

POLITECNICO DI TORINO

Department of Architecture and Design

Master's Degree Thesis in Architecture Construction City

Sharing Digital Cultural Heritage as a Method to Generate Collective Memory

Candidate: Melika Kord

Supervisor: Prof. Willemina Zwanida Wendrich

Academic Year 2025/2026

Abstract

This thesis explores the architectural and spatial consequences of the displacement of the Dakka Temple *(Pselchis)* in Lower Nubia via the digital reconstruction. Throughout history, the Dakka region was dependent on the predictable, pre-industrial annual inundation cycle of the Nile river to protect its local life systems and sacred architecture in the narrow alluvial corridor between the first and second cataracts. The construction of the Aswan Low and High Dams in the twentieth century harmed this dynamic equilibrium, forming Lake Nasser on a permanent basis, structurally submerging local settlements and physically moving monuments such as Dakka away from their vital Nilotic axis. This research addresses the dual loss of material context and regional *genius loci* via the construction of an integrated spatial data pipeline to link fragmented 2D analog archives, specifically the *1913 metric surveys of Günther Roeder* and *C.M. Firth*, with modern 3D parametric modeling.

Methodologically, the study executes a dual-environment framework combining Historic Building Information Modeling (HBIM) in Autodesk Revit, and regional geospatial and hydrological analyzes in QGIS. The key deliverables are a full geometric reconstruction on the macro- and micro-scale of the temple complex, from the Meroitic core of the Ergamenes Chapel to the monumental entrance gateways. The model operates as a transparent academic asset, incorporating custom metadata parameters for chronological phases, structural anomalies, and archival sources directly into this geometric database. Moreover, taking advantage of a photo-reconstructed historical Digital Elevation Model (DEM) and modern topographic data provides the reconstruction of historical water-level matrix information from 1902 to 1963, visually re-creating the relationship between the temple structure and its lost environment. This research ultimately shows how open-source interoperability and digital repatriation workflows (IFC and WebGL) can be prioritized to create and rebuild the collective memory of the Nubian diaspora through sharing digital cultural heritage.

Acknowledgements

In the middle of my studies on this project, in the cold days of winter, many of my countrymen sacrificed their lives for freedom back in my hometown, IRAN.

To my Iranian brothers and sisters, who went through one of the most heartbreaking moments in our country's history on January 8 and 9, 2026. Many of the courageous people who rose up and gave their lives to achieve freedom are no longer with us. As a little gesture to help honor their memory and to show my sincere respect for their sacrifice, I warmly dedicate this thesis' work, study, and effort that went into this project exclusively to them.

Completing my master's thesis has been both challenging and satisfying, thanks to many people's constant assistance, support, and collaboration.

First and foremost, I would like to express my sincere appreciation to Professor Wendrich, who advised my thesis. Throughout our project, her deep academic understanding, constant encouragement, and accurate feedback offered the crucial basis for handling the challenges of archeological archives and architectural reconstruction.

The creation of the historical Digital Elevation Model (DEM) of the Lower Nubian valley was made possible by Dr. Matthew Dalton's skill in historical photogrammetry and generosity with sharing helpful ideas, for which I am incredibly grateful. His technical advice helped bridge the crucial gap between regional geospatial analysis and architectural BIM workflows.

I am also grateful to my family, especially my parents back in Iran, for their unconditional love, patience, and limitless support through this school journey. Many thanks to little but protective and caring circle of friends for the motivational conversations, times of mutual laughing, and endless encouragement that kept me grounded, especially when I do not have my parents close to me, they are my second family.

Finally, looking beyond the completion of this research on the Dakka Temple, it is my sincere desire to one day use these integrated HBIM and geospatial methodologies and their results to

preserve, document, and share the world's broader cultural heritage treasures—particularly in my homeland, IRAN, where ancient landscapes are profoundly rich in monuments waiting to be digitally preserved and remembered.

Free Iran,

Woman, Life, Freedom

زن، زندگی، آزادی

Table of Contents

Abstract ..... **ii**

Acknowledgements ..... **iii**

Table of Contents ..... **v**

Table of Figures ..... **xiv**

Chapter 1: Introduction **1**

1.1 Research Background and Motivation ***1***

1.1.1 The Spatiality of Displaced Heritage: Physical Salvage vs. Landscape Severance 1

1.1.2 The Architecture of Translation: Built Geometry as an Anchor for Intangible Nubian Lifeworlds 4

1.1.3 The Historical and Spatial Trajectory of the Dakka Temple (Pselchis) 4

1.1.4 Digital Cultural Heritage: Reclaiming Collective Memory in Virtual Spaces 4

1.2 Statement of the Problem ***5***

1.2.1 The Rupture of *Genius Loci*: The Spatial Consequences of the Aswan High Dam Inundation 5

1.2.2 The Analogue Archive vs. Spatial Reality: Metric Limitations and Fragmentation of 2D Documentation 5

1.2.3 The Technical Silo: The Separation of Architectural BIM Workflows from Regional Geospatial Contexts 5

1.3 Research Objectives and Questions ***6***

1.3.1 Primary Objective: Generating a Semantic 3D Repository for Displaced Heritage 6

1.3.2 Core Research Questions: *What, How, and Why Must the Spatial Identity of Dakka be Digitally Preserved?* 6

1.3.3 Addressing the Digital Void: Can a 3D Reconstruction Carry Local Memory? 6
1.3.4 Defining the Stakeholders: *Whose Collective Memory and Which Community?* 7
1.4 Methodology Overview: The Integrated Spatial Data Pipeline 7
1.4.1 The Archival Anchor: Synthesizing the 1913 Metric Records of Roeder and Firth 7
1.4.2 Parametric Reconstruction: Semantic Modeling and Intangible Metadata Embedding in Revit 8
1.4.3 The Terrain Synthesis: Differentiating Modern Topographies from Photo-Reconstructed Historical DEMs 8
1.5 Significance, Scope, and Delimitations of the Study 9
1.5.1 Academic Value to Ptolemaic Architectural Typology and Digital Diaspora Studies 9
1.5.2 Defining the "Sharing" Framework: Transnational Accessibility and Digital Repatriation 9
1.5.3 Delimitations and Bounds of the Reconstruction 9
1.6 Thesis Structure 9
Chapter 2: Historical Context and The Nubian Landscape 12
2.1 The Sacred Topography and Architectural History of Lower Nubia 12
2.1.1 The Location of Nubia: Geography, People, and Regional Architecture 12
..... 14
2.1.2 Chronological Construction: The Pharaonic Origins and Ptolemaic-Roman Expansions of the Dakka Temple (Pselchis) 14
2.1.3 The Core Focus: The Foundation and Spatial Evolution of the Dakka Temple (Pselchis) 21
2.2 Post-Temple Transformations: Re-appropriation, Closure, and Adaptation 21

2.2.1 The De-Consecration Phase: The Spatial Alterations of the Christian and Early Islamic Eras 21
2.2.2 The Early-Modern State: Structural Conditions and Observations by 19th and Early 20th-Century European Expeditions 22
2.3 Modern Severance: The Trauma of Displacement and the Loss of Genius Loci ... 24
2.3.1 The Impact of the Low and High Aswan Dams on the Lower Nubian Valley 24
2.3.2 The Physical Relocation: Deconstruction, Displacement to Wadi es-Sebua, and Loss of the Nilotic Axis 25
2.3.3 The Human Disruption: The Forced Migration and Scattered Settlements of Local Nubian Communities 26
2.3.4 The Conservation Dilemma: Critically Questioning *What, How, and Why* Heritage Should Be Preserved in the Dakka Region 27
Chapter 3: Theoretical Framework and Archival Anchors 30
3.1 The Object of Preservation: Intersecting Tangible and Intangible Heritage 30
3.1.1 Defining the Baseline: Archival Evidence from the Roeder and Firth Documentation 30
3.1.2 Defining the Memory: *Whose History is Preserved in the Dakka Region?* . 31
3.1.3 The First Principles of Collective Memory: Architecture as the Container of Vanishing Landscapes 31
3.1.4 The "Inseparable Matrix": How Does the Reciprocal Relationship of Structure and Landscape Relate to Cultural Heritage? 32
3.2 The Mechanics of Preservation: Institutional Responses vs. Indigenous Realities 33
3.2.1 State-Led and International Interventions: The Roles of the Egyptian Government, the UNESCO Campaign, and Western Alliances 33
3.2.2 The Displaced Stakeholders: Critically Evaluating the Agency, Omission, and Lived Experiences of Local Communities 34

3.2.3 The Architectural Translation Layer: How Material Form Saves Endangered Intangible Heritage 35

3.3 The Purpose of Preservation: Future Horizons, Knowledge Sharing, and Digital Repatriation..... 36

3.3.1 Transgenerational Continuity: Safeguarding Historical and Cultural Identity for the Future 36

3.3.2 Democratizing the Archive: The Ethics of Open-Access Spatial Knowledge and Shared Research Methodologies 36

3.3.3 Digital Repatriation: Overcoming Spatial Severance by Returning Architectural Assets to a Diaspora 38

3.4 Synthesis: Architecture as the Catalyst for Collective Memory..... 39

3.4.1 Reconciling the Theoretical Triad: Synthesizing the "What, How, and Why" of Nubian Heritage Reclamation 39

3.4.2 The Conceptual Bridge: Handing over Theory to Digital Architectural Reconstruction 40

Chapter 4: Methodology and Digital Reconstruction Workflow 43

4.1 Introduction to the Workflow: "Multidisciplinary" Aspect of Architecture..... 43

4.1.1 Translating Conceptual Memory into Parametric Reality: The Collective Memory Framework 43

4.1.2 The Double Anchor: Linking Local Lifeworlds with the Roeder and Firth Archival Datasets..... 44

4.1.3 Spatial Syntax: How Architectural Geometry Materializes Invisible Narrative Landscapes 45

4.2 Digital 3D Reconstruction Phase (Revit)..... 46

4.2.1 Modeling the Temple Geometry: Pylons, Massive Masonry, and Internal Passageways 46

4.2.2 Delineating Historic Chronology: Modeling the Ptolemaic Core and Roman Expansions 47
4.2.3 Parametric Rules for Historic Anomalies: Forcing Analogue Metrics into Digital Logic 48
4.3 The Heritage BIM (HBIM) Integration Phase 49
4.3.1 Defining Custom Metadata Parameters for Intangible Heritage Data 49
4.3.2 Embedding the Synthesized Archive: Linking Nubian Linguistic Data and Historical Texts to 3D Geometry 51
4.3.3 The Open-Source Transition Workflow: Breaking the Proprietary Barrier via IFC and WebGL Preparation 52
4.4 Spatial Synthesis and Landscape Integration (QGIS to Revit) 53
4.4.1 Grounding the Reconstruction: Topographic Realities and Spatial Coordinates 53
4.4.2 Processing the Modern Topography: Preparing Web-Sourced Digital Elevation Models in QGIS 54
4.4.3 The Historical Terrain Paradox: Reconstructing Lost Topographies from Archival Photography 55
4.4.4 A Bidirectional Interoperability Pipeline: Integrating Architectural BIM and Geospatial Analysis 70
4.5 Chapter Synthesis: The Creation of the Smart 3D Model from the Analog Archive 71
4.5.1 From Analogue Fragmentation to Spatial Synthesis: Translating 2D Archival Drafts into a Living HBIM Asset 71
4.5.2 Honoring the Archive: Achieving Absolute Geometric Fidelity to 1913 Metric Records 72
4.5.3 Methodological Foundation for Comparative Spatial Assemblies: Setting up the Dual-File Environment 73
Chapter 5: Results, Spatial Analysis, and Digital Outputs 75

