot be quantified on present evidence, and a metal-detector transect across the interior would be the obvious test.

The single most substantial numismatic context at the site was identified during the 2019 grid-based metal-detector survey in the southern part of the site, outside the building complex. A few centimetres beneath the arid surface, in Trench 2019/8, the survey located Grave 2019/1, a poorly preserved inhumation accompanied by forty silver coins. The manner of their deposition is important and has been described here in the past in terms that do not fit it well. The coins did not lie in a concealed mass but in a row across the waist of the skeleton, in the position in which a purse worn or laid on the body would be expected to be found, and textile impressions preserved in the corrosion products of the silver indicate that they were

contained in cloth[501]. The group is therefore best described as a purse buried with the dead, and the term hoard, used of it in earlier accounts including the present author's, is misleading: a hoard implies concealment for later recovery, and nothing about the disposition of these coins implies that. The distinction is not merely verbal. A purse records what a person was carrying, or what those who buried them chose to place on the body; a hoard records a decision to withdraw wealth from circulation. The two support different inferences, and the arguments built on this group below are built on the first reading[502].

The detailed analysis of this group, catalogued in the Appendix, reveals a composition for which few published parallels could be identified in the region. One should be entered here, because it is close in kind if not in date: the group found at Humeima in southern Jordan in 1991, five gold solidi of Arcadius and eighteen silver drachms of Yazdagird I with a pair of gold earrings, read by its publishers as the contents of a purse of cloth or leather that had decomposed, and taken to link that roadside settlement to the caravan routes between the Roman and Persian worlds.[503] The chronological span of the forty coins is about three centuries — from a drachm of Pērōz, struck between 466 and 484, to a dirham of 170 AH (786/787), cutting across the separation of Sasanian and Islamic monetary deposits that characterises most published hoards from the region.[504,505] The earliest specimens in the bundle are Sasanian silver drachms carrying the royal portrait and the fire altar with attendants: a drachm of Pērōz I, one of Hormizd IV of his ninth year, and four of Khosrow II, of his ninth, thirty-fourth, thirty-seventh and thirty-ninth years — 599, 623, 626 and 628. To these belong a drachm of Yazdgerd

[501]The disposition is recorded in the excavation documentation and illustrated in Figure 117. The reading followed here — that the coins were contained in something worn or laid at the waist rather than deposited as a concealed hoard — was put to the present author in an examiner's report and is adopted because it accounts for the evidence better than the alternative.

[502]On the distinction between a purse deposit and a concealed hoard, and on the difficulty of separating them, Grierson 1970, 15–18, and Stahl 1992; the debate over the Sutton Hoo parcel is the standard illustration of the problem and is discussed in Appendix 9.2.4.

[503] De Bruijn and Dudley 1995, 695 and 697, on the Humeima purse, whose criterion is worth borrowing: there the uncirculated state and uniformity of the coins showed "not a normal mercantile purse, which usually contains a variety of circulated denominations". The Pānkān group answers to their normal case rather than the exception: its coins are worn, and various in ruler, mint, denomination and date. Their further inference — solidi and drachms together suggesting an owner who "traveled in both Roman and Sasanian territory" — ties such purses to the routes interconnecting the two worlds. The Humeima group was lost rather than buried, so it is a parallel for the purse, not for the burial.

[504] The date is worth registering, because the purse closes in the first year of Hārūn al-Rashīd's caliphate and in the region Heidemann is describing. Heidemann 2010, 658: demand in northern Mesopotamia then "exceeded by far the regular production of copper coinage" — coins were cast until their model was unrecognisable, and copper sheets cut into octagonal pieces — while "Umayyad and Sasanian dirhams still circulated until the early fourth/tenth century": the general condition that makes the composition of this purse intelligible.

[505] For a Sasanian silver hoard from Iraq itself, published with its pottery container, Bivar 1963, on the group said to have been found at Hilla near Babylon; Bivar notes there that the vendor's account of the provenance, though unverified, is not contradicted by the contents of the find (157). Malek 1995 publishes a fifth-century group of the same character. Neither crosses the conquest, which is what distinguishes the Pānkān purse.

III of his third year, 634, struck two years after his accession and in the middle of the conquest,[506] and hemidrachms of Ṭabaristān in the names of the ispahbad Khurshīd and of the Abbasid governor ʿUmar ibn al-ʿAlā. These pre-Islamic issues were retained alongside a majority component of post-reform Islamic silver dirhams struck under the Umayyad and early Abbasid caliphates (including issues of Caliph al-Manṣūr).[507]

The mints represented among the Abbasid dirhams in the group indicate the geographical reach of the monetary system in which Pānkān participated. Alongside silver struck in the Mesopotamian administrative centres of al-Baṣra and al-Kūfa, which is unsurprising at a site in this region, the group contains dirhams bearing the mint signatures of Ifrīqiyya and al-ʿAbbāsiyya in North Africa. The presence of North African silver in the Zagros foothills is a genuine and notable fact, but the inference to be drawn from it requires care. Mint signatures record where a coin was struck; they do not record the route by which it travelled, and a single dirham cannot establish a commercial link between Tunisia and northern Iraq. What such a coin does demonstrate — and this is the more secure and, arguably, the more interesting claim — is that Pānkān lay inside a single, vast, monetarily integrated caliphal economy within which silver moved freely from one end of the empire to the other, and that even a minor frontier waystation in the Zagros received coin from its furthest western provinces. It is participation in an integrated currency zone, rather than a direct trade route to the Maghreb, that the group attests.

The transformation of a militarised strongpoint into a hub of the caravan economy is not unique to Pānkān; it recurs as a structural pattern across pre-modern imperial road systems more broadly. Earley-Spadoni notes that comparable fortified installations in Urartu and Neo-Assyria doubled as message relays that "worked as rest stations" and "protected the roads,"[508] while the Neo-Assyrian empire maintained a formal network of way-stations, the *bēt mardēti*, spaced "at regular intervals… estimated between 20 and 30 km apart, along roads"—roughly the distance of a single day's march—and evidently possessing "a residential character meant

[506] The Yazdgerd III drachm deserves separate notice. Its corpus is small — Tyler-Smith could assemble only 194 specimens excluding the commonest issues of Sakastān — and most towns did not mint at all under him, so that the coinage "cannot yet be used to chronicle the Arab conquests of Iran" (Tyler-Smith 2000, 137, 150). A piece of his third year, 634, is therefore an uncommon object rather than an ordinary one, and its presence in a purse buried at Pānkān two centuries later says more about what was worth keeping than about what was circulating.

[507] The spread of mint signatures in the purse is what the hoard literature would lead one to expect: the seventh-century Quetta hoard contains issues of twenty-nine mints, taken by its editor as "a reflection of the wide circulation of coins from place to place" (Malek 1993a, 79); its drachms of Khosrow II average 3.96 g (standard deviation 0.14 g) against an intended weight of c. 3.98–4.07 g, figures against which the weights recorded in the Appendix may be set. Göbl's caution about attributing individual sigla to places applies throughout.

[508] Earley-Spadoni 2025, 123.

for housing soldiers, officials, and families" rather than serving a purely military garrison function.[509] This dual military-and-logistical role is attested archaeologically, not only textually. At Getap in Armenia, an excavated Urartian fort sited at the junction of two roads has been interpreted as a way station on functional grounds: alongside its defensive garrison, the structure's stalls "may have been used to stable horses," a direct architectural signature of caravan traffic passing through what was, in the first instance, a military installation.[510] A comparable case is documented on the Assyrian side of the frontier at Tell Masaikh on the middle Euphrates, a fortified settlement built around a governor's residence that commanded a river crossing and has similarly been proposed as a bēt mardēti way station embedded within a fortified administrative centre.[511] Read together, these cases indicate that the coexistence of military and caravan/logistical functions within a single fortified installation was a recurrent, cross-regional pattern in the pre-modern Near East rather than an idiosyncrasy of the Pānkān sequence. Earley-Spadoni argues explicitly that this broader pattern of fire-beacon signalling, way-stations, and message relays "was undoubtedly influential in the later development of imperial road networks in the Persian, Hellenistic, Roman, and Byzantine spheres," and that the salient traits of the Persian Royal Road itself—fire beacons, way stations, and message relays—"have predecessors in the ancient Middle East."[512] Pānkān's own transition from garrison fort to caravanserai can accordingly be situated within this longue durée continuity of route-securing infrastructure across the ancient and late antique Near East, even though the Pānkān evidence alone cannot demonstrate a direct institutional lineage between the Iron Age FRN and the Sasanian-Byzantine frontier.

The specific mixture of Sasanian and Abbasid silver in Grave 2019/1 (with a *terminus post quem* around the early 9th century AD) reflects a distinct, conservative regional economic behaviour. While central Islamic cities like Raqqa or Nippur rapidly melted and replaced older currencies with exclusively new Abbasid issues, the population at Pānkān engaged in "negative selection". On this model the older Sasanian drachms, of higher and more reliable silver content, were preferentially withheld from circulation and retained as a store of value, while newer dirhams served active transactions. The composition of the group is consistent with that behaviour, though it should be noted that a single deposit cannot by itself demonstrate a

[509]Earley-Spadoni 2025, 160.
[510]Earley-Spadoni 2025, 135.
[511]Earley-Spadoni 2025, 168.
[512]Earley-Spadoni 2025, 189.

regional monetary preference, and the pattern would need to be tested against further finds from the region before it could be asserted as characteristic of the frontier economy as a whole.

It remains to state what the numismatic evidence does and does not establish. It does establish that coin was in everyday use at Pānkān over a long period, that Byzantine copper circulated here well beyond the end of Byzantine authority in the region[513], that the site was drawing silver from across the caliphate by the late eighth century, and that at least one inhabitant had accumulated and concealed a substantial sum. It does not establish a commercial peak, and the language of zeniths and explosive growth should be resisted: the assemblage is small, its chronology is broad rather than concentrated, and nearly half of it is a single act of deposition. What the coins support is a more modest but firmer proposition — that Pānkān was a continuously monetised place, integrated into successively Byzantine-facing, Sasanian, and caliphal economic systems without a visible break, and that the transition between those systems left no detectable interruption in the site's economic life. That continuity across a political rupture is the numismatic finding of real significance here, and it is one the architecture and the small finds independently support.

6. The Small Finds: An Interpretive Overview

The individual small finds referred to in this chapter are catalogued in full—with measurements, weights, material identifications, and photographs—in the Appendix, published as a separate catalogue volume alongside this dissertation. The discussion below does not repeat that catalogue data; instead, it offers a category-by-category functional and typological interpretation of the small-finds assemblage, cross-referenced throughout to the relevant catalogue (Cat.) numbers, so any individual object can be looked up directly in the Appendix volume.

6.1.Personal Adornment: Rings and Pins

6.1.1. Rings

The ring assemblage from Pānkān comprises eleven individually catalogued objects, working within a narrow and long-lived formal repertoire: a cast hoop, either plain or of D-shaped or rectangular cross-section, joined to a separately worked or integrally cast head

[513] Walmsley supplies the mechanism, and it is an institutional one rather than a matter of inertia: "until the reform of the coinage under ʿAbd al-Malik in 696-97, the long-standing Byzantine issues of the sixth century and the pre-reform Arab issues seemingly circulated together as legal currency of equivalent face value" (Walmsley 1999, 346). Byzantine copper at Pānkān after 640 therefore needs no special explanation: for more than half a century after the conquest it was money.

carrying a bezel or cell. Several examples preserve the cell without any surviving inlay (Cat. nos. 2009, 2122, 2156, 2158, PO17); one silver ring head (Cat. no. 2136) retains genuine traces of a dark-coloured glass inlay within its lozenge-shaped bezel, and a further piece (Cat. no. 20161031FIND002_ring) is bimetallic, combining a silver head with a soldered bronze hoop—a combination presumably reflecting an economy of precious metal rather than a distinct workshop tradition. Two further fragments (Cat. nos. 2099, 2112) preserve only wire hoops, one still bearing the soldering scars of a now-lost head, while a small rectangular fragment (Cat. no. 2126) is only tentatively identified as a ring-head fragment at all.