5.1 Macro-Scale Geometry: Introduction to the Dakka Temple and Its Structural Parts 75

5.1.1 Comparative Analysis of the Dakka Temple 3D Model and Roeder and Firth's 2D Plans 75

5.1.2 Spatial Correlation Between the 3D Model and the Reconstructed Geometric Plans Derived from Roeder's Survey 80

5.1.3 Complete Volumetric Reconstruction of the Temple Core and Photographic Cross-Referencing 83

5.2 Micro-Scale Architectural Details and Parametric HBIM Integration 85

5.2.1 The Chapel of Ergamenes (Arqamani) (*Ergamenes Kapelle)*: 85

Meroitic Core, Walls, and Roof Assembly and its Architectural Moldings 85

5.2.2 The Sanctuary *(Adytum)*: 96

False Doors, Monolithic Naos, Structural Junctions, and the Architectural Moldings 96

5.2.3 Roman Expansions and Structural Modifications 113

5.2.4 Transverse Room (*Querraum* Transition Gap) and Ptolemaic Monolithic Gateway 113

5.2.5 The Lion-Headed Waterspout *(Wasserspeier)* 113

5.2.6 The Pronaos *(Vorhalle)*: 128

Intercolumnar Screen Walls, Papyrus Columns, and Roof Assembly 128

5.2.7 The Pylons (Eastern and Western Towers): 140

Staircase Networks, Light Slits, and Flagstaff Voids in addition to the Central Entrance gateway in between the Pylons. 140

5.2.8 The Courtyard Well Basin *(Brunnen)* and Approach Infrastructure 164

5.3 Architectural Elevations and Section Cuts of the Revit Model 172

5. 3.1 Architectural Elevations 173

5.3.2 Architectural Sections 174

5.4 Cartographic and Landscape Outputs: Dual-Terrain Integrations and Hydrological Simulations 175

5.4.1 Phase 1: 175

Current Situation of the Dakka Temple (Modern Baseline Assembly) 175

5.4.2 Phase 2: 184

Historical Situation in the Original Location (Photo-Reconstructed Historical DEM) 184

5.4.3 Phase 3: Hydrological and Gauge Records (Temporal Water-Level Matrix, 1902–1963) 189

Temporal Matrix Phase 1: 1902 — The Aswan Low Dam Baseline Inundation 191

Phase 2: 1908–1909 — The Barsanti Restoration 193

..... 195

Phase 3: 1912 Firth Survey Map Baseline 196

..... 197

Phase 4: 1934 — The Royal Air Force Flight Parameter 199

..... 200

..... 201

Phase 5: 1944 Winter High Pool — Peak Low Dam Storage Cycle 202

..... 203

Phase 6: 1944 Summer Drawdown — Peak Low Dam Storage Cycle 204

..... 205

..... 206

Phase 7: 1963 – Corona Spy Satellite Imagery 207

..... 208

Chapter 6: Discussion and Critical Evaluation 210

6.1 The Epistemological Leap: From Flat Paper Archives to 3D Spatial Reality 210

6.1.1 Evaluating the Precision, Ambiguities, and Limitations of Günther Roeder's and C.M. Firth's Documentation 210
6.1.2 Methodological Friction: The Challenges of Translating Historic Analogue Metrics into Parametric BIM Logic 211
6.1.3 Software Interoperability Boundaries: Managing Data Translation between Open-Source QGIS and Autodesk Revit 212

6.2 Reclaiming the Genius Loci: The Model as a Mnemonic Vessel 213

6.2.1 Recontextualizing the Displaced Monument within its Lost, Paradoxical Landscape 213
6.2.2 *For Whom Does the Model Speak?* Questioning the HBIM Environment as a Conditional Anchor for Living Memory vs. Data Recreation 214

6.3 Ethical Reflections: The Politics of Digital Reclamation and Stewardship 215

6.3.1 The Paradox of Virtual Authenticity: Navigating Subjective Reconstruction and Objective Metric Boundaries 215
6.3.2 Decolonizing the Virtual Space: Representation, Data Ownership, and the Prevention of Digital Colonialism 216

Chapter 7: Conclusion and Future Horizons 219

7.1 Summary of Research Achievements and Findings 219

7.1.1 Realizations in Architectural and Spatial Modeling: Materializing the 1913 Archive 219
7.1.2 Realizations in Tangible-Intangible Heritage Synthesis: The Smart HBIM Repository 219

7.2 Contributions to the Fields of Digital Heritage and Diaspora Studies 220

7.2.1 Advancing HBIM Workflows for Relocated and Submerged Historical Monuments 220
7.2.2 The Model as a Decentralized Vector for Reclaiming Collective Memory 220

7.3 Future Horizons: Frameworks for Public Dissemination and Cultural Engagement *221*

7.3.1 Synthesizing Structure and Landscape: The Core Principle of Relevant Cultural Heritage 221

7.3.2 Democratizing the Spatial Archive: Open-Access Knowledge Sharing and Shared Research Methodologies 221

7.3.3 Immersive Spatial Mediums: Alternative Futures for Virtual Heritage Representation 222

7.3.5 Recommendations for Future Interdisciplinary Digital Archaeology and Architectural Research 222

Bibliography 224

Table of Figures

Figure 1. a) & b): The location of Wadi-es Sebua - c) The Current Location of Dakka Temple in Wadi_es Sebua – d) The original location of Dakka temple and its distance from the current location. 2

Figure 2. The Temple of Dakka at Wadi es-Sebua. *Photo by Dennis G. Jarvis (Egypt-9A-106), licensed under CC BY.* 3

Figure 3. Ancient Nubia (after K. Michalowski, 1967b, p. 29). *Volume II of the UNESCO General History of Africa ("Ancient Civilizations of Africa")* 13

Figure 4. The Temple of Dakka in 1838, *watercolor and lithograph by the Scottish painter David Roberts during his travels in Egypt and Nubia in 1838, and later published around 1842–1849*14

Figure 5. South Site of the East Pylon: King. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 30* 16

Figure 6. South side of the West Pylon: Osiris and Isis. Demotic inscription no. 18 B.C. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 31* 17

Figure 7. East Half of Pronaos Façade. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 41* 18

Figure 8. West Half base of Pronaos. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 44* 19

Figure 9. The Ptolemic Gate in Querrum- a)at the Western gatepost - b)at the Eastern gatepost. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 68* 20

Figure 10. General view of the village near the Temple of Dakka (1906). *Photograph by John Garstang. Glass plate negative, Garstang Museum of Archaeology, University of Liverpool (Catalogue Ref: JG/K/3/6/3).* 59

Figure 11. Map El_Dakka, 1909. *PRIVATE COLLECTION* 60

Figure 12. Map El_Allaqi, 1909. *PRIVATE COLLECTION* 61

Figure 13. Map Gerf Hussein, 1909. *PRIVATE COLLECTION* 62

Figure 14. Map El Dakka, El Allaqi, and Gerf Hussein showing the Lower Nubian area, 1909. *PRIVATE COLLECTION*..... 63

Figure 15. Plan 1: Sites of Cemeteries near Dakka (Scale 1:25,000). From *C. M. Firth, The Archeological Survey of Nubia: Report for 1909–1910 (Cairo: Government Press, 1915).* 65

Figure 16. Reconnaissance aerial photograph of the Dakka area, 1934. *Produced by the Geographical Section, General Staff (GSGS), British War Office. Sourced via the Oriental Institute / CAMEL collections (University of Chicago), courtesy of Dr. Matthew Dalton.* 66

Figure 17. United States Army Air Forces Trimetrogon mapping photography, captured July 5, 1944. *Provided courtesy of the National Archives and Records Administration (NARA / NACP), courtesy of Dr. Matthew Dalton.* 68

Figure 18. Corona satellite imagery of the Dakka region acquired in July 1963. *Provided courtesy of the National Archives and Records Administration (NARA / NACP), courtesy of Dr. Matthew Dalton.* 69

Figure 19. Roeder's plan of the Dakka Temple..... 78

Figure 20. Firth's plan of Dakka temple..... 79

Figure 21. The Geometric floorplan of Dakka temple developed in Revit based on Roeder's plan 81

Figure 22. Comparison of the generated floorplan in Revit and the floorplan of Reoder, including the Isometric view of the entire temple..... 82

Figure 23. The Internal spatial relations/circulations..... 83

Figure 24. The comparison between the photo of temple taken by Roeder's team and the reconstructed 3D model in Revit 84

Figure 25. The Chapel of Ergamenes with displaced elements 87

Figure 26. Chapel of Ergamenes: Roeder's photos vs. the Revit's 3D model. 89

Figure 27. The Sanctuary with displaced elements..... 98

Figure 28. The Sanctuary: Roeder's photos vs. the Revit's 3D model. 100

Figure 29. 1), 2)Roman Expansions around Chapel of Ergamenes- 3)The Lion-Headed Waterspout - 115

Figure 30. Roman Expansions: Western wall including Hidden Staircase..... 116

Figure 31. Roman Expansions: Eastern wall including Roman small Chapel Northern and Secondary Access Door 119

Figure 32. The generated North Facade of the Pronaos in Revit vs. Roeder's photos 130

Figure 33. The Internal space of Pronaos (the hypostyle hall) in Roeder photos vs.3D model in Revit 131

Figure 34. The generated column in Revit vs. The photo of the column of Dakka temple taken by Roeder 135

Figure 35. The Pylon: Eastern Pylon 143

Figure 36. The Pylons: Western Pylon 151

Figure 37. The Pylons: The Main Central gateway (in between the Pylons) 158

Figure 38. The North Face of the main Entrance gateway in 3D model vs. Roeder's photos ... 159

Figure 39. The South Face of the main Entrance gateway in 3D model vs. Roeder's photos ... 160

Figure 40. The Courtyard Well Basin *(Brunnen)* 165

Figure 41. Approach Infrastructure: 1) The Pylons' Approach/Foundation, 2) The northern portal threshold, 3) The Main stairs on the Northern portal..... 168

Figure 42. Current Location of Dakka temple in Aswan, Egypt. *Googlemaps.com* 176

Figure 43. The Coordinates of Dakka temple in https://earthexplorer.usgs.gov 177

Figure 44. The DEM of the area around Dakka temple..... 178

Figure 45. Importing the DEM from USGS into QGIS and controlling the Z elevations 179

Figure 46. Selecting a small portion of terrain close to Dakka temple..... 180

Figure 47. a) Contours and b) Vertices in QGIS on the selected area for preparing the terrain to import in Revit 181

Figure 48. The terrain of QGIS in Revit as the topography base around Dakka temple and positioning the temple On it..... 182

Figure 49. The Original Location of Dakka temple (Ed Dakke) on google maps and the distance from the current one..... 185

Figure 50. The generated Historical (20th century) DEM in QGIS..... 186

Figure 51. Importing the 3D model of Revit in QGIS and place it on its true position and coordinates over historical DEM 187

Figure 52. Different views of Dakka temple on its original location 188

Chapter 1:

Introduction

Chapter 1: Introduction

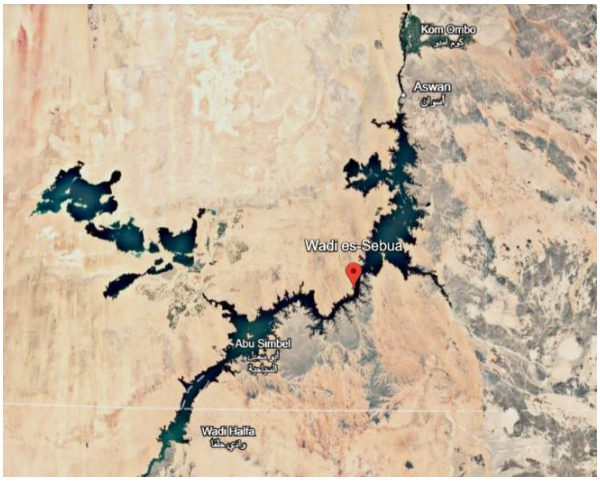
1.1 Research Background and Motivation

1.1.1 The Spatiality of Displaced Heritage: Physical Salvage vs. Landscape Severance

In the early years of twentieth century, hydrological working significantly changed the landscape of Lower Nubia:a narrow strip of fertile alluvial soil enclosed within the desert plateaus of the Nile valley. The building of the Aswan Low Dam (1902) and its subsequent heightening, followed by the reservoir of Lake Nasser behind the Aswan High Dam in the 1960s, led to the inundation of ancient settlements, agricultural lands and sacred geography. In this regional submergence context, historical monuments such as the Temple of Dakka *(Pselchis)* were totally harmed. International campaigns of salvage, under the authority of UNESCO, dismantled the temple stones and moved them to an artificial plateau at *Wadi es-Sebua*. But this physical rescue was at a significant spatial cost. The monument was preserved as a particular architectural artifact, forever displaced from its original alignment along the Nilotic axis and separated from the native communities whose daily lives gave it meaning. However, the Dakka temple was not the only one to displace; Removal of local settlements from their ancestral environment is a serious trauma to their life and natural communication they made over years with Nile riverbanks and surroundings, as cultural memory researchers point out. (Halbwachs, 1950/1980; Fernea “The Blessed Land” 1980, pp. 66–69; UNESCO Courier, Feb.–Mar. 1980, p. 12).

a)





b)

c)



d)



Figure 1. a) & b): The location of Wadi-es Sebua - c) The Current Location of Dakka Temple in Wadi_es Sebua – d) The original location of Dakka temple and its distance from the current location. [1]

[1] Earth.google.com – Google maps.com



Figure 2. The Temple of Dakka at Wadi es-Sebua. *Photo by Dennis G. Jarvis (Egypt-9A-106), licensed under CC BY.*

1.1.2 The Architecture of Translation: Built Geometry as an Anchor for Intangible Nubian Lifeworlds

This study takes into account the permanence of this landscape severance through digital architectural reconstruction not only as a technical exercise in the use of computer- but as an act of translation. Architecture is an important link between the physical stone construction and the intangible cultural heritage of the displaced Nubian diaspora. The digital space becomes an intermediary space, as a physical return to the flooded valley is no longer possible – a structured container where geometry becomes one of the elements of reclaiming the collective memory. This research investigates how built form can serve as a foundation of vanishing landscapes and regain the continuous relationship of past environments with future generations by embedding historical data and spatial patterns into a parametric model.

1.1.3 The Historical and Spatial Trajectory of the Dakka Temple *(Pselchis)*

The architectural history of Dakka is a complex outline of continuous adaptation over centuries. It first existed as a small sanctuary of the third century B.C.E. built by the Meroitic king Arqamani (Ergamenes II), and was gradually expanded by Ptolemaic kings and Roman emperors, who covered the earlier core with protective enclosures. The temple experienced considerable shifts in its life, from its deconsecrating and conversion into a Coptic church in late antiquity to its structural collapse and documentation by European expeditions in the early twentieth century. Understanding this multi-layered structure is critical to determining the baseline geometry of the monument prior to its twentieth-century displacement.

1.1.4 Digital Cultural Heritage: Reclaiming Collective Memory in Virtual Spaces

In an era where physical heritage has become increasingly vulnerable by environmental and geopolitical disruption, digital cultural heritage offers new ways for preservation and repatriation. However digital models need to move beyond becoming static visualizations or academic useless objects. This project aims to build an open and accessible digital repository using Historic Building Information Modeling (HBIM) and geographic information systems as a decentralized vector of collective memory for the Nubian diaspora and independent scholars to take part with, question and reside their displaced heritage.

1.2 Statement of the Problem

1.2.1 The Rupture of *Genius Loci*: The Spatial Consequences of the Aswan High Dam Inundation

The main problem dealt with in this research is the permanent loss of the *Genius Loci*_ the spirit and character of the place, caused by the creation of Lake Nasser (UNESCO Courier, Feb.–Mar. 1980, pp. 5–8). Although the Dakka Temple's stone blocks were physically saved and reconstructed at *Wadi es-Sebua*, the building's reciprocal relationship with its surroundings was destroyed when they were transferred into an artificial geography. This causes a crucial conservation dilemma: can the physical preservation of carved masonry represent true heritage responsibility when its ecological, spatial and community context is no longer existing?

1.2.2 The Analogue Archive vs. Spatial Reality: Metric Limitations and Fragmentation of 2D Documentation

The second problem is the nature of the primary source material. Our knowledge of the pre-inundation temple is largely dependent on the cautious, two-dimensional metric surveys of *Günther Roeder (Der Tempel von Dakke, 1930)* and *C.M. Firth (1915)* during their campaigns of 1909-1911. Such analog archives are invaluable but also fragmented, since they capture a monument already in structural decay and in serious danger of submersion. The methodology of translating flat paper drafts, hand-written measurements and historical photographs into a precise three-dimensional spatial reality demonstrates a considerable amount of methodological friction between historical ambiguity and the rigid requirements of modern parametric software.

1.2.3 The Technical Silo: The Separation of Architectural BIM Workflows from Regional Geospatial Contexts

Moreover, digital preservation nowadays is often under a severe technical silo: Architectural modeling tools (such as Autodesk Revit) are designed for modern construction in isolation, and geospatial tools (such as QGIS) are used at a regional level without internal architectural language. The digital workflows are repeating the historical mistake of isolating the building from its landscape by disconnecting the monument from its territory. A significant challenge of this

research is to overcome this software limitation and to create a coherent, bidirectional pipeline between architectural BIM and historical terrain reconstruction.

1.3 Research Objectives and Questions

1.3.1 Primary Objective: Generating a Semantic 3D Repository for Displaced Heritage

This research project aims at producing a comprehensive and conceptually complex 3D digital model of the Dakka Temple, including both the temple geometry and the landscapes in which it originally stood and to which it was later relocated. We also hope that this project will create a resource that will be accessible to future researchers and communities in a digital format.

1.3.2 Core Research Questions: *What, How, and Why Must the Spatial Identity of Dakka be Digitally Preserved?*

The research is organized around core questions that form the framework of the entire thesis in order to manage this investigation:

1. What is the architectural and archival baseline of the Dakka Temple and how do we reconstruct its physical reality accurately from the fragmented twentieth-century documentation (Roeder, 1930; Firth, 1915)?
2. How do we translate these analog metrics and historic terrains into a dynamic, mutually compatible digital workflow that combines HBIM and geospatial terrain modeling?
3. Why is this reconstruction necessary? How can a digital architectural model serve as an ethical container for collective memory?

1.3.3 Addressing the Digital Void: Can a 3D Reconstruction Carry Local Memory?

This research presents a critical methodological question: Is not a digital reconstruction also capable of automatically erasing the local memory? If poorly managed, a Historic Building

Information Modeling (HBIM) environment may turn into a cold, technical playground of geometric precision that reproduces the elite, top-down erasures of the past. To avoid this, the digital model has to be consciously designed not only as a visual simulation, but also as a dynamic anchor for the living memory. The model tackles the gap between the digital data and the lived, human experience of the monument by introducing custom metadata, archival notes and structural irregularities into the parametric database.

1.3.4 Defining the Stakeholders: *Whose Collective Memory and Which Community?*

These are important considerations: the objective of this preservation, the question of whose collective memory we are talking about, and whose community we are serving. This study is explicitly concerned with the displaced indigenous Nubian communities of Old Dakka *(Pselchis)* – the local population whose ancestors lived close to the temple for millennia, whose traditional mud-brick settlements (such as Birba and Dakka) were submerged by Lake Nasser, and whose traditional lifeworlds were destroyed by governmental displacement to areas such as *Kom Ombo* (Fernea, 1980, pp. 66–69; Johansson, 2014, pp. 24–25; UNESCO Courier, Feb.–Mar. 1980, p. 12).

This thesis analyzes the collective memory of this displaced diaspora, for whom the name of the temple signifies an original place of being that has to be reclaimed by means of open, accessible, spatial knowledge.

1.4 Methodology Overview: The Integrated Spatial Data Pipeline

1.4.1 The Archival Anchor: Synthesizing the 1913 Metric Records of Roeder and Firth

This methodology bases its foundation on the systematic synthesis of the architectural handbook *Günther Roeder's Der Tempel von Dakke (1930)* and archeological surveys C.M. Firth's *(The Archeological Survey of Nubia, Report for 1909–1910).* These primary records provide the precise

metric dimensions, block layouts and spatial sequences, such as the complex switchback pylon staircases, essential to frame the digital reconstruction in historical fact[2].

1.4.2 Parametric Reconstruction: Semantic Modeling and Intangible Metadata Embedding in Revit

The geometrical modeling process in Autodesk Revit has been challenged by the irregularities and non-vertical masonry profiles of the ancient temple. It addresses historical anomalies and structural gaps explicitly, avoiding the projection of an idealized software-native perfection on the architecture. Apart from that, custom shared parameters are embedded within the HBIM database that directly relate physical stone elements to Roeder's archival pages, chronological phases, and levels of certainty, which results in turning the model into a transparent, self-authorizing academic asset.

1.4.3 The Terrain Synthesis: Differentiating Modern Topographies from Photo-Reconstructed Historical DEMs

The workflow required to establish a dual-terrain environment to partially make up for the loss of the original setting. Modern baseline topographies derived from USGS (https://earthexplorer.usgs.gov/) digital elevation models are compared to a photo-reconstructed historical Digital Elevation Model (DEM) derived from archival aerial photography and historical lake-level data. This section also includes a simulation of the flooding around the temple and related hydrological changes in water level from the time of the construction of the Low Aswan Dam (about 1902) to the early 1960s (about 1963), before the relocation of the temple to *Wadi es-Sebua* under the supervision of UNESCO. The two settings in terrain _ modern vs 20th century, allows simulation of the historical phases of inundation, visually showing the progressive drowning of the Lower Nubian landscape, especially the Dakka temple, and the severance of the Nilotic axis.

[2] The epigraphic and decorative relief programs documented in Roeder's Tome II and other volumes are part of the cultural context of the site as a collective scholarly effort, but the main focus of the thesis is on the spatial geometry, construction chronology and landscape integration of the monument.