One object catalogued within this group almost certainly does not belong to it: Cat. no. 2259 has no hoop, and the record's own description identifies it as a distinct 'shield-shaped cell ornament (cloisonné) soldered from silver sheet,' with a soldered backplate and mantle and engraved V-shaped decoration on its reverse, catalogued under the heading 'Cloisonné Ornament (Cell Mount).' It is recommended that this piece be reclassified out of the Rings category and treated instead as an independent small dress or mount fitting; it is excluded from the ring typology discussed below.

The plain bezel-and-hoop ring is one of the most formally conservative and long-lived object types in later antique and medieval material culture, produced by essentially unchanged methods across many centuries and a wide geographic range. O. M. Dalton, in the standard reference work for this material, states plainly that 'the precise dating of rings in the Middle Ages is often a matter of great difficulty; sometimes it is impossible,' since in the absence of an inscription or distinctive figural device 'the age of a ring must usually be determined by its type, by the nature of its ornament or legend, or by more general considerations of style'—a caution that applies with particular force to undecorated examples such as most of the Pānkān group.[514] Dalton's own dedicated survey of Oriental (Western Asian, i.e. broadly Islamic-sphere) signet rings notes that such rings are characteristically inscribed, an Oriental signet 'bear[ing] a legend, either with the name of the owner, or with a maxim, or a text from the Koran,' impressed in ink rather than wax—a form of legible personal or religious identification quite distinct from the plain or non-textual bezels that dominate the Pānkān group.[515] None of the Pānkān ring heads preserves any trace of an inscription: where the cell survives at all, it is either empty (Cat. nos. 2009, 2122, 2156, 2158, PO17) or, in the one case where an inlay does survive (Cat. no. 2136), a plain dark glass paste rather than an engraved or inscribed device.

[514]Dalton 1912, xvii–xviii.
[515]Dalton 1912, xxxii.

On Dalton's own typological logic, this absence of epigraphic decoration argues against reading the Pānkān rings as 'classic' inscribed Islamic-period signets of the kind he catalogues, and is equally compatible with a pre-Islamic (Sasanian) origin or with an early Islamic-period but non-elite, non-epigraphic local product; on present evidence, none of the ten genuine ring pieces can be assigned a narrower date than the site's general occupation sequence on this basis alone.

Dalton's 1912 catalogue remains, however, an unsatisfactory sole authority for this material, and more recent work on Sasanian glyptic allows placing the Pānkān rings more . No monograph or synthetic study of Sasanian or early Islamic finger rings as an artefact class appears to have been published, so the argument must be assembled from the seal literature. Nils Ritter's analysis of the Sasanian corpus divides it between pierced hemispherical and ellipsoid stamp seals, worn suspended on a cord, and a substantial minority of flat, convex, or concave ring-stones cut specifically to be set into the bezels of metal finger rings[516]. This distinction matters for the Pānkān group: an empty cell on a cast hoop is, on Ritter's evidence, most economically read as a vacant setting for exactly such a ring-stone, rather than as an unfinished or purely decorative feature — and therefore as a form with a genuine Sasanian-period pedigree, not only an Islamic-period one. The single surviving inlay at Pānkān, the dark glass paste in the lozenge-shaped bezel of Cat. no. 2136, is likewise well paralleled: St John Simpson and Andrew Meek document glass bezels set into copper-alloy and silver finger rings across a range of Sasanian sites, and argue explicitly against reading coloured glass merely as a cheap substitute for gemstone, since at some sites it appears to have been valued in its own right[517]. Simpson's survey of Sasanian funerary evidence — already drawn on above for the Pānkān burials — further notes that finger rings with decorated bezels are a recurrent component of Sasanian grave assemblages in Mesopotamia[518]. Together, this material does not permit any individual Pānkān ring to be dated more narrowly, but it does shift the balance of probability: the assemblage is at least as consistent with Sasanian-period production as with an early Islamic one, and the empty cells should be understood as settings emptied of their stones rather than as evidence of a lesser or unfinished class of object.

[516]Ritter 2017, 277–292.
[517]Simpson and Meek 2018, 105–120.
[518]Simpson 2018, 425–448.

6.1.2. Bronze Pins

The seven pieces catalogued as bronze pins divide into two functional groups. Four are demonstrably complete or near-complete dress or utility pins with a worked head: Cat. no. KHANFIND014, whose head is partitioned by ribs and terminates in a knob, its shaft of circular cross-section; Cat. no. 2043, with a cylindrical head bearing a circumferential groove; Cat. no. 2241, a plain tapering-point fragment; and Cat. no. 2248, a pin with an eyelet-shaped head formed by hammering the wire into a rectangular cross-section, through which a separate bronze chain link is threaded. This last piece is of some functional interest: an eyelet head strung with a chain link is not a construction required for simple garment fastening, and more plausibly indicates that the pin was tethered—whether to a matching second pin, to a small suspended implement such as a cosmetic or toilet tool, or to a container—to guard against its loss, though which of these specific functions applied cannot be determined from the surviving fragment alone. The remaining three pieces (Cat. nos. 2097, 2142, 2144) are plain, undecorated lengths of circular-section bronze wire preserving no head or point and cannot be confirmed as pins rather than off-cuts or fragments of some other wire-built object; a further fragment (Cat. no. 2094) is tentatively identified in the record itself as possibly belonging to a wire bracelet rather than a pin.

Simple bronze dress pins with a ribbed, grooved, or knobbed head, produced by casting or by working wire, are attested as a standard, non-elite component of Sasanian-period Iranian bronze assemblages more generally. In the Encyclopaedia Iranica synthesis of pre-Islamic Iranian bronze-working, Vincent Pigott notes, citing Donald Whitcomb's report on the Sasanian levels at Qasr-i Abu Nasr, that 'decorative artifacts cast in bronze are well represented: buckles, attachments, hooks, pendants in the shapes of animals, a seal, fibulae, bells, and pins'— the same broad repertoire of generic small bronze dress and utility items recovered at Pānkān.[519] This suggests that the Pānkān pin assemblage sits squarely within an ordinary, well-attested category of Sasanian-period Iranian material culture, but Whitcomb's summary is itself a general inventory rather than a dated typology, so it does not permit a narrower chronological placement for any individual Pānkān piece, including the eyelet-and-chain construction of Cat. no. 2248, for which no closer published parallel could be located in the course of this research. Whitcomb's Qasr-i Abu Nasr report can now be consulted directly on this point rather than at second hand: the site — itself a Sasanian citadel continuing in use into the Islamic period, and thus a close structural analogue to Pānkān — yielded a comparable

[519]Pigott 2000, 457–471, citing Whitcomb, 176.

series of plain copper-alloy pins[520], and a recent archaeometallurgical re-examination of thirty-three of those objects, including six pins and a finger ring, found no correlation between object type and alloy choice, indicating that such items were made from whatever copper-base metal was to hand rather than to a type-specific recipe[521]. This is consistent with the impression given by the Pānkān pins, which show no standardisation of alloy-related colour or finish. For the eyelet-and-chain construction of Cat. no. 2248 no Near Eastern parallel could be identified, and it should be stressed that this is a genuine gap in the published record rather than a gap in the present search: tethered or paired dress pins, and pins suspended with small implements as a set, are a well-defined artefact class in Romano-British and continental European archaeology[522], but no comparable corpus has been assembled for the late antique or early Islamic Near East. The Pānkān piece is accordingly recorded here as a functionally interpretable but typologically unplaced object.

6.1.3. The Silver Lunula Pendant

The single most accomplished piece of personal adornment from the site is a silver *lunula* pendant (Cat. no. PO25), built from a double-arched crescent whose three points were folded back and soldered to form loops, from which drop-shaped pendants hang on wire links. Twisted filigree wire is soldered to the face, and two cells were set into the centre, the upper one retaining a blue glass bead[523]. The technique is competent but not luxurious: the perforations were driven through from the front with a square-sectioned punch and the burrs left unfinished on the reverse, and one cell has lost its inlay. This is silverwork of good but provincial quality, not court production.

Its interest lies in the geography of the form rather than in the workmanship. The combination of a crescent body with a tripartite suspension of dangling elements has an exceptionally long and wide currency: the closest Islamic parallels are Iranian pendants of the eleventh and twelfth centuries[524], the closest formal parallel of all comes from Byzantine material of the tenth and eleventh centuries in the Carpathian Basin, the structural logic is present in sixth- and seventh-century Byzantine elite goldwork, and the underlying idea of suspending three elements from a body goes back to Roman jewellery of the third and fourth

[520]Whitcomb 1985, 169, 174–175, fig. 65.
[521]Oudbashi, Colburn, and Carò 2025.
[522]Eckardt and Crummy 2008. The comparison is to the artefact class, not to the region: no equivalent corpus of late antique or early Islamic Near Eastern toilet sets has been published.
[523]Simpson and Meek 2018, 105–120, on the use of coloured glass in settings of this kind.
[524]Hasson 1987, 42 (Inv. no. J275) and 25, fig. 18; the full range of parallels, including the Carpathian, Byzantine and late Roman antecedents, is set out in the Appendix.

centuries. The same design was therefore being made, in different metals and for different markets, across the whole span between the Mediterranean and Iran. A piece of this kind cannot be assigned to a single cultural sphere, and the attempt would misrepresent it: it is a rural Islamic-period version of a form that Byzantine, Sasanian and Islamic workshops all produced.

One chronological point deserves emphasis, because it bears on the site's later history rather than its prime. The dated parallels closest in workmanship cluster in the eleventh to thirteenth centuries, appreciably later than the sixth- to ninth-century horizon that dominates the rest of the assemblage; but the constructional combination itself is attested three centuries earlier, in Byzantine crescent earrings of the sixth and seventh centuries with a central setting and suspended chains, and a crescent pendant of sheet is excavated in Iran itself in the ninth or tenth century. On the evidence now available the second reading is the better supported: the form is long-lived, and the piece need not be pulled down to the site's thin later phase. Two readings are possible. Either the pendant belongs to the thin later occupation independently attested by the coinage, which continues to the early thirteenth century, in which case it is one of the few objects that can be attached to that phase; or the form is longer-lived than its published parallels suggest, and the piece is contemporary with the main occupation. The first is the more economical explanation and is preferred here, but neither can be demonstrated, since the pendant was recovered by metal-detector survey rather than from an excavation trench.

6.2.Objects of Christian Devotion

Two objects from Pānkān are unambiguously Christian, and because both can be dated with more accuracy than most of the assemblage, they carry a weight out of proportion to their size. They are discussed here as finds; the following chapter pursues their implications for the site's religious composition.

6.2.1. The Cross Fibula

The cast bronze cross fibula (Cat. no. 2076) is the most closely dated object from the site. Its obverse carries a cross whose lower arm is enclosed by a divided wreath, with dot-in-circle ornament on the upper part of the *crux gemmata* and punched decoration and concave indentations imitating cellwork on the lower arm. The published analogue is a cross fibula in the Munich exhibition volume of Byzantine material, of the same dimensions and technique and dated to the sixth or seventh century[525], and the execution of the *crux gemmata* motif

[525]Wamser 2004, 276, Cat. No. 422; the full discussion, including the auction parallels, is given in the Appendix.

corresponds to that on belt buckles of Schulze-Dörrlamm's Types D25 and D26, which belong to the first half of the seventh century[526]. A date between about 600 and 650 is therefore secure, which places the object in the last decades of Byzantine authority in the region and the years immediately following the Arab conquest.

Functionally, it is a garment fastener, worn at the chest, and in the Mediterranean world such fibulae were part of Romanised female dress. Its presence at Pānkān is not evidence of Byzantine administration; it shows that someone at the site fastened their clothing in a Byzantine idiom and, in doing so, displayed a Christian device. Read alongside the scattered Byzantine copper coinage, which circulated here across the same decades, it indicates that the site's Byzantine-facing connections were expressed in dress and in everyday transactions rather than in institutions.

6.2.2. The Pectoral Cross

The second object is a small solid-cast bronze pectoral cross (Cat. no. PO18), with an integral suspension loop set perpendicular to the plane of the cross so that it hung flat against the body. Five punched ring-and-dot motifs are arranged one at the crossing and one on each arm, a scheme generally understood as a simplified rendering of the *crux gemmata*, the punched circles standing in for the gemstones of precious-metal prototypes. The type is well represented in the Byzantine sphere: closely comparable cast crosses with this exact five-point scheme are published from the Balkans and attributed to Syro-Palestinian workshops of the fifth to seventh centuries[527], and in Khairedinova's typology of early medieval crosses from south-western Crimea the same combination of widening arms and five circles defines a variant dated by grave associations at Eski-Kermen to the last quarter of the sixth and the first half of the seventh century[528]. The Pānkān cross therefore belongs to the same horizon as the fibula.

One negative conclusion is worth stating explicitly, because the alternative is tempting in a region where the Church of the East was dominant. The upper arm of the Pānkān cross widens noticeably, and flaring arms are sometimes treated as a marker of so-called Nestorian cross forms. On inspection, the widening here is irregular rather than designed, and is better explained by the quality of the mould or the hand of the caster than by a theological distinction.

[526] The comparison is with the cross-shaped rigid buckle plates of Types D23–D26, which Schulze-Dörrlamm dates "teils aus dem späten 6. Jahrhundert, teils aus der ersten Hälfte des 7. Jahrhunderts" (Schulze-Dörrlamm 2009b, 11). In Band 30,1 itself, Type D24 is placed in the second half of the sixth century, Type D25 in the first half to the middle of the seventh, and Type D26 in the first half of the seventh (Schulze-Dörrlamm 2009a, 201–206, with the chronological table at 248).
[527] Wamser 2004, Cat. Nos. 426–427; for the Syro-Palestinian attribution of the type, see the Appendix.
[528] Khairedinova 2012, 417–440, esp. on the platelet crosses of Variant 3 and their dating at Eski-Kermen.

The object should not be used as evidence for the specific confessional affiliation of its owner. What it does show is that a mass-produced, inexpensive devotional object of a type made in Byzantine provincial workshops reached a fortified site well beyond the imperial frontier — and, on the Crimean evidence, that such crosses were worn principally by women and children, strung on a cord, as personal protection rather than as clerical insignia.

6.3.Dress Fittings of Byzantine Type

The belt fittings point in the same direction as the fibula, and to the same decades. The plate of a cast bronze buckle (Cat. no. PO24) survives with its hoop broken away and its tongue lost; its face carries punched ring-and-dot decoration, and its reverse preserves two integral casting lugs set along the central axis. That construction — lugs cast onto the back of a solid plate rather than rivets driven through it — is diagnostic of the Byzantine buckles with rigid plates, but it does not by itself fix a type or a date. The forms usually invoked for a piece of this appearance are the Syracuse and Corinth types of the seventh century; the difficulty is that the Corinth type is not attested in the Near East, and that Schulze-Dörrlamm assigns the buckles of this general form found at Palmyra and Qalʿat Semʿān to her Type F1 instead, dating that type to the late seventh and eighth centuries on the strength of its Umayyad ornament and of an example from an Umayyad-period building at Jerash. On the first reading the buckle would belong to the last decades of Byzantine authority in the region; on the second, to the site's early Islamic occupation. The object needs to be re-examined against both, and no chronological weight is placed on it here.[529]

The significance of the piece is that it is a standardised imperial dress fitting recovered several hundred kilometres outside the empire. Two readings remain possible on the present evidence: the object may be an import, or one of the provincial imitations this widely copied type generated. Either way it indicates that the dress idiom of the Byzantine military and official classes had currency at a Sasanian frontier site. That this was not a one-way movement is shown by a functionally analogous cast-bronze buckle from the Sasanian citadel of Qasr-i Abu Nasr[530], which differs in the articulation of its lyre-shaped outline but matches the Pānkān piece in proportion and purpose. The two spheres produced comparable objects for comparable

[529] The construction is diagnostic in the sense stated, but the type attribution is not secure: see the discussion in the Appendix, where the Corinth type is shown to exclude the Near East and the eastern Mediterranean Type F1 is proposed as the form against which the fragment should be tested. Schulze-Dörrlamm 2009b, 22 and 136–140.

[530] Whitcomb 1985; the same object is included in the compositional study of Oudbashi, Colburn, and Carò 2025.

needs, and Pānkān contains products of both. The remaining strap fittings add little: a plain shield-shaped bronze strap-end and a cast belt mount with a heart-shaped motif, neither of which is closely dateable. The two silver chapes catalogued with them are recorded as modern and are excluded from consideration here.

6.4.Cosmetic and Pharmaceutical Equipment

Two catalogued items belong to a class of small cast-bronze spouted mortar used for grinding and mixing pigments, kohl, ointments, and medicinal preparations: an intact, well-preserved vessel (Cat. no. KHANFIND034) and the handle of a second, otherwise lost example (Cat. no. PANKAN20161103_1). Five further bronze vessel fragments are catalogued alongside them, but none preserves a diagnostic feature and none can be attributed to the type. Both secure pieces carry dot-in-circle decoration, and the manufacturing traces on the intact vessel are informative in their own right: filing marks of at least two grades survive on the interior and walls, and the cast depressions were filed but never chased, indicating competent serial production rather than individual craftsmanship. These objects sit within the well-documented early Islamic metalwork tradition of the region[531], and the closest dated parallels are regional rather than distant: an unpublished group in the Erbil Civilisation Museum attributed to the Abbasid centuries, and a mortar from Darband-i Bāzyān — the site that provides the closest architectural parallel to Pānkān — recovered from the environs of its church[532].

Two secure examples do not make a series, and no quantitative argument is built on them here; they nevertheless carry some interpretive weight. A vessel of this kind may be merchandise, in transit or held for sale; it may belong to residents with the means and the inclination to grind and apply cosmetics, which would tell against reading the later site as a purely functional halt; or it may be pharmaceutical rather than cosmetic — the same vessel serves both purposes — and so suit an establishment servicing travellers. The first reading finds little support: the surviving handle fragment is worn and was secondarily perforated, evidently for continued use, which reflects possession rather than stock. Between the second and third, the evidence does not decide, and both fit the waystation interpretation. What the mortars do establish is that the material culture of daily life at Pānkān was neither improvised nor

[531]Allan 1982, on the early Islamic metalwork tradition within which these vessels sit.
[532]Ali and Déroche 2016, 11–18; the Darband-i Bāzyān mortar and the Erbil Civilisation Museum group are described in the Appendix.

impoverished, and that it was drawn from the same regional metalworking tradition as the material at neighbouring sites, including an ecclesiastical one.

6.5.The Cast Bronze Camel Fragments

Two finely detailed cast-bronze fragments (Cat. nos. 2229 and 2118) preserve the lower leg and hoof of a camel figurine, and a further foot fragment from a comparable zoomorphic statuette was recovered by survey north of the enclosure. They were not free-standing sculpture: their scale and finish indicate that they served as feet or supports for a composite object, most plausibly a vessel or incense burner of a type for which zoomorphic supports are well attested in Islamic metalwork. Because their significance is economic rather than typological, they are discussed in full in the following chapter and in the Appendix[533], where both the trade-route reading and the complementary possibility that they reflect the camel's ordinary presence as regional livestock are set out.

6.6.Weaponry and Horse Equipment

6.6.1. Arrowheads

The seven iron arrowheads recovered at Pānkān form a technologically consistent group: each is forged flat from a thin iron sheet, with the blade cut into a triangular or elongated triangular outline and a separately forged tang attached at a narrow neck, rather than being socketed. Three examples (Cat. nos. 2001, 2003, 2016) already carry a broad "Medieval, 10th–15th century" attribution in the site's own records. It is important to be precise about what this construction does and does not indicate. The presence of a tang is not in itself chronologically diagnostic, and it would be wrong to treat tanged construction as distinguishing the Pānkān group from a supposedly socketed Parthian and Sasanian norm. Boris Litvinsky's survey of the eastern Iranian evidence notes that socketed and tanged heads both occur from antiquity through the medieval period, and that tanged forms in fact predominate among iron arrowheads for the straightforward technological reason that sockets are more difficult to forge[534]. The excavated evidence bears this out in the immediate region: at Hatra, in northern Iraq, the arrowheads recovered from layers of the first half of the third century AD — the horizon of the Sasanian siege of the city — are described by their excavators as predominantly three-bladed tanged iron arrowheads of a type widely distributed across the Near East, Iran, and Central

[533]Sala 2023, 119–129; the objects and their parallels are treated in full in the Appendix, and their economic implications in Chapter 5.
[534]Litvinsky 2000.

Asia, with socketed examples in the clear minority[535]. The same pattern is reported from ed-Dur in the Gulf, where the trilobate arrowheads are all of iron and all tanged, and where socketed copper-alloy trilobates represent the earlier rather than the later tradition[536]; a recent published typology of ninety-four arrowheads from Kerman similarly assigns socketed trilobate forms principally to the Achaemenid period and the tanged forms to earlier rather than later horizons[537]. What actually distinguishes the Pānkān heads from this regional Parthian–Sasanian norm is therefore not the tang but the blade: they are flat, two-dimensional, single-plane blades, whereas the characteristic Parthian and Sasanian iron arrowhead of the Near East is three-bladed (trilobate) in section. That is a real and defensible distinction, and it is the one on which the group's attribution to a later, medieval horizon should rest. A subsidiary observation supports the same reading: one Pānkān example (Cat. no. 2001) has a tang of square cross-section, and in his study of the metal finds of the Crusader Kingdom of Jerusalem Joppe Gosker, drawing on Kate Raphael's analysis of the Vadum Iacob assemblage, records that tanged arrowheads of square section were the dominant Eastern type, associated with composite-bow and crossbow archery and designed to penetrate armour, and were very rare in contemporary Europe[538]. Gosker's parallels come from the Crusader-period Levant, a different sub-region and historical context from the Zagros frontier, so the parallel is offered for the manufacturing tradition rather than for a date. No published typology of arrowheads specific to Sasanian-through-Ilkhanid Iraq could be identified in the course of this research, and the undated examples in this group should accordingly still be treated as provisionally placed.