1.5 Significance, Scope, and Delimitations of the Study

1.5.1 Academic Value to Ptolemaic Architectural Typology and Digital Diaspora Studies

This research project will be beneficial to the wider fields of digital heritage, architectural history and diaspora studies, by demonstrating how advanced BIM and GIS workflows can be adapted for archeological reconstruction. It creates a reliable and reproducible methodology for recording monuments that have experienced environmental trauma and physical displacement by going beyond simple visual simulation.

1.5.2 Defining the "Sharing" Framework: Transnational Accessibility and Digital Repatriation

This project, accordance with the ethics of digital repatriation, refuses to store spatial data in proprietary, closed-source systems. The research emphasizes the importance of a transition workflow from proprietary .rvt formats to open source Industry Foundation Classes (IFC) and lightweight WebGL viewers and argues that the real democratization of heritage requires the removal of economic and technological barriers for the Nubian diaspora.

1.5.3 Delimitations and Bounds of the Reconstruction

The study is limited to the architectural core, pylon structures and its comparative regional landscape settings. The social history of Lower Nubia is fascinating, but the thesis focuses specifically on the spatial morphology of the temple structure and its hydrological environment as a primary vehicle for investigating collective memory.

1.6 Thesis Structure

Following this introductory section, **Chapter 2** provides the historical context through tracking the development of Lower Nubia's architecture and the consequences of dam construction in the twentieth century. **Chapter 3** presents the theoretical framework, exploring the intersection between tangible architecture, institutional preservation and collective memory. **Chapter 4** describes the methodological workflow including the practical steps of Revit modeling, metadata

embedding and terrain synthesis in QGIS. **Chapter 5** presents the spatial analyzes, the geometrical results and the hydrological simulations. In **Chapter 6**, the methodology is critically evaluated, with a focus on metric friction, software boundaries, and ethical issues in virtual heritage. Finally, **Chapter 7** brings together the research achievements, reviews key findings and proposes future horizons for open-access digital archeology, architectural assets and public engagement.

Chapter 2:

Historical Context and The Nubian Landscape

Chapter 2: Historical Context and The Nubian Landscape

2.1 The Sacred Topography and Architectural History of Lower Nubia

2.1.1 The Location of Nubia: Geography, People, and Regional Architecture

To understand the temple of Dakka, we have to look at the unique topography of Lower Nubia—a region the ancient Egyptians called *Wawat*, between the first and second cataracts of the Nile (Roeder, 1930, pp. 10–12). It is a narrow, corridor between the eastern and western deserts of Egypt in a hyper arid region acting as an environmental buffer zone between Egypt and sub-Saharan Africa.

The landscape consists of an in places narrow strip of fertile alluvial mud bounded tightly by sandstone cliffs and desert plateaus, intersected by historical inland caravan routes leading toward *Kalabsha* (Roeder, 1930, pp. 10–12). The environmental constraints supported human settlement across successive historical periods (Firth, 1915, pp. 3–5; Johansson, 2014, pp. 24–25). For millennia, indigenous groups—most prominently the sedentary Nubian C-Group and the semi-nomadic Medjay (Pan-Grave) cultures—constructed lifeworlds along these riverbanks, developing a distinctive regional architecture of circular semi-subterranean huts, stone-retained tumuli, and complex rock art (Firth, 1915, pp. 3–5).

The survival and spatial planning of these indigenous lifeworlds depended on the Nile's annual natural flood cycle which existed before all modern hydrological construction. Before the Aswan dams were built, the river was predictable, life-giving, and followed a seasonal cycle. Each autumn the summer monsoon rains brought a huge amount of water and rich, organic silt down the Nile valley from the Ethiopian highlands, flooding the narrow alluvial strips of Lower Nubia (Firth, 1915, pp. 3-5; Roeder, 1930, pp. 10-12).

The Rhythms of the Nile: The Pre-Industrial Natural Inundation Cycle:

This annual inundation, far from being a harmful catastrophe, was the primary engine of the economic continuity. The floodwaters supplied water to the high banks and left layers of rich sedimentary soil *(sebakh)* on the agricultural plains around settlements such as Dakka and Birba (Firth, 1915, pp. 3–5). When the floods subsided, the local communities planted their crops into the newly prepared soil. Their agricultural seasons, settlement patterns and ritual architecture were

all organized according to the rhythm of the river (Firth, 1915, pp. 3-5; Johansson, 2014, pp. 23-26). This deep and ancient integration with the natural movement of the river is reflected in the orientation of monuments such as the Dakka Temple along the north-south Nilotic axis, a dynamic equilibrium that was only permanently broken when the dams of the twentieth century turned the seasonal river into an unchanging and long-term reservoir (Johansson, 2014, pp. 23–26; UNESCO, 1960, p. 2).

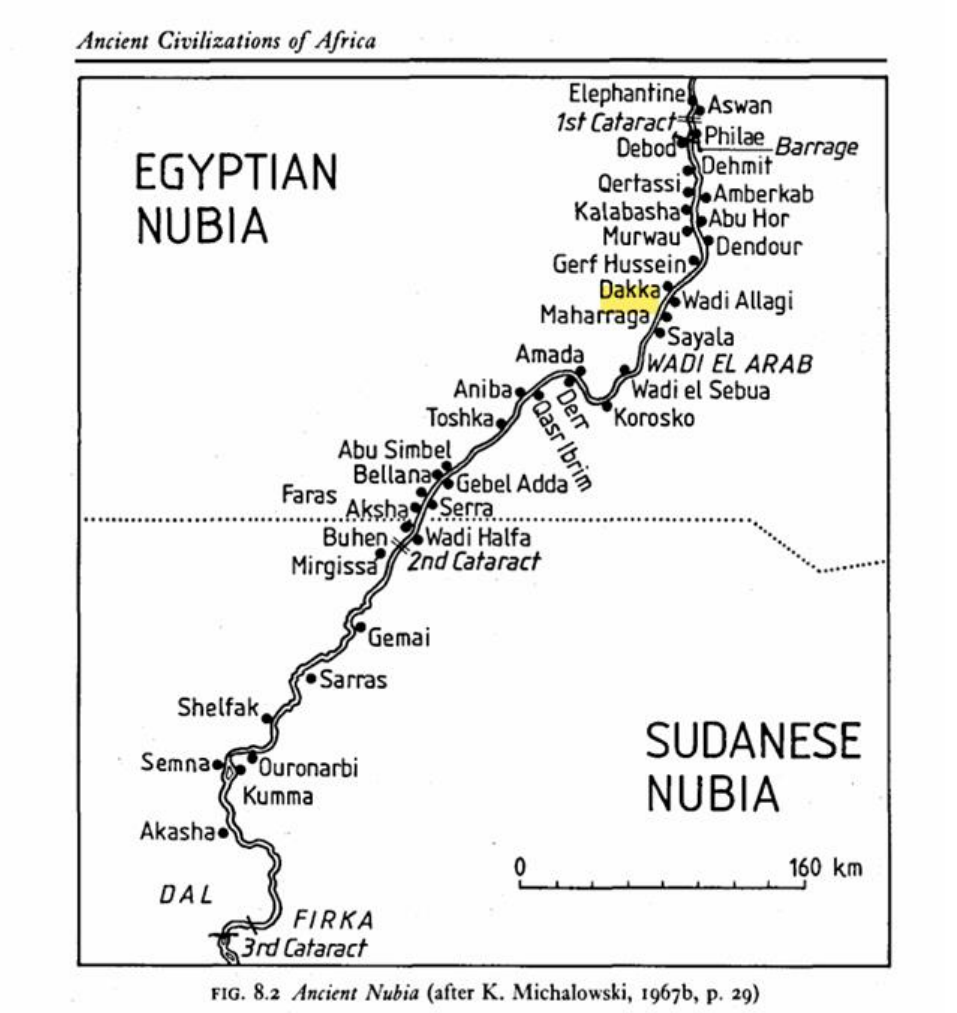


FIG. 8.2 *Ancient Nubia* (after K. Michalowski, 1967b, p. 29)

Figure 3. Ancient Nubia (after K. Michalowski, 1967b, p. 29). *Volume II of the UNESCO General History of Africa ("Ancient Civilizations of Africa")*



Figure 4. The Temple of Dakka in 1838, *watercolor and lithograph by the Scottish painter David Roberts during his travels in Egypt and Nubia in 1838, and later published around 1842–1849*

2.1.2 Chronological Construction: The Pharaonic Origins and Ptolemaic-Roman Expansions of the Dakka Temple *(Pselchis)*

The architectural history of Dakka—known anciently as *Pselkis* or *Pr-Srqt* (The House of the goddess Selket)—is a story of continuous structural expansion across Pharaonic, Meroitic, Ptolemaic, and Roman control. Although the temple is best known for its building phases during the Hellenistic Period, architectural clearance of early 20th-century documentations and during relocation campaigns of the 1960s, revealed physical evidence of an earlier New Kingdom[3] presence (ca. 1500-1200 BCE). Reused stone blocks bearing the cartouches of Thutmose III, Seti I, and Merneptah were found embedded within the later foundations (Roeder, 1930, pp. 13–15).

[3] Günther Roeder (1930) — New Kingdom Architectural Footings: The structural details regarding the hidden stone blocks of Thutmose III, Seti I, and Merneptah found beneath the later northern extensions are recorded in *Tome Premier (Texte), Seite 13–15 (§ 18–23)*

The site experienced architectural rebirth during the third century BCE. The Meroitic king Arqamani (Ergamenes II), built a small, elegant core chapel dedicated to Thoth of Pnubs, defining the initial spatial axis and cosmic East-West orientation of the sanctuary (Roeder, 1930, pp. 50–60). This indigenous Nubian shrine was quickly expanded upon by a succession of Macedonian-Egyptian rulers. Ptolemy IV Philopator built a monumental, pylon-like gateway directly in front of Arqamani's chapel, turning the site into a layered architectural dialogue. Later, Ptolemy IX Euergetes II added a spacious vestibule, or pronaos, which further pushed the temple axis northward and framed the façade with elegant, leaf-sheaf capitals (Roeder, 1930, pp. 50–60).