6.6.2. Horse gear

The two pieces of horse gear recovered at Pānkān—a cast iron prick-spur point (Cat. no. 2150) and a jointed, two-part iron snaffle-bit mouthpiece (Cat. no. 2034)—attest to mounted activity at the site but resist close typological dating on present evidence. The spur is of the simple prick type, with a single fixed conical point rather than a rotating rowel; this was the standard, long-lived form of riding spur across most of the pre-modern Old World, and, absent decoration or a securely stratified association, cannot be assigned a narrower date on formal grounds alone. The jointed snaffle bit is similarly of a functionally universal design attested, with only minor variation, from the Bronze Age into the modern period, and is not in itself a chronologically diagnostic object. No closer typological parallels are proposed for either

[535]Bruno 2016, 278–302, esp. pl. 8.
[536]Delrue 2007, 239–250.
[537]Khonsarinejad, Riahiyan Gohorti, and Tavakoli 2023, 73–96.
[538]Gosker 2021, 18.

piece here; both are presented as evidence for the practical maintenance of horses at the site rather than as dating evidence. Two qualifications should nonetheless be entered. The judgement that both forms are non-diagnostic rests, for want of anything closer, on Western European scholarship: the standard chronology of the prick spur is Blanche Ellis's, developed on the London material[539], and John Clark's work on medieval bits establishes that jointed snaffles were in use throughout the Middle Ages and make up almost all surviving medieval mouthpieces, so that a jointed snaffle carries no chronological weight[540]. No equivalent typology for either object class has been published for the Sasanian or early Islamic Near East, and that absence, rather than any positive finding, is the reason no closer date is proposed here. Second, the spur may be of more interest than its plain form suggests: Shapur Shahbazi's survey of pre-Islamic Iranian horse equipment discusses bridles, bits, and saddles but does not mention spurs at all, and holds that the stirrup itself was not known in Iran before the Arab conquest[541]. This is an argument from silence and carries little weight, but it does raise the possibility that a spur at Pānkān belongs to the site's Islamic period rather than its Sasanian occupation. The suggestion is recorded here as a question for future work, not as a dating argument.

6.7.Utilitarian and Structural Ironwork

6.7.1. Knives

The three iron knives recovered at Pānkān are, in two cases, too fragmentary to characterise beyond their basic function: Cat. nos. 2021 and 2258 preserve only sections of blade with broken tips and, in the case of 2021, a chipped cutting edge, offering no typologically diagnostic feature. The third piece, Cat. no. 2251, is more informative: its spine (back) is intact, and it preserves the base of what the excavation record describes as a high-set handle, that is, a tang set above the line of the blade's back rather than in line with it, though only the beginning of the tang survives before the break. A handle offset above the blade's axis in this way is a genuine constructional choice rather than damage or wear, and is potentially diagnostic of a specific regional or chronological knife tradition; however, no published typology of Sasanian-through-Islamic-period Near Eastern knives specific enough to place this

[539]Ellis 1995, 124–150, esp. 127, 130. The typology is Western European; no equivalent Near Eastern spur typology has been published.
[540]Clark 2019, 177–190; cf. Clark 1995, 43–52.
[541]Shahbazi 1987, 724–730. The absence is argued here only as absence of evidence: Shahbazi surveys bridles, bits, and saddles but does not mention spurs, and states that the stirrup was not known in Iran before the Arab conquest.

feature chronologically or regionally could be identified within the scope of this research, and the best-known Western medieval knife typologies consulted (chiefly English material) do not address this handle configuration in a form transferable to the Zagros frontier context. The feature is recorded here as a genuine point of interest meriting further comparative study, rather than as a basis for a specific date or origin claim. That this is a genuine lacuna in the literature, and not merely a limitation of the present search, is confirmed by the one substantial recent study of medieval knives from the region: in their archaeometallurgical analysis of twelve thirteenth- to fourteenth-century knives from Kinet Höyük in southern Turkey, Ümit Güder and Scott Redford sort the blades into four morphological groups and record their tang construction as predominantly whittle tangs set into wood or bone handles, but draw their comparative framework entirely from British and Central European material, offering no Near Eastern typology to work against[542]. Vincent Pigott's survey of Iranian ironworking makes the underlying point more generally, observing a long-term typological and technological conservatism in Iranian iron tools that limits how far form alone can carry a date[543]. The offset tang of Cat. no. 2251 is accordingly presented as a recorded and potentially diagnostic feature awaiting a typology that does not yet exist.

6.7.2. Knife Sheath Fittings

The three objects catalogued under Knife Sheath Fittings require some reclassification. Cat. no. KHANFIND018_2, a cast bronze knife-handle ornament with ribbed decoration and a rectangular perforation, is a plain, non-diagnostic fitting. Cat. no. 2145, an oval perforated washer plate, is already flagged in the excavation record itself as 'likely not of archaeological age but a modern piece, possibly belonging to a knife,' and is accordingly treated here as a probable intrusive, non-archaeological find requiring no further typological discussion.

The third piece, Cat. no. KHANFIND016, is catalogued under the heading 'Lyre-shaped whetstone,' but its own description in the record identifies it correctly as something else entirely: 'a forged iron fire-steel (strike-a-light) with a lyre-shaped form,' one end broken and missing. This is a mislabelling of the find category rather than of the object itself, and the piece should be reassigned from whetstones to its own category as a fire-making implement. A fire-steel of this kind was struck against flint or another hard stone to shower sparks onto tinder, and is unrelated in function to a knife sheath fitting, though the two categories are sometimes conflated in find catalogues because complete fire-steels, like knives, were

[542]Güder and Redford 2023, 39–54.
[543]Pigott 1984, 624–633.

commonly carried on a belt or in a pouch. Comparable equipment is independently attested in the broader medieval Levantine sphere: in his 2021 University of Haifa dissertation on the metal finds of the Crusader Kingdom of Jerusalem—already cited above for the Pānkān arrowhead assemblage—Joppe Gosker records a fire striker recovered at Belvoir Castle and notes that Johns, excavating at ʿAtlit, used the Arabic term znād for the fire steel he found there, a term Gosker describes as 'apparently still in use at the time,' indicating that this class of object circulated under a shared Arabic terminology in the contemporary Frankish–Islamic Levant.[544] No closely matched typological parallel could be identified, however, for the specific lyre-shaped subtype of KHANFIND016: the best-documented lyre-shaped or 'purse-type' fire-steels are associated with Viking-age Scandinavia, a connection too distant in time, geography, and cultural context to be proposed here, while the form most often illustrated for the wider Islamic world—the belt-worn chakmak or 'chuckmuck' pouch-and-striker set—is documented mainly from the seventeenth century onward and centred on Central and North Asia rather than the medieval Zagros frontier. KHANFIND016 is accordingly presented here as Pānkān's own example of a broadly attested, functionally well-understood fire-making implement, correctly identified for the first time as such, rather than as a closely dateable typological find. Johns's ʿAtlit report, in which the term znād is used, is now available in Denys Pringle's collected edition and can be consulted directly[545].

6.7.3. Nails

The eighteen iron nails recovered at Pānkān form a structurally and technologically uniform group: all are hand-forged, with square-sectioned shanks and heads deformed by hammering, and several preserve a bent or broken tip consistent with having been driven into, and subsequently withdrawn or collapsed from, a timber element. Forged iron nails of this generic type were manufactured by essentially unchanged methods across many centuries in the pre-modern Near East, and, lacking decorative or typological features, cannot on formal grounds alone be assigned a narrower date than the general construction horizon of the building phase with which they are associated. They are accordingly interpreted here simply as functional fixings—most plausibly from roofing, doors, or other timber fittings within the fort and later caravanserai—rather than as chronologically diagnostic finds in their own right. No study of hand-forged nails as an archaeological find class appears to have been published for the Near East, and the only developed nail chronologies are those of British and North

[544]Gosker 2021, 14, 111.
[545]Johns 1997.

American historical archaeology, which turn on the machine-cut and wire-drawn manufacturing methods of the industrial period and are therefore inapplicable here. Pigott's observation of long-term conservatism in Iranian iron tool forms applies with particular force to a class of object as functionally constrained as a nail[546].

6.7.4. Chain fragments

The single fragment recovered in this category—a small double loop of bent bronze wire—is too generic in form to support a specific functional or chronological attribution on its own. Such simple wire loops occur widely across periods and contexts, serving equally plausibly as a chain link, a suspension fitting, or part of a composite object now otherwise lost; no closer identification is proposed here.

6.7.5. Iron fragments

The eleven pieces grouped under this heading are more heterogeneous than the general 'undiagnostic' label implies, and are treated individually where a functional identification is possible. Most notable is a corroded sickle-blade fragment (Cat. no. 2004), direct material evidence for small-scale agricultural activity at or near the site, complementing the storage and provisioning function argued for Pānkān's interior on architectural grounds. A shield-shaped, drilled iron plate (Cat. no. 2257) and a bent strap loop (Cat. no. 2028) are most plausibly structural or furniture fittings, though their fragmentary and singular character precludes a more specific identification; a forged iron spike (Cat. no. 2020), a curved rod, a curved plate, and a bent pin fragment are similarly interpreted as generic structural or utilitarian ironwork rather than as diagnostic finds. None of these pieces is decorated or of a sufficiently standardised form to support typological dating, and no closer parallels are proposed for them here. The sickle fragment deserves rather more emphasis than its condition suggests. Sasanian agrarian production in the Zagros and its margins is now reasonably well studied as an ideological and practical system[547], and iron sickles and reaping hooks are a standard component of the Iranian agricultural tool repertoire, persisting with little formal change into the ethnographically documented present[548]. No synthesis of excavated Sasanian or early Islamic agricultural ironwork exists against which the Pānkān piece could be typologically placed, but its presence is nonetheless meaningful: it is direct material evidence that grain was being harvested at or near the site, and it supports the reading of the fort's interior as a place of storage and

[546]Pigott 1984, 624–633.
[547]Hartnell 2014, 182–208.
[548]Bromberger 2000.

provisioning rather than a purely military installation. The generally small size and fragmentary condition of the iron assemblage as a whole should also not be over-interpreted as evidence of poverty or marginality. In his assessment of the Sasanian frontier city of Merv, St John Simpson notes that the scarcity of metal of any kind in excavated assemblages reflects systematic recycling by metalsmiths rather than an absence of metal in circulation[549] — a taphonomic argument that applies directly to Pānkān, where the casting waste discussed below independently attests to on-site metalworking.

6.8.Decorative and Structural Bronzework

6.8.1. Bronze decoration

The six objects catalogued as bronze decoration are formally heterogeneous, united mainly by their function as applied ornament on a larger, otherwise lost, organic or composite object. The most informative piece is Cat. no. 2123, a cast, shield-shaped mount with channelled surface decoration, whose reverse preserves its original bronze mounting pin, an iron backing plate, and organic material—tentatively leather or wood, though not identifiable with certainty in its current corroded state—physically trapped beneath the backing plate by iron-corrosion staining. This is genuinely useful direct physical evidence: it confirms that at least one bronze fitting at the site was mounted, via an iron plate, onto an organic substrate, most plausibly a belt, strap, or item of wooden furniture or fittings, rather than being a free-standing object. Two conjoining copper-alloy sheet fragments (Cat. nos. 3035–3036) preserve a band of punched decoration combining V-shaped and oblique punch-marks, a simple and technically undemanding decorative technique attested very widely across the ancient and medieval Near East and therefore not chronologically diagnostic in itself. A further cast fragment (Cat. no. 3006) preserves only post-depositional chisel damage and no diagnostic decorative scheme. The two most technically accomplished pieces are Cat. no. KHANFIND041, a thick engraved-and-punched bronze sheet whose maker first incised guide lines before executing a ring-punched and radiating-line design—visibly, by the excavators' own account, without a fully worked-out preliminary layout, since the pattern slips outside the guide lines in places—and Cat. no. KHANFIND048, a cast tin-bronze conical terminal or knob with ribbed decoration and a moulded neck rib, evidently the finial of a composite object now otherwise lost.

[549]Simpson 2014, 116–143.

No published typological parallels specific enough to support a narrower date for any of these six pieces could be identified for this study. The punched and ring-punched decorative technique itself, however, is independently attested on Iranian bronzework of a comparable general period: James Allan, in the Encyclopaedia Iranica survey of bronze-working in Islamic Iran, notes that earliest Islamic-period vessels in high-tin bronze were ‘often decorated with incised dot-and-circle motifs or disk-like facets,’ the same basic ring-punch technique used on Cat. no. KHANFIND041.[550] Allan’s discussion concerns cast vessels rather than sheet mounts or fittings, so it does not offer a close object-for-object parallel, but it does establish that ring-and-dot punch decoration was a live, regionally current technique on Iranian bronzework of broadly the right period, rather than an idiosyncratic or intrusive feature at Pānkān. None of the six pieces preserves a design distinctive enough to anchor it to a narrower date on this basis alone; they are presented here as evidence of a modest, technically competent decorative bronze-working tradition present at, or supplying, the site, rather than as independently dateable finds in their own right. Two further points can now be made with proper support. First, the organic material preserved beneath the iron backing plate of Cat. no. 2123 is identifiable in principle rather than merely by guesswork: mineral-preserved skin and leather, held in the corrosion products of an adjacent iron object, is a recognised and analysable category of archaeological evidence with an established identification methodology[551], and specialist examination of this piece would very probably determine whether the substrate was leather or wood. Second, the claim that ring-and-dot decoration is not chronologically diagnostic can be stated as a documented finding rather than an impression: in their study of the motif in south-eastern Arabia, Michele Ziolkowski and Ali Al-Sharqi trace an unbroken use of dot-in-circle ornament from the later third millennium BC through to living craft practice, across stone, ceramic, wood, ivory, and metal, executed throughout with a simple rotated multi-point tool[552]. On that evidence the motif itself carries no dating value whatever. What remains potentially informative at Pānkān is not the motif but its execution: the incised guide lines of Cat. no. KHANFIND041, and the maker’s failure to keep the punched design within them, record a specific working procedure and a specific level of workshop competence, and it is on that basis rather than on the ornament alone that the piece might eventually be placed.

[550]Allan 2000, 471–472.
[551]Cameron 1991, 25–33.
[552]Ziolkowski and Al-Sharqi 2006, 152–162.

6.8.2. Bronze fragments

The thirty-four bronze fragments catalogued here are, individually, too small, amorphous, or featureless to support object-level identification: most are corroded scraps of sheet or cast bronze, several preserving casting marks or an isolated original edge but none retaining enough of an original form to permit typological placement. Rather than force individual attributions, they are presented here as evidence for the general availability and circulation of worked bronze at the site; several pieces—those explicitly preserving casting marks and residues—are considered alongside the lead-working evidence discussed immediately below as part of a broader pattern of on-site secondary metalworking. The inference from casting marks and residues to on-site production should be drawn carefully, since crucible fragments, moulds, and slag are the diagnostic indicators of a working area, and casting debris alone can travel as scrap[553]. What can be said on present evidence is that scrap copper alloy was accumulating at the site in quantity, which is consistent both with recycling of the kind documented at Merv[554] and with the small-scale secondary working indicated by the lead evidence below. Compositional analysis of a comparable Sasanian and early Islamic copper-base assemblage from Qasr-e Abu Nasr has shown a wide and unsystematic alloy range, including impure copper, tin bronze, brass, and leaded bronzes, the pattern expected where metal is repeatedly remelted from mixed scrap[555]; instrumental analysis of the Pānkān fragments would be the obvious next step, and is recommended here as a specific avenue for future work.

6.9.Evidence for On-Site Metalworking and Later Reuse

6.9.1. Lead fragments

The sixty lead fragments catalogued here divide, on the evidence of their own descriptions, into two interpretively significant groups rather than forming an undifferentiated mass of debris. A first group, comprising at least twenty-one pieces, consists of small (c. 1–2.5 cm), rectangular or oval lead blanks that have been bent into a U-shape, several retaining casting marks or a scratched, worn surface; none preserves a legible stamped design. This distinctive folded-strip form is the standard method of manufacturing a lead seal (bulla/plomba)—a strip of lead looped around the cord fastening a sack, bale, or document and then compressed, and in administered contexts often stamped, to certify or tax its contents—

[553]Historic England 2015a, sections 4 and 5.
[554]Simpson 2014, 116–143.
[555]Oudbashi, Colburn, and Carò 2025.

and the site's own excavators have accordingly flagged these pieces individually as likely seals. Even without legible impressions to read, the sheer number of candidate sealings recovered is itself significant: it converges directly with the toll-gate and gate-complex evidence discussed in Chapter 4 and with the commercial/caravanserai interpretation argued in Chapter 5, providing independent material support for the proposition that goods moving through Pānkān were formally inspected, taxed, or certified at the site. Should any of these pieces preserve a legible die impression on closer specialist examination, they would merit separate sigillographic study; in the absence of one, they are presented here as a class rather than individually attributed. A second, distinct group of at least five further pieces is explicitly described in the catalogue as casting waste, spillage, or sprue residue from the casting process itself, rather than as fragments of finished objects. Combined with the comparable casting-defect evidence noted among the bronze fragments and the disproportionate number of miscast lead musket balls discussed above, this indicates that at least occasional, small-scale lead- and bronze-working took place on or near the site, in addition to its role as a node of long-distance exchange. One further piece (Cat. no. 2230) is tentatively identified in the catalogue as a possible lead weight, which—if confirmed—would similarly support the site's function as a place of commercial exchange requiring the weighing of goods, though this identification cannot be considered secure on present evidence.

The identification of these folded strips as sealings can be supported, and refined, from a substantial comparative literature that also bears directly on the site's chronology. The technique itself is well documented: a lead strip or blank looped around a cord and compressed is the standard method of securing and certifying a consignment, and the Roman corpus of such objects has been given a full typology and an explicit analysis of their use in taxation and in the distribution of goods[556]. For the periods that concern Pānkān, the decisive distinction is one of material. Sasanian sealing practice, as Richard Frye's survey sets out, worked in clay and bitumen rather than lead, and it is in clay that the relevant Sasanian form appears: a heavier class of sealing "attached to cords that fastened a container of merchandise, or … applied directly on the container"[557]. The function attested at Pānkān therefore has a genuine Sasanian precedent, but the medium does not. Lead, by contrast, is the characteristic sealing material of the Byzantine and early Islamic administrations. Petra Sijpesteijn's study of seals from early Islamic Egypt and Syria draws the distinction explicitly, noting that clay predominantly sealed

[556]Still 1995, esp. 80–84 and 135–142.
[557]Frye 1989, 545–546.

documents whereas lead sealings were frequently used to secure bags, containers, and boxes, and could be fastened directly to textile sacks; she traces their fiscal use as far east as Khurasan[558]. A substantial corpus of Umayyad lead seals is now published from Syria-Palestine[559], while on the Byzantine side Nicolas Oikonomides's classic study of the seals of the kommerkiarioi demonstrated that lead sealing served the fiscal and commercial control of goods in transit, not merely chancery business[560], and John Cherry has since set out the wider medieval practice of sealing merchandise as a mark of quality, origin, and payment of duty[561]. If this reading is correct, the Pānkān sealings are therefore more likely to belong to the site's Byzantine-facing or early Islamic phases than to its Sasanian foundation — an independent chronological indication that converges with the numismatic evidence for intensified activity outside the walls in the early Islamic centuries.

Two caveats must be entered. First, no published Sasanian lead sealing could be identified in the course of this research, and no excavation report from Iraq, Iran, Syria, Anatolia, or the Caucasus was found publishing a comparable group of blank, unstamped, folded lead sealings; the Pānkān group therefore lacks a close excavated parallel, and the interpretation rests on form and function rather than on a matched find. That difficulty is not unique to this site: Maxim Mordovin's guide to the identification of archaeological lead cloth seals is explicitly concerned with recognising such objects by their form and method of attachment when the stamp is illegible or absent, and describes a class of small lead fittings attached not to the edge of a fabric but to a string or cord, used to seal entire bales[562] — the closest published formal analogue to the Pānkān pieces. Second, the tentatively identified lead weight (Cat. no. 2230) cannot be confirmed as such on present evidence; lead was the commonest material for balance weights in the Roman and Byzantine East, and recently published assemblages provide a comparative frame should the piece be studied further[563], but a single unmarked lead lump of appropriate mass is not by itself a weight. Both the sealings and the possible weight would repay specialist examination, and are presented here as a coherent and mutually reinforcing body of evidence for commercial control at the site rather than as individually secure identifications.

[558]Sijpesteijn 2018, 99–147.
[559]Ramadan 2019, 273–286.
[560]Oikonomides 1986, 33–53.
[561]Cherry 2019, 167–192.
[562]Mordovin 2018, 21–27.
[563]Tekin 2024, 137–194.

6.9.2. Lead Musket Balls

The seven lead musket balls recovered at the site, ranging between roughly 1.0 and 1.5 cm in diameter and bearing casting seams typical of mould-cast ammunition, belong to the Early Modern period and are therefore intrusive to the site's late antique and early Islamic occupation sequence. Three of the seven are explicitly recorded as miscast or defective examples—a proportion too high to be coincidental in a small assemblage of ammunition proper. Together with the casting waste and spillage identified among the lead fragments discussed below, this raises the possibility that at least some of this material reflects small-scale lead casting or ammunition repair carried out at or near the site during its later, post-abandonment reuse, rather than representing rounds lost or fired in combat. This inference should be hedged, however, and two published assemblages show why. At the Ottoman military compound (Qishle) in Jaffa, ten balls from secure late Ottoman contexts measured between 12.06 and 16.3 mm and were cast in gang moulds, several retaining the broken or sawn stubs of their sprue links[564]; and a study of some three hundred lead bullets from the 1664 Ottoman siege of Novi Zrin, which likewise records mould seams and sprue scars in detail, distinguishes musket calibres of roughly 15–18 mm from pistol calibres of roughly 12–15 mm[565]. Two consequences follow for the Pānkān material. The recorded diameters of roughly 1.0–1.5 cm place these balls at or below the pistol end of that range rather than in the musket range, so the label "musket ball" should be treated as a conventional description of the object class rather than as an identification of the weapon; and, more importantly, the Novi Zrin assemblage — far larger than Pānkān's and from an unambiguous combat context — reports no defective or miscast examples at all. No study could be identified that treats miscast balls as an established indicator of on-site casting[566]. The high proportion of defective pieces at Pānkān is therefore presented here as a genuine and so far unparalleled observation calling for explanation, rather than as a pattern with published parallels behind it; on-site casting remains the most economical explanation, but it is not the only possible one, and the small size of the assemblage should caution against resting much weight on the proportion.

6.10. What the Assemblage as a Whole Indicates

The categories discussed above have been treated individually, as the catalogue requires; but the assemblage also carries information as a whole, in its composition, and that

[564]Arbel 2021, 387–389.
[565]Padányi and Ondrék 2019, 58–77.
[566]Sivilich 2016.

information bears directly on the central question of what Pānkān was. Setting aside the coins, which are discussed separately, the Appendix catalogues one hundred and ninety individually recorded small finds. Excluding the demonstrably intrusive Early Modern material, the surviving ancient assemblage numbers one hundred and eighty-one objects[567]. Grouped by function, these divide very unevenly. Objects of personal adornment and dress — finger rings, earrings and pendants, the cross, the cross fibula, the belt mount and strap-end, and the bronze pins — together with the cosmetic mortar, its companion handle, and the vessel fragments catalogued with them, account for some thirty-four pieces, or roughly nineteen per cent of the ancient assemblage. Structural ironwork, principally the eighteen forged nails, accounts for a further nineteen. Utilitarian tools — knives, the fire-steel, the sickle — are present but few. And one hundred and five pieces, fifty-eight per cent of the whole, are undiagnostic fragments of bronze, lead, and iron[568].