When the Roman Empire annexed Egypt, the emperors Augustus and Tiberius completed the structural sequence. They enclosed the rear shrine within a massive sandstone perimeter, integrating an *adytum* (sanctuary) and internal passageways into a standardized imperial layout. Each successive phase extended the physical footprint of the site, embedding distinct political and religious architectural styles into the stone fabric of *Pselkis.*

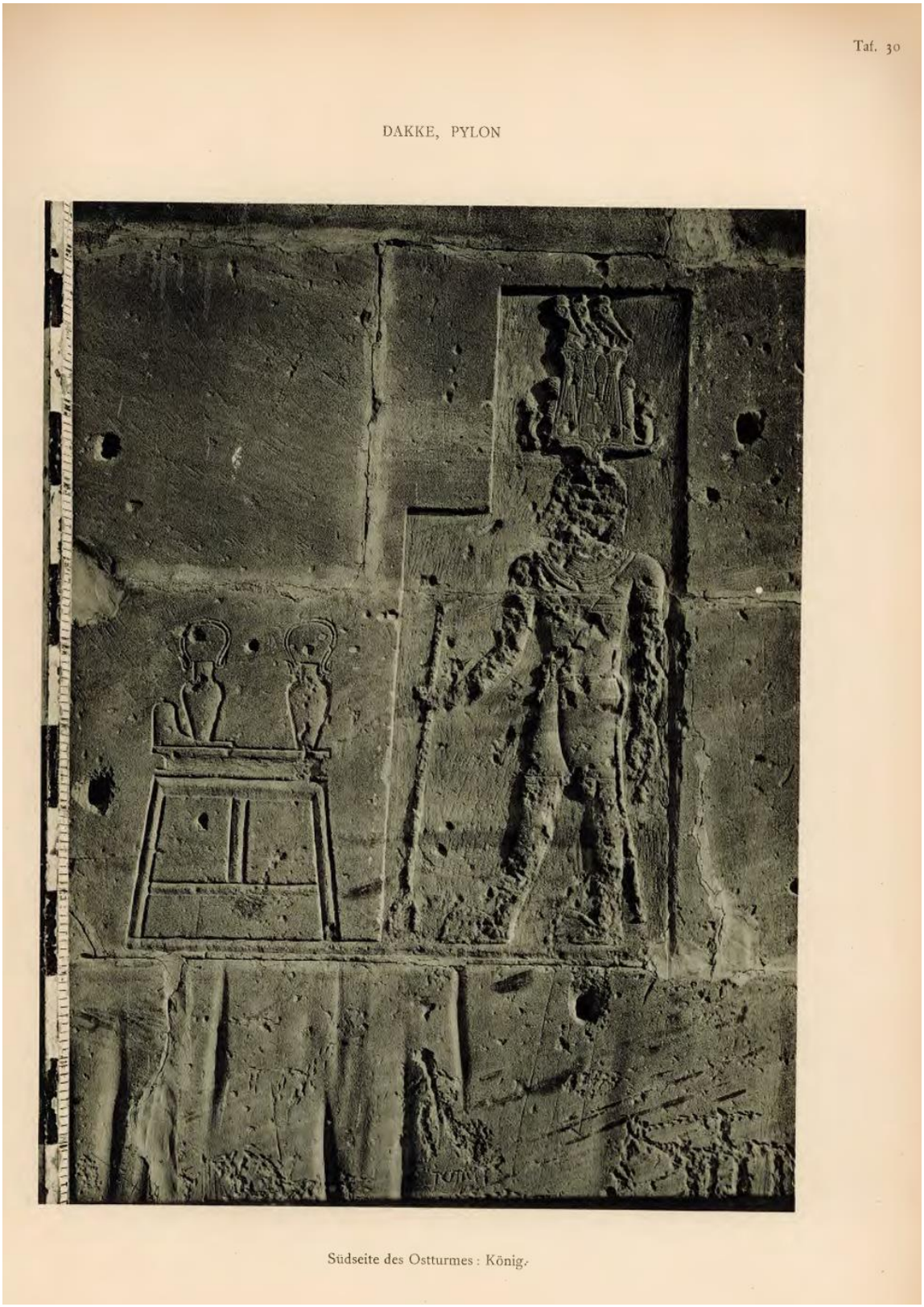


Figure 5. South Site of the East Pylon: King. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 30*

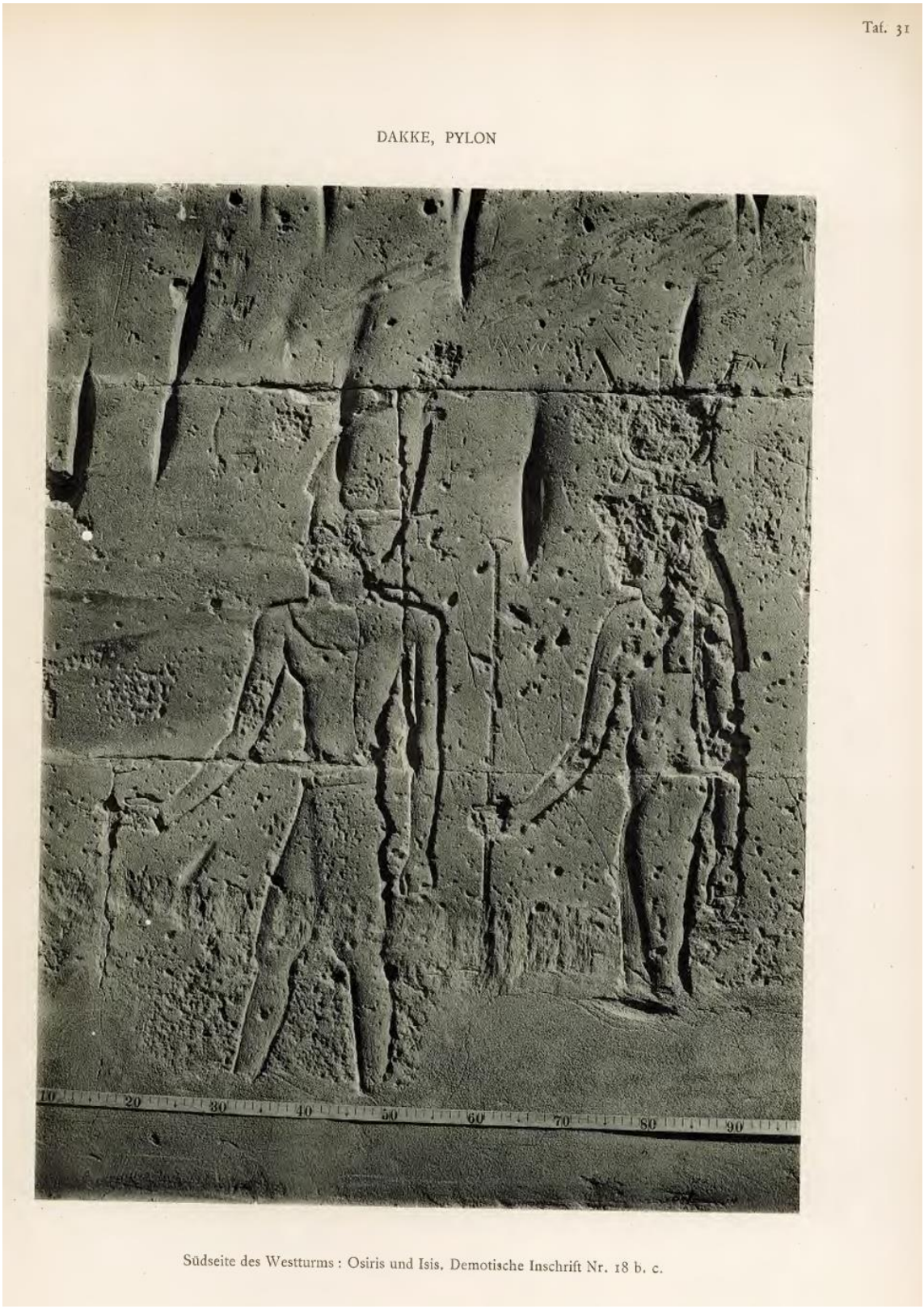


Figure 6. South side of the West Pylon: Osiris and Isis. Demotic inscription no. 18 B.C. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 31*



Figure 7. East Half of Pronaos Façade. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 41*

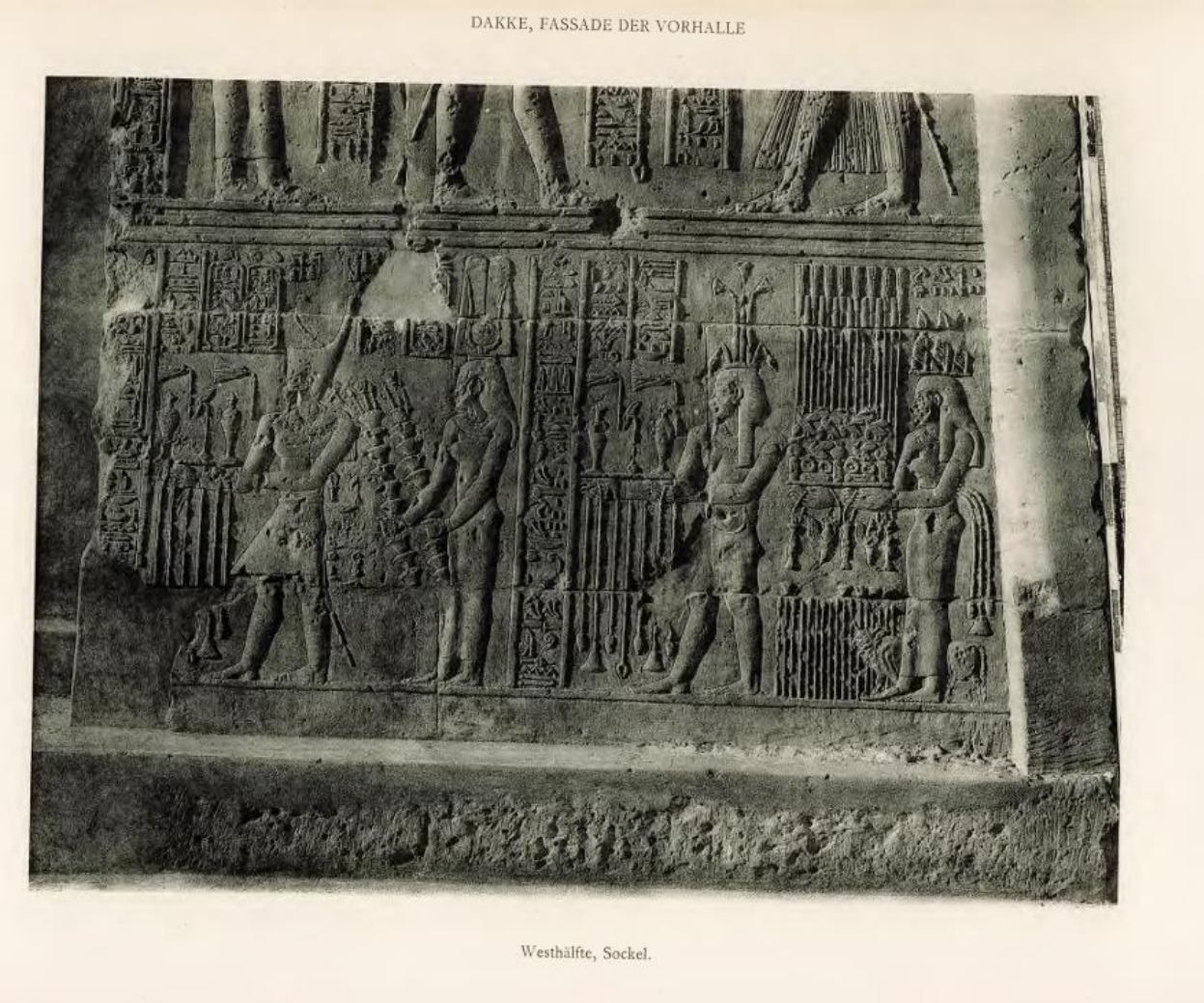


Figure 8. West Half base of Pronaos. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 44*



Figure 9. The Ptolemic Gate in Querrum- a)at the Western gatepost - b)at the Eastern gatepost. *Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol II, Taf. 68*

2.1.3 The Core Focus: The Foundation and Spatial Evolution of the Dakka Temple *(Pselchis)*

At the heart of our spatial analysis is the original architectural kernel of the monument: the chapel built by King Arqamani. To understand how the temple functioned, we have to look at its underlying spatial syntax. Originally, Arqamani's chapel was a self-contained, modest sanctuary constructed from a local *rötliches hellbraun* (reddish light brown) sandstone (Roeder, 1930, pp. 50–60)[4]. It featured a highly specific, linear axial flow with an entrance facing the Nilotic north[5] and an offering exit leading south. The walls were covered in detailed carved reliefs depicting the Nubian king offering to Thoth and Isis, establishing a clear cosmic division where Thoth claimed the western half of the space and Isis held the eastern domain (Roeder, 1930, pp. 50–60). With the construction of the gateway right in front of the chapel by Ptolemy IV, the open-air offering space was converted into a layered sequence of rooms. By the end of construction of the Roman additions and extensions, the original chapel became enclosed within the expanding temple structure (Roeder, 1930, pp. 50–60). Movement through the complex progressed from the open, illuminated public spaces of the Ptolemaic *pronaos* through the narrow passageways of the Ptolemaic-Roman cross-chambers, ultimately arriving at the core sanctuary. This spatial progression follows the typical axial layout characteristic of Egyptian temples from the New Kingdom onward, and is particularly well-preserved in monuments of the Hellenistic Period.