Against this, the military component is strikingly small. The entire ancient assemblage yields seven iron arrowheads and two pieces of horse gear: nine objects, or five per cent of the total. There are no blades that can be identified as weapons, no spearheads, no fragments of armour of any kind — no mail, no lamellae, no scale — no shield fittings, and no scabbard mounts of ancient date, the two silver chapes in the catalogue being explicitly recorded as modern. Set beside this, the twenty-one candidate lead sealings discussed above outnumber the site's entire ancient weapon assemblage by three to one[569], and the dress and cosmetic objects outnumber it by nearly four to one. It is tempting to read this against the architecture — perimeter walls, interval towers, a defended gate complex, and a glacis[570] — and to conclude that the assemblage is not what a permanently garrisoned fort would leave. That conclusion cannot be drawn from the weapon count, and the comparative evidence shows why: excavated

[567]Cat. nos. 2032 and 2033, the two silver scabbard chapes, are recorded in the catalogue as "Modern Era (Contemporary)" and are excluded here, as are the seven Early Modern lead musket balls.
[568]All figures in this section are counts of individually catalogued entries in the Appendix, tabulated by the present author; the functional groupings are analytical categories imposed here for the purpose of comparison and do not correspond to the catalogue's own arrangement.
[569] Payne 2015, 134–136, treats Sasanian seals and bullae — "clay moldings used to validate access to goods or documents" (134) — as the most representative evidence for the men enlisted at the middling levels of imperial service, offices "particularly urgent in late Sasanian northern Mesopotamia" (136); the ōstāndār of Iberia placed a simple cross on his bulla, and the āmārgar of Khuzestan and northern Mesopotamia is identified as a Christian by the reduction of the plural yazdān to the singular yazd (135).
[570] The point is worth stating against the dissertation's own temptation. Sauer, Nokandeh, and Rekavandi 2022, 287, observe that campaign bases "are often as well defended as permanently occupied military fortresses or fortress cities, but are evidently not designed for comfortable permanent long-term occupation by a military garrison". Defensive strength does not by itself distinguish a garrisoned fort from a temporarily occupied one; internal architecture and the bulk assemblage do.

Sasanian forts whose permanent occupation is not in question yield weapon assemblages as small as this one or smaller.[571,572]

What the comparative material does establish is which classes of evidence can settle the question, and weaponry is not among them. The excavators of the Gorgan Wall forts rest their case for permanent occupation on the internal architecture and the bulk assemblage instead: repeated building phases in the barracks, hearths and ovens belonging to successive horizons, and large quantities of pottery — the features that distinguish a garrisoned fort from a campaign base.[573,574] Measured against those criteria the Pānkān evidence is simply thin rather than negative. The interior has been sampled by a small number of trenches; the structures identified within it have not been excavated to the point where a sequence of occupation floors, hearths and rebuildings could be established for the Sasanian phase; and no quantified ceramic assemblage from an intramural occupation deposit of that phase exists. The question of how the enclosure was occupied in its first life is therefore open, and it is open for want of the right excavation rather than because the finds have answered it.[575] Several further

[571] The same difficulty, met the same way, at the one excavated sequence in eastern Arabia spanning the end of the Sasanian period and the rise of Islam: at Kush the concentration of trilobate and quadrilobate arrowheads "might suggest a military presence", but the scarcity of coinage, of low denominations above all, argues against professional soldiers being stationed there, and the botanical assemblage reads as a self-sufficient smallholding rather than a unit supplied from outside (Kennet 2009, 158). Two of those three lines — the denominational profile of the coinage and the subsistence evidence — remain available at Pānkān; the third does not, for the reasons set out in the preceding note.

[572] The comparative figures cut against the inference: the 2014–2016 Gorgan Wall excavations recovered four weapons in total from Fort 2 and Qal'eh Iraj combined, although a trench crossed the full width of a barrack block; earlier work at Tureng Tappeh produced six projectile pieces; and the late Roman legionary fortress of El-Lejjun, with an estimated garrison of 1,000–2,000 men over more than two centuries, yielded eighteen pieces of weaponry, with armour entirely absent (Sauer, Nokandeh, and Rekavandi 2022, 603–605, with Table 18.1). The excavators conclude that the scarcity "should not lead us to conclude that their garrisons were poorly equipped or that Fort 2 was occupied temporarily only", attributing it to recovery, reuse and recycling, to the value of metal, and to the tidiness of an occupied intramural area (604–605).

[573] Sauer, Nokandeh, and Rekavandi 2022, 604, where the criteria are stated: multiple building phases in the barracks, ovens and fireplaces belonging to three distinct horizons, and large quantities of pottery — "all in sharp contrast to the temporarily occupied campaign bases lacking similar internal architecture and comparable quantities of finds".

[574] Their criteria extend further than weaponry and barracks, and on two of them Pānkān has something to offer: at Fort 2 "the significant number and concentration of ovens, bones, cooking pots, storage jars and storage pits … leaves no doubt that the fort was permanently occupied by a substantial garrison" (Sauer, Nokandeh, and Rekavandi 2022, 161), and the pits are treated as positive rather than negative evidence, underground storage freeing space for accommodation (ibid.). The two stone-lined pits at Pānkān, interpreted as granaries, and the niched storage rooms of the north-eastern block therefore count towards permanence on these criteria rather than against it, and the ceiling proposed above should be read as a ceiling on accommodation, not as an argument about function.

[575] A third possibility should be kept open between permanent garrison and temporary occupation: at Buraq Tappeh — the excavated fort closest to Pānkān in size — the evidence is "not easy to reconcile with an assumption of a short and transient occupation", yet the room explored passed through a phase as "a roofless and unoccupied ruin" before being reoccupied (Sauer, Nokandeh, and Rekavandi 2022, 278); "occupation density of a Sasanian military site could vary greatly over time" (171), and for campaign bases the excavators posit "caretaker garrisons" in periods of peace (761).

qualifications must be entered before the composition of the assemblage is allowed to carry interpretive weight, because each of them could in principle account for the pattern without any change in how the site functioned. Recovery is the most serious. The great majority of the metal finds derive from grid-based metal-detector survey concentrated outside the walls, whereas the interior was sampled by a limited number of trenches; the assemblage therefore describes the extramural zone far better than it describes the fort's interior, and a garrison's equipment, if it existed, would have been deposited principally inside.[576] Second, iron survives poorly in these conditions, and it is the larger iron objects — blades, spearheads, armour — that corrode most completely; the high proportion of undiagnostic iron fragments is consistent with that. Third, weapons are curated objects: they are valuable, they are removed by a departing garrison, and they are recycled, and the evidence for systematic metal recycling at comparable Sasanian sites is explicit[577,578]. Fourth, the assemblage is not chronologically homogeneous. It accumulated across the whole life of the site, and the categories that dominate it — dress fittings, cosmetic implements, sealings, coins — are those associated with the later, commercial phases rather than with the Sasanian military foundation. The absence of weapons may therefore be less a statement about the fort than a statement about which phase of the site the surviving assemblage principally represents.

Taken with those qualifications rather than in spite of them, the composition of the assemblage supports a narrower claim than the absence of weapons might at first seem to license. It is not evidence that the enclosure was never garrisoned. What it does describe is the character of the material that accumulated in the zone the survey actually covered, and that material is not the debris of soldiering but the debris of transit, exchange, and ordinary domestic life: people who fastened their clothes, ground and mixed cosmetics, sealed and certified consignments, lost small change, drove nails, repaired and recast metal, and occasionally shot arrows. The absence of weaponry does not overturn the architectural evidence that the site was

[576] A behavioural explanation should be entered beside the recovery bias, since the two are not exclusive: Wordsworth 2024, 300, finds the Karakum buildings too small to house a caravan — fifteen to twenty rooms against trains of some 150 camels and eighty people in Burnes's nineteenth-century account — so that "much of the livestock and presumably the majority of individuals might have camped outside", a practice also documented for Safavid Iran. Pānkān's interior is larger, but the same logic applies to any traffic of that order, and material lost by people camped outside the walls would be recovered by the survey method used here.
[577] Simpson 2014, 116–143.
[578] For the written evidence behind that expectation see Milwright 2017, 215–221, a dossier of translated sources on recycling and repair: metal, unlike fired clay, "was also a readily recyclable material, although there remained a constant demand for freshly smelted ingots of pure metal" (215), and the accompanying readings — al-Jāḥiẓ on the sifting of household refuse, the Epistles of the Brethren of Purity on the indispensability of the scavengers, and the ḥisba manuals on the mending trades — indicate how systematically worn and broken metalwork was gathered and returned to circulation.

built as a military installation — the architecture is not in doubt — and, on the comparative evidence, it would not overturn it even if the interior had been excavated as extensively as Fort 2. What the assemblage does suggest, on the balance of its composition and its chronology rather than on the weapon count alone, is that the material now recoverable was formed principally during the period when the enclosure had ceased to function primarily as a garrison post. On this reading the small finds and the architecture are not in tension; they simply date from different phases of the same building's life, and the finds record the later one. That conclusion is arrived at here independently of the numismatic and architectural arguments made elsewhere in this dissertation, and it converges with them.

7. Conclusion

The archaeological work at Pānkān has revised earlier assumptions about the site and established a more complex sequence than previously supposed. The integrated methodology indicates that Pānkān was founded as a Sasanian military installation, sited at a point of constricted movement controlling the Zagros foothills and the approaches to Adiabene.[579] Its principal interest, however, lies in what followed. The stone architecture survived the Arab-Muslim conquests without significant interruption and was adapted for use as a fortified waystation serving caravan traffic.

The material evidence (the narrowed gate passages, the inserted domestic ovens, the silver purse from Grave 2019/1, and the religious and cosmetic small finds catalogued in the Appendix) describes a roadside community of mixed composition, in which Zoroastrian, Christian, and Islamic material occurs together. The chronological range of the recovered material, and the distances over which some of it travelled, indicate that Pānkān was not just a peripheral outpost: it functioned as a point of exchange and maintained connections across successive imperial systems until its abandonment in the later Middle Ages. The results from Pānkān bear on the development of this particular site, and also on the development of this specific site but on the wider discussion of how frontier territories were transformed in the Late Antique and early Islamic Near East.

[579] Habibi 2024, 212, whose formulation of the problem applies directly to the Zagros front north of his study area: the region "has a limited number of safe inter-regional paths with proper conditions for regular use", paths in use for millennia and known best to their inhabitants, so that "communication, information flow and product transportation could be controlled or disrupted by these populations". Earlier states met the difficulty by granting privileges to the highlanders or conceding autonomy to local dynasts; a garrisoned enclosure at a constricted point is the Sasanian answer to the same problem.

This trajectory could be reconstructed with confidence for the site's earlier and later horizons, however, the intervening Sasanian–Byzantine–early Islamic centuries themselves remain, across the wider region, strikingly source-poor. To address this evidentiary gap, the dissertation adopted a comparative, two-endpoint methodological strategy, bracketing the sparsely documented middle period between two much better-attested moments in the same landscape's longer history. The earlier endpoint came from the Urartian kingdom's confrontation with Neo-Assyria. Earley-Spadoni's GIS-based analysis of a fortified, route-controlling network[580] suggested a working model: control of a small number of well-placed chokepoints could translate into influence disproportionate to a polity's raw size disproportionate to a polity's raw size. Throughout, this analogy served as a working assumption, not an established law, and was tested against a critical literature that cautions against equating node-control with continuous territorial control[581]. The later endpoint, the political geography of the same border region under the Kurdish hereditary emirates of the late Ottoman period, showed an independently attested case of small, mountainous polities deriving disproportionate regional importance from control of route-defining passes rather than from continuous administration[582]. Although the Urartian–Assyrian and late Ottoman endpoints differ in almost every historical particular (language, religion, imperial structure, and nearly two and a half millennia), their shared structural feature offered an independently motivated, comparative expectation against which Pānkān's own excavated evidence could be tested, not an assumption that the site's middle-period occupants exercised comparable political authority to either endpoint.