2.2 Post-Temple Transformations: Re-appropriation, Closure, and Adaptation

2.2.1 The De-Consecration Phase: The Spatial Alterations of the Christian and Early Islamic Eras

The life of the Dakka temple did not end when the ancient cults faded; instead, the monument underwent a phase of spatial re-appropriation. Around the sixth century CE, as Christianity swept

[4] *Günther Roeder (1930) — Chapel of Arqamani (Ergamenes II):* For the precise spatial layout, dimensions, and the cosmic East-West orientation of the reliefs between Isis and Thoth within the core shrine, see *Tome Premier (Texte), Seite 50–60 (§ 107–124)*

[5] "Nilotic North" refers to local cardinal alignment dictated by the flow of the Nile River rather than true magnetic north. Precisely, the entrance aligned with the local riverine north (the Nile axis).

southward through the Nile Valley, the sanctuary was formally de-consecrated and converted into a Coptic church. This transition involved structural and visual alterations to the ancient space. Coptic monks and local worshippers coated the detailed Pharaonic and Ptolemaic high-reliefs with a thick layer of white lime plaster and lime-trowel stucco. Over these ancient images of gods and kings, they painted vibrant, polychrome Byzantine-style frescoes of Christian saints, angels, and red Coptic-crosses (Roeder, 1930, pp. VII–VIII, 7–9)[6].

The structural fabric itself was changed to accommodate the new liturgy. To create a layout suitable for a Christian basilica, new openings were inserted into the masonry through the solid stone: In the pronaos, an entire door was cut through the western intercolumnar screen wall, while a window was placed in the eastern screen, altering the original architectural symmetry (Roeder, 1930, pp. 7–9). By the fourteenth century, as Islam gradually replaced Christianity as the dominant religion force in Lower Nubia, the space was adapted once more. The Christian liturgical furnishings and plaster layers were gradually eroded, and the building was occasionally used for local habitation and shelter (Firth, 1915, pp. 3–5; Roeder, 1930, pp. 7–9). Rather than destroying the monument, these successive religious eras physically layered their own beliefs onto the stone, converting the pagan temple into an archive of Nubian cultural and historical transitions.

2.2.2 The Early-Modern State: Structural Conditions and Observations by 19th and Early 20th-Century European Expeditions

By the early nineteenth century, when the first European expeditions began to record monuments beyond the First Cataract, the temple of Dakka stood in a state of advanced deterioration. Centuries of desert winds had driven sand down from the Libyan plateaus, burying the lower portions of the structure and choking the open courts. Early travelers like Frédéric Cailliaud (1822) and the French-Tuscan expedition under Champollion (1829) found the monument structurally compromised but visually stunning, still framed by its ancient mud-brick enclosure walls (Larson,

[6] In *Günther Roeder's (1930), Der Tempel von Dakke, Tome Premier (Texte)* document, the structural modifications, plastering, and Christian reuse of the pronaos/vestibule are detailed in *Vorwort, Seite VII–VIII* and *Seite 7–9 (§ 6–8)* (under the section covering structural interventions and post-pharaonic modifications).

2006, p. 4; Roeder, 1930, pp. V–VII)[7]. However, the structural integrity of the temple deteriorated rapidly over the course of the century. In the late autumn of 1896, a severe desert storm caused the entire western half of the Ptolemaic pronaos to collapse (Roeder, 1930, pp. 7–9). By the time Gaston Maspero conducted an official inspection in January 1905, the eastern half had come down as well, leaving nothing standing north of the Ergamenes chapel except the isolated gateway of Ptolemy IV (Roeder, 1930, pp. 7–9)[8].

Systematic architectural documentation of Dakka began in the winter of 1909–1911, when the German Egyptologist Günther Roeder arrived to conduct an exhaustive, stone-by-stone architectural survey. Working under the immense pressure of the impending second heightening of the low Aswan Dam—a hydrological development discussed further in Section 2.3.1—Roeder's mission was essentially a race against time. He encountered a monument in mid-collapse, partially choked by sand and actively threatened by rising water (Roeder, 1930, pp. V–VII). Roeder's approach was radically different from the romantic sketches of his predecessors; he brought a surveyor's precision to the site, systematically numbering blocks measuring internal chambers, and meticulously drafting the complex switchback logic of the pylon's internal staircases. His resulting two-volume monograph, *Der Tempel von Dakke (1930)*, captured the spatial reality of the temple at a critical moment of vulnerability—after the structural collapses of the late 19th century, but just before a team led by Alessandro Barsanti arrived to stabilized the fragile foundations using structural cement (Roeder, 1930, pp. VII–VIII, 7–9)[9].

Concurrently, C.M. Firth and the Archaeological Survey of Nubia were recording an eroding landscape that was being impacted both by man and nature. The local farmers who were engaged in digging up the *sebakh*—a layer of nitrified organic matter rich in fertilizers for their crops—were busy excavating the ancient mud-brick ruined town and the foundation of the temples (Firth,

[7] *John A. Larson (2006) — Lost Nubia: A Centennial Exhibit of Photographs, Page 4 (Photograph 2)* for original architectural context and early twentieth-century environmental views of the pylon and sand drifts. Supplemented by *Günther Roeder (1930), Vorwort, pp. V–VII* for historic descriptions of sand drifts and early traveler accounts.

[8] *Günther Roeder (1930) — Der Tempel von Dakke, Tome Premier (Texte), pp. 7–9 (§ 6–8)* detailing the precise timeline of the 1896 storm, the total collapse of the vestibule by 1905, and Maspero's inspection.

[9] *Günther Roeder (1930) — Der Tempel von Dakke, Tome Premier (Texte), Vorwort, pp. VII–VIII and pp. 7–9 (§ 6–8)* for Alessandro Barsanti's subsequent use of cement stabilization and structural footings.

1915, pp. 3–5)[1] . Firth and his crew were removing the heavy sands that covered the Roman custom house and huge amounts of broken amphorae found north of the pylon (Firth, 1915, pp. 25–26, 34–37). Together with Roeder's architectural surveys, these early twentieth-century documentation campaigns provided the final empirical baseline of the site prior to mid-twentieth-century industrial engineering projects (Firth, 1915, pp. 3–5; Roeder, 1930, pp. V–VII).

2.3 Modern Severance: The Trauma of Displacement and the Loss of *Genius Loci*

2.3.1 The Impact of the Low and High Aswan Dams on the Lower Nubian Valley

Before we proceed with the massive structural and environmental changes of the twentieth century, a crucial distinction must be clarified: the disaster of the region was not the annual movement of water, but the artificial regulation and permanent trapping of water. For thousands of years, the Nile's natural annual inundation was a nourishing, circular rhythm. Every fall, the river rose in a predictable way, spreading nutrient-rich silt across the alluvial plains and watering nearby settlements naturally. The river then calmed down, farming and people live in harmony with nature (Firth, 1915, pp. 3–5; Johansson, 2014, pp. 23–26)[1] . [1]

The beginning of the twentieth century marked the fundamental transformation of the Lower Nubian landscape. First came the building of the Aswan Low Dam in 1902 and then the subsequent elevation of the structure in 1912 and 1934, initiated a regime of artificial water storage that altered the local ecosystem. Alluvial plains at Dakka, cultivated over centuries, were submerged beneath reservoir waters for several months each year. The soft sandstone of the temple was exposed to seasonal waterlogging and salt crystallization, accelerating the degradation of unrecorded reliefs and inscriptions (Roeder, 1930, pp. 10–12).

It reached its culmination point in the 1960s when the Aswan High Dam was constructed. As a result, Lake Nasser formed—an enormous and permanent body of water that engulfed the entire ancient valley of Lower Nubian Nile. Slow-moving sections of the river were now covered by a

[1] C. M. Firth (1915) — *The Archæological Survey of Nubia: Report for 1909–1910*, Part I, pp. 3–5 (for *sebakh* digging, destruction of mud-brick walls, and agricultural practices) and pp. 25–26, 34–37 (for Roman custom house and amphorae deposits).

[1] This distinction has been emphasized clearly in the related references mentioned in the texts.

lake of more than 500 kilometers of length (Johansson, 2014, pp. 23–26). In this context, the total drowning of the valley in Lake Nasser spelled a final death knell of Dakka's geography. Plains, channels of ancient wadis, and natural hillocks of sandstone—which had historically governed the spatial organization of the settlement and its surrounding cemeteries—were now submerged by water for several meters (Roeder, 1930, pp. 10–12; Johansson, 2014, pp. 23–26).

2.3.2 The Physical Relocation: Deconstruction, Displacement to *Wadi es-Sebua*, and Loss of the Nilotic Axis

In reaction to the approaching flood of the High Dam, there was a great effort made on behalf of the world to salvage the cultural heritage of Lower Nubia (Johansson, 2014, pp. 23–26). Already in 1908–1909, Alessandro Barsanti had begun the first phase of stabilizing Dakka and re-erection of the pronaos' fallen walls, which he had reinforced with structural cement casing of the damaged foundations (Roeder, 1930, pp. VII–VIII, 7–9). But permanent conservation needed a totally different approach—complete relocation.

In the 1960's, the temple of Dakka was disassembled stone by stone under the UNESCO salvage framework. Before the UNESCO campaign, Dakka stood at an original ground elevation of +110 meters above sea level (UNESCO, 1960, A Common Trust, p. 32; UNESCO Courier, Feb.–Mar. 1980, p. 14). Following the early heightening of the original Aswan Dam, the sanctuary was subjected to periodic submersion for most of the year, emerging only during brief windows between July and August when the dam gates were opened (UNESCO, 1960, A Common Trust, p. 32). With the impoundment of Lake Nasser behind the High Dam, the site faced permanent submersion beneath the projected reservoir level of +182 meters (UNESCO, 1960, A Common Trust, pp. 2, 8, 32; UNESCO Courier, Feb.–Mar. 1980, pp. 5, 14).