Within this framework, Pānkān's architecture and siting are best understood as one instance of a broader, increasingly well-documented category of small Sasanian frontier installations. Recent scholarship has reframed the Sasanian Empire's provincial architecture and landscape as part of an imperial 'topography of power', in which building programmes—not confined to the great dynastic centres—extended royal authority visibly across the landscape[583]. A dedicated 2014 special issue on the archaeology of Sasanian politics examined

[580]Earley-Spadoni 2025.
[581]Smith 2005, 832, 841; Parker 2013, esp. 126, 138–140.
[582]Atmaca 2021, 45–72; Bruinessen 1992.
[583] Canepa 2018, 21, for the definition — imperial ideals "emplaced through a pointillated 'topography of power' built or enacted at innumerable places throughout their lands under the control of the king, agents, or proxies" — and 122 for the Sasanian application: Mesopotamia and the plateau rapidly reshaped, new regional settlements controlling their hinterlands "militarily and economically", and long-derelict northern Mesopotamian sites such as Nineveh renewed as Sasanian settlements. The limits of the book, cited here for a framework rather than for evidence, are stated in the literature review above: fortification is not among its

the empire's borderland building projects as an instrument of domestic and foreign policy and the broader relationship between coinage, military construction, and state capacity[584]. Pānkān adds a single, closely excavated case to this developing picture: a fortified enclosure sited at a route convergence instead of a demographic or agricultural centre, whose subsequent, unbroken repurposing as an early Islamic waystation is itself evidence for the durability of chokepoint-based strategic value across a major political and religious rupture.

The site's later functional history also speaks directly to the research history of the caravanserai as an institution. As the dedicated literature review above set out, systematic scholarly study of the caravanserai began comparatively late and concentrated overwhelmingly on its most familiar, monumentalised Seljuk-period form[585], a centre of gravity that remains broadly true of the field today. Pānkān's Sasanian-to-early-Islamic transition offers a rare example from the pre-Seljuk antecedent period that this scholarship has typically treated as marginal, reinforcing recent work that locates the institution's roots much earlier than its monumentalised Anatolian form, in a longer regional tradition of fortified, route-controlling waystations[586]. Pānkān's own evidentiary contribution therefore falls where the research history is thinnest: not as a Seljuk *khān*, but as one of its pre-Seljuk antecedents, architecturally and functionally continuous with, and not superseded by, the institution's better-known later form.

A parallel historiographical intervention concerns the 'Silk Road' itself. As set out in the literature review, scholarship on the trans-Eurasian network has tended to concentrate on its central and eastern Asian stretches. The long corridor between Transoxiana and the Mediterranean, within which Pānkān lies, has remained thinly studied[587]. Recent historiography has traced this bias to the term's nineteenth-century, China-centred coinage and to its largely unexamined inheritance in later scholarship[588]. Pānkān's multi-period numismatic and material assemblage, spanning Byzantine, Sasanian and early Islamic material within a single excavated frontier context, supplies the granular, western-network evidence that this historiography lacks. It is a small but concrete step toward closing a documented gap in the field, and it avoids treating the Silk Road as an already adequately studied background against which the site's finds could simply be read off.

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categories, and the Zagros is not named. The 2014 special issue is *Journal of Ancient History* 2 (2), for which see Hartnell 2014 and Simpson 2014.

[584]Alizadeh 2014; Howard-Johnston 2014.

[585]Turan 1946, 471; Erdmann and Erdmann 1961–1976; Constable 2003.

[586]Thareani 2007, 123; Genequand 2012; Al Shqour 2019.

[587]Chin 2013, 194; Rezakhani 2010, 420; Payne 2018, 227.

[588]Frankopan 2015; Chan 2025.

The numismatic evidence recovered from Grave 2019/1 anchors this argument empirically. The forty-coin purse, which spans Sasanian drachms of the fifth through early seventh century, Umayyad and Arab-Sasanian transitional issues, and ʿAbbāsid dirhams down to the late eighth century, is rare in the regional record because it combines three successive monetary regimes within a single mortuary deposit, where comparable published assemblages typically remain single-period[589]. Heidemann's studies of the region's currency document a recurrent pattern of hoarding: lower-value coin was spent and kept in circulation, while higher-value silver was withheld[590] . Seen in this light, the retention of older Sasanian silver alongside newer ʿAbbāsid issues places Pānkān within a conservative, regionally anchored monetary economy[591], not the rapid turnover attested at contemporary imperial centres[592]. The physical characteristics of the group indicate that it should be read in the first instance as a purse, coinage carried on the person and interred with them: the coins lay in a compact, undispersed row across the waist of the skeleton; a textile impression is consistent with a bag or wrapping; and the group is directly associated with a single buried individual. The purse may have been concealed, possibly sawed into the buried individual's – possibly a merchant - clothing. That does not exclude the second reading, since a purse of carried coinage may itself represent accumulated personal wealth; the comparative literature on the Sutton Hoo coin parcel shows how difficult the two are to separate in practice. The position of the coins on the body nevertheless makes the purse the primary description here.[593]

Beyond the coinage, the excavated evidence documents a plural frontier community. Burial practice at the site, an extramural and unfurnished inhumation of a broadly attested late Sasanian and early Islamic type, largely conforms to regional norms for this class of grave.

[589]Tyler-Smith 2004; Bivar 1963; Heidemann 2014; Bates 1978.

[590] Heidemann 1998, 104–105, for the long persistence of Sasanian silver in circulation; Heidemann 2010, 649–650, for the two-tier currency structure of the period.

[591] An alternative reading of the Sasanian component has to be met, from the one region where the question has been posed directly: for the hoards of ʿUmān and Bahrayn, Kennet observes that the early Islamic coins "were all minted elsewhere and brought to Arabia during the Early Islamic period, so it seems quite likely that the Sasanian coins with which they were hoarded arrived at same time", sporadic finds of the same rulers being absent (Kennet 2008, 55–64). The composition of his group is strikingly close to the Sasanian component here — twenty of Khosrow II, two of Hormizd IV, one each of Yazdagird III and Kavād I. At Pānkān the argument for long retention rests not on the drachms alone but on their being carried with dirhams of the later eighth century; the possibility that the whole group was assembled late, the Sasanian silver reaching the site as old metal rather than as current coin, cannot be excluded and is not excluded here.

[592] One consequence of the same evidence tells against the reading offered here, and should be stated: Heidemann's hoards show Sasanian silver current across the caliphate long after the fall — "one hundred and forty years after the fall of the Sasanian empire, its coins were still in circulation" — neither officially recalled nor "driven out by market forces" (Heidemann 1998, 104–105). The presence of old drachms in a purse of the 780s is therefore not by itself evidence of a conservative or peripheral economy; it is what the general pattern would predict. What remains distinctive at Pānkān is the contrast with Nippur rather than the retention as such.

[593]Grierson 1970, 15–18; Stahl 1992, 3–14.

One departure is significant. Grave 2019/1 does not face the qibla, although qibla-facing burial was a strong communal norm even at newly established Islamic frontier communities[594]. The most plausible explanations are a non-Muslim identity for the deceased or an irregular act of interment outside ordinary communal ritual. This reading fits the fact that a purse of silver was left in place on the body, something a burial conducted under communal supervision would be less likely to permit, and it has parallels in departures from cemetery norms documented elsewhere in the early Islamic world[595]. This picture of coexistence is corroborated independently by the small-finds assemblage: crosses and cosmetic implements occur alongside coinage bearing fire-altar iconography, and this Zoroastrian, Christian and Islamic material attests to overlapping religious identities at the site across its Sasanian-to-early-Islamic transition. The cast-bronze camel-leg fragments recovered at Pānkān likewise sustain a double reading: as evidence for the mechanics of long-distance caravan trade through a landscape identified as a natural Bactrian–dromedary breeding zone[596], and as evidence for the camel's ordinary presence as regional livestock, husbanded locally and not merely passing through with caravans, in line with pastoral husbandry traditions documented elsewhere on the Iranian plateau[597].

The architectural sequence, the comparative chokepoint framework, the numismatic and burial evidence, and the small-finds assemblage all point the same way: a small, strategically sited Sasanian fort that survived the seventh-century conquests structurally intact and was subsequently repurposed as a fortified waystation serving long-distance trade, hosting in the process a religiously and economically mixed community across more than three centuries of use; as the silt horizon in the gate passage shows, that use was sustained but not uninterrupted. The chronological density and geographical range of the recovered material show that Pānkān was more than a peripheral outpost; it was a small but legitimate node within the wider commercial and cultural fabric connecting the Sasanian, Byzantine and early Islamic worlds. The findings from Pānkān contribute to the local site-level record, and to three wider, still-developing scholarly conversations identified above: the archaeology of small Sasanian frontier installations, the pre-Seljuk research history of the caravanserai, and the historiography of the Silk Road's western, Mediterranean-facing stretch.

[594]Simpson 2018, 429–430; Bullion et al. 2022, 637–638, 642.
[595]Srigyan et al. 2022.
[596]Sala 2023, 119–129.
[597]Tapper 1985, 60–63; Bulliet et al. 1990.

These conclusions should nonetheless be read with their limitations clearly in view. The two-endpoint methodology adopted here is a heuristic for generating an independently motivated comparative expectation, not direct evidence for the site's own middle-period political affiliation, which remains—as it does across the wider region—undocumented in primary written sources. A more basic limitation stands beside it: only a small part of the enclosure has been excavated, and the greater part of the interior remains untouched, so that every negative observation in this study — the absence of liturgical installations, of an internal plan in the magnetograms, of substantial weaponry — is bounded by the excavated sample rather than by the site. A number of specific findings likewise call for further work beyond the scope of the present study: professional conservation and closer study of the coins from Grave 2019/1 may yet refine what can be said about them, and the fibula and belt-buckle typologies discussed in the Appendix would benefit from direct physical comparison with the Schulze-Dörrlamm and Wamser corpora rather than from published photographs alone. These and the other requirements of the project are set out in section 7.2 below. The Appendix catalogue compiled alongside this dissertation is intended, in time, to support such further work as an independently citable dataset in its own right. None of these open questions weakens the central argument advanced here; rather, they mark the productive directions in which a still comparatively young excavation programme can be expected to develop.

7.1.The Research Questions Answered

It may be useful to state the results of this study against the four questions with which the literature review closed[598], since the answers are of unequal strength and it is as well to say which are secure.

The first question was what was built at Pānkān, in what sequence, and to what standard. This is the question the evidence answers best. The site is a roughly square enclosure of about 0.46 hectares with four circular corner towers and up to nine U-shaped interval towers, a single certain gate at the centre of the southern curtain and a possible second at mid-north, a curtain one metre thick carried on a plastered glacis, and an interior of which about three-quarters was built over with ranges of barrel-vaulted rooms set against the walls. Walls and towers were cast in timber formwork as discrete units and joined by accretion, a method still in regional use in the nineteenth century. The plan corresponds closely to the small fortified enclosure now recognised across the Sasanian world from Sīrāf to Fulayj, and to that extent the answer to the

[598]The four questions are set out at the end of the literature review, section 1.3.7.

question of standard is affirmative (the evidence is set out at sections 4.1 and 4.3–4.6, and the comparative material at 2.3 and 5.3): an installation of this modest scale in a peripheral province was built to a recognisable imperial formula. Two features, however, point east rather than west. The interior is densely built rather than kept open as in the Romano-Byzantine castrum, and the gate developed from paired quarter-round buttresses into a single rounded gate tower — a form that recurs in the Umayyad *quṣūr* some two centuries later. Neither observation can support a claim of descent from the evidence of one site, and neither does it.

The second question was when the complex was built, and on what evidence. Here the answer is weaker than the confidence with which it has often been stated. The foundation date of 430–560 AD is a calibrated range derived from AMS measurement of charcoal recovered from the wall mortar of a single room in the north-eastern range. Charcoal in a construction mortar cannot be intrusive, which makes the association secure, but it dates the growth of the wood rather than the raising of the wall, and the interval between the two is not measurable. The determination therefore establishes that the range cannot have been built before the fifth century and is consistent with a foundation in the later part of the calibrated span, where the ceramic and numismatic evidence independently falls. It does not fix a construction date; it derives from one building, and the direct dating of the lime binder, which would date the act of building itself, has not been attempted. The determination and its limits are discussed at section 3.6, and the sequence into which it is fitted at sections 4.1 and 4.4. The chronology of the site is accordingly supported by the convergence of three independent classes of evidence rather than established by any one of them.

The third question was what the complex was for, and whether that changed. The evidence supports a change in the balance of activity but not the sharp functional break with which such sequences are often described. Pānkān was founded as an imperial installation with a pronounced logistical character: two large storage pits best interpreted as granaries, extensive narrow vaulted storage, an interior given substantially to provision, and, on present evidence, no identified barrack. After the conquest, the standing fabric was adapted by new occupants, whose work is visible in a different brick fabric, a poorer mortar and the reuse of Sasanian material; the gate was reduced to a narrow doorway, one storage pit was converted to an oven and the other filled, and the coin sequence turned Islamic. Over the following centuries, the material record outside the walls accumulated the profile of a place where small everyday transactions were conducted in coin over a long period. None of this excludes a continuing military presence, and the dissertation does not claim that it does. What it supports is that the weight of activity shifted towards service and exchange, and that the capacity for bulk provision

declined. The architectural evidence appears in sections 4.4 and 4.6, the material evidence in chapter 6, and the argument, together with its objections, in sections 5.6–5.8.

The fourth question was what the site contributes beyond itself. Three contributions can be claimed with reasonable confidence. It adds a fully published example to a class (the small Sasanian hinterland enclosure) for which the excavated corpus remains very small, and it does so from a region, the Zagros front of northern Iraq, in which the transitional belt between the surveyed plains has scarcely been examined. It supplies a quantified assemblage spanning the Sasanian–Islamic transition at a rural site, a category of evidence on which the period's chronologies still depend and of which there is little. It also offers granular evidence from the western stretch of the exchange network that historiography has been shown to neglect. It is evidence that, if read carefully, describes a station of regional importance servicing traffic rather than a stage on a trans-Eurasian artery. That is a smaller claim than the site has sometimes been made to support, and it is the one the material will bear. The three contributions are argued at sections 5.3, 1.3.5 and 5.8 respectively.

It may finally be useful to state, against the four gaps identified at the close of the literature review, what this study has and has not done about them[599]. The first was the thinness of the excavated corpus of small Sasanian hinterland enclosures. That gap is addressed directly: the present work publishes one such site in full, with its currently known plan, construction sequence, interior, burials and material, and the comparison with Sīrāf, Fulayj and Gird-i Kazhaw offered at sections 4.3 and 5.3 is possible only because the Pānkān record now exists at that level of detail. The second was the absence of survey in the foothill belt between the mapped plains of northern Iraq. That gap remains open and cannot be closed by work at a single site; this study contributes one securely dated point within it, and an explicit statement, in section 7.2, of what a survey of that belt would need to establish. The third was the neglect of the western stretch of the exchange network in the historiography of long-distance trade. Here the contribution is evidential rather than interpretive: sections 5.8 and 5.9 present a quantified assemblage from a single node in that corridor and draw from it a restrained conclusion about what such a node looks like. The fourth was the region's dependence on numismatic sequences that have themselves shifted. The catalogued coinage presented in the second volume are offered as a contribution to that problem.

One further strand deserves to be drawn together at the end rather than left where the evidence for it was presented. The religious geography of this frontier, set out in Chapter 2, is

[599]The four gaps are stated at section 1.3.7.

not background to the archaeology of Pānkān but a condition of it. The empire that built the fort ruled a province in which the majority of the population was probably Christian, in which a metropolitan of the Church of the East sat forty kilometres away at Arbela, and in which the imperial religion was expressed through coinage, patronage and inscription rather than through a dense provision of cult buildings. That is the setting in which a garrison of the Sasanian state operated, and it explains why the material from the site is religiously mixed without that mixture requiring explanation: a pendant cross, coinage bearing the fire altar, and later Islamic issues occur together at Pānkān because they occurred together in the society the site served. The dissertation has resisted the temptation to convert that mixture into an institutional claim. However, the mixture itself is one of the more secure results of the work, and it is what a small frontier installation in late antique Adiabene should be expected to produce.

7.2.Directions for Future Research

The limitations set out above are not all of the same kind. Some follow from the state of the wider field and cannot be remedied by work at Pānkān; others follow from what has and has not yet been done at the site, and are remediable. The second group is set out here, in the order in which it would be sensible to address it, because a dissertation that identifies what it could not do is of more use to the next investigator than one that does not.

Two lines of work are already under way and are recorded here so that the present study is not read as leaving them undone. Portable X-ray fluorescence measurements on the metal finds were completed in the field with the leading participation of Dr Béla Török and the author immediately before the submission of this dissertation; the evaluated data will be presented in a future publication, which will bear directly on the questions of alloy, provenance and on-site metalworking raised in Chapter 6[600]. The faunal and sealing work described above remains unresolved. Beyond these, three targets follow from what has already been attempted rather than from what has not. The interior of the enclosure was surveyed magnetically in 2021 as far as the ground allowed, and the result was poor for reasons of noise rather than of coverage; a different instrument or configuration would be the obvious next attempt[601]. Metal-detector survey inside the walls has been productive in every season and should be continued as a

[600] The measurements were made in the field with a portable XRF instrument by Dr Béla Török (University of Miskolc, Institute of Metallurgy) and were completed immediately before the submission of this dissertation. The dataset is therefore not presented here; the evaluated data will appear in a future publication.

[601] The 2021 campaign did include the accessible parts of the interior; see section 3.4.2, where the constraints are described. The problem was not access to the ground alone but the density of surface and near-surface stone, which produced a level of noise against which weak archaeological anomalies could not be separated.

routine accompaniment to excavation rather than treated as a separate exercise[602]. And the southern foreground has been tested once, in 2019, with an almost sterile trench that did not recover the structures suggested by the 2014 magnetogram; the area is large, the burial ground lies at its edge, and a series of trenches rather than a single sounding will be needed to establish what is there[603].

The most immediate needs concern material already recovered. The faunal assemblage from the storage pits and the occupation deposits has been recorded but not analysed, and its identification could answer directly the question of how the installation was provisioned and what its relationship was with the surrounding countryside — whether it drew on local herds, on transhumant flocks, or on supply from further afield[604]. The lead sealings are the second priority. None preserves an impression legible to the naked eye, but they have not been examined by a specialist under raking light or by radiography, and a single legible die would move the argument about the administration of goods at the site from inference to evidence[605]. Neither of these requires a return to the field.

A second group of needs concerns dating. The foundation date rests on one determination from one building. Two things would strengthen it. The first is a series of determinations from the other structural blocks, which would establish whether the enclosure and its interior ranges are of one campaign or of several — a question on which the argument about the density of the interior, and hence about the site's relation to the Umayyad *quṣūr*, partly turns. The second is the direct dating of the lime binder, which would date the setting of the mortar rather than the growth of the wood; the mortars would first have to be characterised mineralogically to establish whether they are amenable, but suitable samples from protected wall cores already exist[606]. The ash lenses in the gate passage, which mark the long period of decay between the Sasanian and the early Islamic use of the entrance, are a third target and would date that interval directly.

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[602] Detector survey has been carried out inside the enclosure in every season, and has consistently produced material; the point made here concerns the difference in intensity and coverage between interior and exterior, not the absence of interior survey.

[603] The trench opened in 2019 in front of the southern gate proved almost sterile, and the structures indicated by the 2014 magnetogram were not encountered in it. A single sounding over a geophysical anomaly is a weak test, and the negative result is reported here as such.

[604] The faunal material from the storage pits is the clearest instance: it was recorded in the field but has not been submitted for analysis, and its identification would bear directly on how the site was provisioned.

[605] Twenty-one candidate sealings are catalogued. None preserves a legible impression to the naked eye; radiography and raking-light examination by a specialist would establish whether any impression survives, and a single legible die would transform what can be said about the administration of goods at the site.

[606] The technique and its requirements are set out in section 3.6. Suitable material from protected wall cores already exists in the archive.

A third group concerns coverage, and here the requirement is not that a method be applied for the first time but that it be applied differently. Magnetometer survey has been carried out both outside the enclosure and, in 2021, across those parts of the interior that could be reached; the difficulty inside was not access alone but the density of surface and near-surface stone, which made the execution of the field survey quite difficult, and raised the noise level above the weak anomalies the method was looking for[607]. A different instrument, a different sensor configuration, or survey along a different axis might yet recover something of the internal ranges, and the question of whether barracks exist among them cannot be settled without it. Metal-detector survey stands differently again. It has been carried out inside the enclosure in every season and has always produced material, so the interior is not unsampled; what differs between interior and exterior is the intensity and the regularity of the coverage, the exterior having been walked on a systematic grid[608]. The contrast between a coin-poor interior and a coin-rich exterior therefore remains, in part, a contrast between two ways of looking. Detecting the interior to the same grid standard as the exterior, and continuing to detect systematically alongside any future excavation, is the cheapest way to strengthen or overturn an argument on which several of the conclusions above depend.

A fourth group concerns excavation. Three targets stand out. The unexcavated interior of the north-eastern block would establish whether the accretive growth visible on the surface reflects a single campaign of construction or a long sequence, and with it whether the densely built interior belongs to the foundation or to the site's later life. The anomalies recorded by the 2014 magnetometer survey in the southern foreground, which are not aligned with the enclosure and may therefore predate it, have already been tested once: a trench opened in front of the southern gate in 2019 proved almost sterile, and the structures the magnetogram appeared to show were not found in it. One negative sounding over a geophysical target is not a refutation, and the southern foreground, together with the burial ground at its edge, remains among the most promising areas for further excavation. The settlement outside the southern gate has been characterised only from surface collection; a single stratified sounding there would date its foundation and abandonment, and would clarify the relationship between the enclosure's interior and the ground outside it, which at present can only be described for the

[607] The 2014 campaign covered the southern and western foreground; the 2021 campaign covered ten areas including the accessible parts of the interior. The northern and eastern approaches have not been surveyed. See section 3.4.

[608] The point follows from the recovery-bias discussion in section 3.5. The interior has been detected in every season, but not on the systematic grid used outside the walls, so the interior–exterior contrast is in part a contrast of method.

early Islamic period. The criteria such an excavation would have to satisfy are known from the Gorgan Wall forts, and they are architectural and ceramic rather than artefactual: a sequence of occupation floors with hearths and ovens belonging to successive horizons, evidence of rebuilding within the intramural structures, and a quantified pottery assemblage from stratified interior deposits. Until an interior sequence of that kind exists, how the enclosure was occupied in its Sasanian phase cannot be settled from the material record.

Beyond the site, the region's most useful contribution to the questions raised here would be a systematic survey of the foothill belt itself. The plains on either side — Erbil, Navkur, Shahrizor — have each been covered by a major project; the transitional ground between them, in which Pānkān and the other fortified sites of the Zagros front lie, has not.[609] Until it is, the relationship between these installations and the settlement systems they were built among will remain a matter of deduction from a handful of excavated points, and the question of whether they constituted a system or merely a set of similar responses to a similar landscape cannot be answered.

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[609] For the district in the Abbasid fiscal registers see Spuler 2015, 472: Shahrazur with Samghān and Darābādh was still reckoned with the province of Mosul around 785, and was assessed at 2,750,000 dirhams around 820 and again around 850. On the density of Kurdish settlement in the Zagros around Ḥulwān and Shahrazur, ibid., 229.

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