In the same years, Under the framework of the UNESCO International Campaign, the Egyptian Antiquities Service assumed direct technical and financial responsibility for dismantling, transporting, and reassembling the Temple of Dakka between 1962 and 1963 (UNESCO, 1982, A Triumph of International Solidarity, p. 18; UNESCO Courier, Feb.–Mar. 1980, pp. 8, 14). The temple was disassembled stone by stone (UNESCO, 1982, A Triumph of International Solidarity, p. 18; UNESCO Courier, Feb.–Mar. 1980, pp. 8, 14). The physical salvage operation required the systematic deconstruction of the pylon, pronaos, and inner chambers (UNESCO, 1960, A Common

Trust, p. 12). As recorded in early architectural surveys, the structure had been built over successive historical phases, incorporating reused sandstone blocks from earlier New Kingdom structures erected under Thutmose III, Seti I, and Merneptah (Roeder, 1930, Tome Premier, pp. 13–15, §§ 18–23; Larson, 2006, p. 4). The dismantling process allowed archaeologists and epigraphists from the *Centre of Documentation and Studies on Ancient Egypt* (CEDAE) to record and extract these earlier Pharaonic blocks before the masonry was transported (UNESCO, 1960, A Common Trust, pp. 2, 12, 18; UNESCO Courier, Feb.–Mar. 1980, pp. 8, 14).

Sandstone parts were taken to the new artificial location, 150 km south of Aswan, close to Wadi es-Sebua and reconstructed at an elevation high enough (+182m) to be safe from the floods of the Lake Nasser (UNESCO, 1982, A Triumph of International Solidarity, p. 18; UNESCO Courier, Feb.–Mar. 1980, p. 14, Johansson, 2014, pp. 23–26). Although this technical solution prevented destruction of the stone itself, it severed the monument from its original environmental and spatial context.

In its original setting on the west bank of the Nile, the temple was carefully aligned along a **Nile-North axis**, interacting directly with the geography of the Nile valley and the inland caravan routes extending toward *Kalabsha* and leading through *Wadi Allaqi* toward the gold mines of the Eastern Desert (Firth, 1915, Part I, pp. 3–5; Roeder, 1930, Tome Premier, pp. 10–12, §§ 9–17; UNESCO, 1960, A Common Trust, map p. 1; UNESCO Courier, Feb.–Mar. 1980, p. 34). The temple's pylon opened onto the Nile river, acting as a threshold linking the waterways of the Nilotic region with the innermost sanctuary of the temple (UNESCO, 1960, A Common Trust, p. 12). In the relocated setting at Wadi es-Sebua, the temple was reconstructed within an entirely artificial geography that lacked any connection to the original hydrology and geography; the considered communication between built geometry and the natural Nubian landscape was split permanently (Firth, 1915, Part I, pp. 3–5; Johansson, 2014, pp. 23–26; UNESCO, 1982, A Triumph of International Solidarity, p. 18; UNESCO Courier, Feb.–Mar. 1980, p. 14)

2.3.3 The Human Disruption: The Forced Migration and Scattered Settlements of Local Nubian Communities

The spatial separation of the Dakka landscape cannot be judged in terms of architectural stones alone; it was a tragic experience of displacement of an entire population (UNESCO Courier (Feb–

Mar 1980, p. 12; A Triumph of International Solidarity (1982), p. 8). Filling up of Lake Nasser[1] required total relocation of over 100,000 indigenous Nubians from their traditional villages of Birba and Dakka (UNESCO Courier (Feb–Mar 1980, p. 12; A Triumph of International Solidarity (1982), p. 8). These settlements shared a very strong connection with the place and carried within them a very distinct social system, architectural form, and agricultural practices that were entirely suited to the Nile environment. This relocation process was carried out between 1963 and 1964, directly preceding the impoundment of the reservoir and the diversion of the Nile at Aswan in May 1964 (Johansson, 2014, pp. 24–25; Fernea, 1980, p. 66; UNESCO Courier, Feb.–Mar. 1980, p. 12).

The displacement projects carried out by the Egyptian and Sudanese governments destroyed this continuity totally. The people of the Egyptian Lower Nubian area of Dakka were forcibly resettled further north into state-made villages in the relatively dry area of Kom Ombo (Johansson, 2014, Chapter 1, pp. 24–25; Fernea, 1980, p. 66; UNESCO Courier, Feb.–Mar. 1980, p. 12). Families were deprived of their birthplace, their palm trees, and their access to the Nile river, and were resettled into crowded, cement-block villages which were not connected to their native environment at all (UNESCO Courier (Feb–Mar 1980) p. 12, 66-69). This displacement resulted in a severe cultural shock experience. The environment of Dakka was now under water, and the living culture, which was the true guardian of the memory of the land, was dispersed into an alien environment, thus the heritage of the past was separated from the living generation of the present (Johansson, 2014, pp. 24–25; Fernea, 1980, pp. 66–69; UNESCO Courier, Feb.–Mar. 1980, p. 12)

2.3.4 The Conservation Dilemma: Critically Questioning *What, How, and Why* Heritage Should Be Preserved in the Dakka Region

With the architectural salvaging of Dakka, we confront a fundamental epistemological question about preservation that is central to heritage management today: what exactly are we preserving by saving this monument? This UNESCO international preservation project of the 1960s functioned within a Eurocentric tradition which valued the materiality and tangibility of stone architecture more than the intangibilities of the landscape and the community (Johansson, 2014, pp. 23–26; UNESCO Courier, Feb.–Mar. 1980, p. 12). In lifting the temple out of its natural

[1] Nile Diversion Date (May 14, 1964); *UNESCO Courier (Feb–Mar 1980), p.8*

context and transporting it to an outdoor museum, the preservation project saved the artifact while losing the spatial context, the original orientation, and the community who gives the meaning to that monument (Johansson, 2014, pp. 23–26). This creates a fundamental paradox of conservation practices.

As Alessandro Barsanti restored the temple *in situ* early in the twentieth century (Roeder, 1930, Tome Premier, Vorwort, pp. VII–VIII; pp. 7–9, §§ 6–8), he used heavy layers of cement on the ancient stone foundations in order to keep it from collapsing structurally. Although his technique kept the walls standing, he also covered up important archaeological information about the ancient masonry and evidence for the older structure dating to the New Kingdom (Roeder, 1930, Tome Premier, pp. 13–15, §§ 18–23; UNESCO, 1960, A Common Trust, p. 12).

We need to raise some ethical questions about this practice: Is the construction of an engineered tourist attraction at an alternative location a successful act of conservation, or is it nothing more than architectural taxidermy, where only the skin is preserved but not the actual context? It would be impossible to recreate the stones of the Dakka landscape without raising the issues associated with this historic process, which involve documenting the disappearance of the Nilotic axis as well as the relocation of the local community (Firth, 1915, Part I, pp. 3–5; Johansson, 2014, pp. 23–26). Otherwise, our digital heritage would become just another tool used to rewrite the Nubian history.

Chapter 3:

Theoretical Framework and Archival Anchors

Chapter 3: Theoretical Framework and Archival Anchors

3.1 The Object of Preservation: Intersecting Tangible and Intangible Heritage

3.1.1 Defining the Baseline: Archival Evidence from the Roeder and Firth Documentation

When we look at what remains of the Dakka temple today at its relocated home in Wadi es-Sebua, we are not looking at the monument in its true archaeological context. Instead, we are looking at a modern engineering puzzle reassembled in the 1960s. If we want to find the true structural and spatial reality of the temple before it was uprooted, we have to look closely at the archival records left behind by Günther Roeder and C.M. Firth during their intense 1909–1911 campaigns. Roeder's survey provided a systematic metric record. Working under the impending impact of the low Aswan Dam's second heightening, Roeder measured and numbered the sandstone blocks, creating an unparalleled record of a building experiencing advanced structural deterioration (Roeder, 1930, Tome Premier, § 3–5, pp. 4–7; Tome Second, Blatt 2–5). For instance, his explicit tracking of the internal switchback staircase in the pylon—which climbs strictly from South to North after making a sharp 90-degree turn from the West-East first flight—gives us the exact geometric parameters needed to build a parametric model today (Roeder, 1930, Tome Premier, § 3–5, pp. 4–7).

Firth's stratigraphic work for the Archaeological Survey of Nubia captured the surrounding landscape while it was being destroyed (Firth, 1915, p. 4, Section III). He documented the massive piles of broken amphorae just north of the pylon and tracked how local farmers were digging up *sebakh* to use as fertilizer, literally melting the temple's contextual landscape away (Firth, 1915, p. 4, Section III; pp. 34–37). These documents are not passive history sheets. They are the metric anchor for our entire reconstruction. They hold the precise, stone-by-stone layout of the Ptolemaic core and Roman extensions before modern concrete and tourism altered the monument's skin forever (Roeder, 1930, Tome Premier, § 3–5, pp. 4–7; Firth, 1915, p. 4).

3.1.2 Defining the Memory: *Whose History is Preserved in the Dakka Region?*

There is a quiet conflict built right into the stones of Dakka. If you walk through the temple using only the official colonial or state-led histories, you get a very specific narrative: a story of Meroitic kings like Arqamani making peace or war with Ptolemaic Pharaohs, followed by Roman emperors like Augustus stamping their imperial bureaucracy into the sandstone. This is the history of the elite, the conquerors, and the state. But this focus leaves us with a massive historical blind spot; *What about the people who actually lived around these stones for millennia?* The indigenous Nubian communities—the descendants of the C-Group, the Pan-Grave cultures, and the later Christianized and Islamized populations—did not view Dakka as a dead museum piece. For them, the temple was merged into the fabric of daily life. When Coptic monks plastered over the pagan reliefs in the sixth century to paint Byzantine frescoes, or when later generations used the internal chambers for shelter, they were layering their own lived experiences onto the architecture.

By asking whose history we are preserving, we expose a deep imbalance. The international salvage campaign saved the Pharaonic and classical architecture because it fits a Eurocentric ideal of global antiquity. But in doing so, they almost entirely erased the local memory of the landscape. Our digital reconstruction cannot just be a vehicle for imperial geometry; it has to serve as a container for these suppressed, local layers of identity.

3.1.3 The First Principles of Collective Memory: Architecture as the Container of Vanishing Landscapes

In order to fully realize why reconstructing the digital version of Dakka would make sense, one must consider the way human memory works. According to Maurice Halbwachs, collective memory cannot be some abstract thing floating in the mind of any individual; it needs its physical containers and a spatial anchor (Halbwachs, M. (1950/1980) The Collective Memory. New York: Harper & Row) Architecture represents a physical container of the collective identity of a community. Separating people from their physical environment inflicts serious trauma on their collective memory (Halbwachs, 1950/1980; Fernea, “The Blessed Land” 1980, pp. 66–69; UNESCO Courier, Feb.–Mar. 1980, p. 12).

The temple of Dakka can be thought of as a spatial mnemonic machine. Its alignment along the Nilotic axis, its position where the desert trade routes intersect, its location next to the river banks

– all of these factors established the monument as an active spatial node inextricably woven into Nubian social and cultural life (Firth, 1915, pp. 3–5; Roeder, 1930, Tome Premier, pp. 10–12, §§ 9–17). In flooding the whole valley with the construction of the Aswan High Dam, it was not only the stone buildings that were flooded, but a physical container of the collective memory of this community was erased from existence (UNESCO, 1960, p. 2; UNESCO Courier, Feb.–Mar. 1980, pp. 12, 66–69). Without the physical space where it belongs, the stories, traditions and language associated with this environment become homeless. Rebuilding this spatial syntax with the help of digital technologies is more than recreation: it is an attempt to restore a broken physical container where this vanishing memory can find a home once again.

3.1.4 The "Inseparable Matrix": *How Does the Reciprocal Relationship of Structure and Landscape Relate to Cultural Heritage?*

In a framework such as Dakka, structure and the landscape are deeply and mutually meaningful, you cannot understand the structure without the landscape, and vice versa. This unique and unavoidable relationship is the essence of an original cultural heritage. The landscape is characterized by the Nile River and the important fact of its flow as a fundamental basis for the construction of such a monument (Roeder, 1930, pp. 10-12). The internal spatial syntax of the temple also relates to the natural qualities of its surrounding environment (Roeder, 1930, pp. 50–60). Additionally, apart from the river, the temple's building material came mainly from the nearest local geology around the site, taking advantage of the local sandstone of the desert plateaus (Roeder, 1930, pp. 10-12). How could we not promote this profound natural connection in such historical investigations?

This raises the subsequent question, and a very important one at this point: How can the cultural heritage be relevant in this dual relationship of structure and landscape? Culture is not a mere abstraction. It is the lived knowledge of a people and a settlement's strong recognition of this dual connection (Fernea, 1980, pp. 66-69). People in a community remember stories by being aware of the place they live, which is also connected by a temple with a long and multilayered history (Halbwachs, 1950/1980; Roeder, 1930, pp. 13–15). The historical evolution of the Dakka Temple is a real heritage, where one can see tangible traces of kingdoms, eras and religions coming and

going (Roeder, 1930, pp. 7-9). A landscape having such a structure has an unbreakable conjunction with it.

As has been said, the annual flood was a fact of life in this particular place (Firth, 1915, pp. 3–5). The local population was not only fully aware of this hydrological rhythm, but also they fully adapted their daily life, survival strategies and agricultural methods to it. Even the ancient kings built the sanctuary with complete understanding of this dynamic (Firth, 1915, pp. 3-5; Roeder, 1930, pp. 50-60). So this heritage is embedded deeply in the culture of the daily life, and this culture is the inheritance of both people and environment of Dakka (Fernea, 1980, pp. 66–69; Johansson, 2014, pp. 23–26). In fact, this is the logic behind why structure and environment are inseparable and why they can never be separated from the definition of authentic cultural heritage.

3.2 The Mechanics of Preservation: Institutional Responses vs. Indigenous Realities

3.2.1 State-Led and International Interventions: The Roles of the Egyptian Government, the UNESCO Campaign, and Western Alliances

The rescue of Lower Nubia in the 1960s is often viewed as a success of world cooperation. And structurally it was fantastic. Faced with the permanent rising waters of Lake Nasser, flooding hundreds of kilometers of territory in Egypt and 180km of Sudanese territory (A Common Trust, The Preservation of the Ancient Monuments of Nubia, p. 2 and repeated in Save the Treasures of Nubia, Part One, p. 3), the Egyptian government, together with UNESCO and a vast association of Western allies, launched an extraordinary engineering campaign. They tore apart the ancient temples like giant modular jigsaw puzzles, removing away thousands of tons of antique sandstone and lifting them up to artificial plateaus like the new site at *Wadi es-Sebua*. But if we look beyond the mid-century geopolitical stories, we can see the deeply interconnected and fractured machinery that drives this intervention.

A system of government-sponsored benefits, organized in the Egyptian Government's Declaration of October 1959, attracted international help. Foreign archaeological missions were offered at least fifty percent of their finds, access to exclusive excavation permits outside the threatened zone,

such as the Royal Necropolis at *Sakkara*, and even whole stone temples, including *Dendur, Debod, Taffeh,* and *Ellesya,* for permanent export to Western public museums (A Common Trust, pp. 4, 27–28 (Declaration by the Government of the UAR)). In contrast, Sudanese Nubia presented a completely different systemic reality: Sudanese Nubia was an area mostly untouched, rich in vulnerable, sun-dried brick architecture resistant to traditional stone disassembly, and lacking substantial museum holdings or alternative elite sites to offer as gifts to exchange. So the Sudan's credibility rested only in the convincing scientific importance of its unknown prehistory and medieval Christian history (A Common Trust, pp. 4, 28 (Letter from the Minister of Education of the Sudan)).

The entire system was based on a Eurocentric concept of preservation that privileged the material historic object above all else. Western institutions were motivated to help save the enormous stone temples, which they saw as the ancestral foundations of Western civilization (A Triumph of International Solidarity, pp. 29–32), but they were not interested in the live culture that surrounded them. The funding, knowledge, and the political decisions; all executed in offices far from Nubia. The effect was a remarkably selective act of preservation: the stone skeletons of an old elite were preserved, but the complex regional environment that gave them context was degraded as secondary damage and existing inhabitants were completely excluded from the database of preservation.

3.2.2 The Displaced Stakeholders: Critically Evaluating the Agency, Omission, and Lived Experiences of Local Communities

While international engineers were busy counting blocks of stone, the actual people of Dakka were experiencing a serious human tragedy. More than 100,000 indigenous Nubians were displaced from their ancestral riverfront lands to government-built settlements such as Kom Ombo, with no local agency of any kind. The Nubian people were seen by the state as logistic challenges that needed to be removed for the sake of modernization and dam building, rather than as primary stakeholders in the heritage being saved (Johansson (2014, Chapter 1, pp. 24–25); UNESCO 1980, Victory in Nubia, The UNESCO Courier, pp. 12–15))

The lived experience of this was catastrophic. Nubian families were displaced from their traditional homes of mud brick, their particular expression of architecture, which was perfectly

suited to the microclimate of the Nile, and packed into sterilized, uniform concrete blocks in the arid desert. They lost their agricultural lifelines, their sacred sites, and their direct relationship with the river (Fernea ,1980, "The Blessed Land", The UNESCO Courier, pp. 66–69; Johansson 2014, Chapter 1, pp. 24–25).

In the official documentation of the UNESCO campaign, these communities are largely invisible, appearing only as nameless figures in the background of photographs capturing the destruction of monuments (UNESCO 1980, Victory in Nubia, The UNESCO Courier, pp. 12–15, 28). The practice of modern digital heritage must acknowledge the substantial ethical debt owed when the real and living maintainers of the Dakka landscape through centuries were systematically excluded from the discussion.

3.2.3 The Architectural Translation Layer: *How Material Form Saves Endangered Intangible Heritage*

It is easy to fall into the trap of separating the tangible stone from intangible living traditions, as two totally different things. But the reality is that material form is precisely the layer that makes intangible heritage legibly grounded in space. The physical geometry of the Dakka temple, its dark, narrowing cross-chambers, its sharp vertical staircases, and the specific orientation of its reliefs is a direct, physical formation of ancient cosmic ideas, rituals, and language (Roeder, 1930, Tome Premier, § 3–5, pp. 4–7; Tome Second, Blatt 2–5). Architecture is a text written in three dimensions. For the displaced Nubian communities, these physical structures served as anchors for local narratives, spatial orientation, and community identity (Fernea, 1980, pp. 66–69; UNESCO Courier, Feb.–Mar. 1980, p. 12).

When fractured, or displaced, the intangible traditions that are tied to the physical monument start to crumble. But, just because of the fact that the stone holds these same geometrical relations, it is a tough hardware drive. Even if software is forcibly dispersed, the living culture, the physical form preserves the spatial syntax of the original ritual actions. Digitally reconstructing the temple's physical exact dimensions, we are in fact rebuilding the spatial indicators for the intangible heritage. Digital geometry is a place where traditional names, regional topographies and lost cultural narratives can be mapped back to earth (Fernea, 1980, pp. 66–69; Roeder, 1930, Tome Premier, § 3–5, pp. 4–7).

3.3 The Purpose of Preservation: Future Horizons, Knowledge Sharing, and Digital Repatriation

3.3.1 Transgenerational Continuity: Safeguarding Historical and Cultural Identity for the Future

The real threat of a landscape sinking beneath the water is the gradual, silent disappearance of identity over generations. For young Nubians born in the diaspora of Kom Ombo, Cairo or abroad, the original valley of Lower Nubia is a mythical landscape only known from faded photographs or old academic texts. The physical relocation of the temple and the loss of the original villages create a significant disconnection between generations. How do you maintain an identity founded on a landscape that no longer exists physically?

Here digital preservation moves beyond an exercise in history to an act of preserving the future. We produce a high fidelity, semantic 3D model, with the goal of developing a proxy environment that younger generations can access, explore and inhabit virtually. It gives a stable structure to the stories that the elders have passed down. It preserves the particular spatial intelligence of the Nubian past from the damages of time or the waters of Lake Nasser, offering a solid foundation for the active construction and reclaiming of future cultural identity.

3.3.2 Democratizing the Archive: The Ethics of Open-Access Spatial Knowledge and Shared Research Methodologies

For more than a century, essential information on the Dakka temple has remained locked away in European archives, expensive monographs which are unavailable in print, or institutional silos. If an outside researcher, a local Nubian community member or an architect outside of the Western academic system wishes to study Roeder's original site plans or view the structural cross-sections of the temple, they are confronted with enormous institutional and financial challenges. This centralized control of data represents a continuation of colonial archiving practices, where the archive functioned as an authoritative instrument of state power rather than an open knowledge repository (Blouin, 2004, pp. 296–297; Ward & Wisnicki, 2019, pp. 200–201).

Whenever we speak of digital heritage, there is a default reaction to demand total, unrestricted open access. That is a worthy objective—democratizing history, dismantling institutional walls,

and returning the past to collective memory. However, when working with data as precise as the reconstruction of the Dakka Temple, total open access reveals itself as a double-edged sword. There is a delicate balance between democratizing an archive and deteriorating or misrepresenting an archive (Müller, 2021, pp. 6–8, 42–46).

We have to be honest about the dangers. These digital assets, raw Digital Elevation Models (DEM) from old satellite imagery or precise Revit geometries of Ptolemaic masonry or historical documents, are of great value. If they are released on the internet without oversight, they are vulnerable to unauthorized use, commercial misuse or outright intellectual theft.

But more common than the threat of aggressive misuse is the very real problem of apparent confusion. My supervisor, Professor Wendrich, put it very well when we were discussing the physical archives: “If you want to have access or observe the archival documents of Dakka in UNESCO institutions of Paris, you must be aware what you are exactly looking for”. She is absolutely right. Unlimited access is useless if an expert or researcher does not have a concise plan of action or the technical skills needed to navigate through specialized architectural and archaeological data. It is simply a vast loss on time and energy and institutional resources.

But there is a much deeper trap we have to avoid here. We cannot treat “open access” as a tool that will cure historical displacement right away. Let us face the hard facts of what we are constructing. So, I complete this project. I just push a massive and complex Revit file or a huge QGIS repo to GitHub. Who actually prevails? A displaced Nubian community trying to reconnect with their physical heritage is not going to be helped by a file that requires a $3,000 computer and a steep software learning process just to open it. Democracy is not expensive, not proprietary software licenses and high end hardware for our digital reconstruction. It is just another form of exclusion, replacing physical barriers with economic and technological ones.

To make our solution fit in with our ethics, we should look at how practical it is to deliver the data. Real democratization is a step away from closed ecosystems. Moreover, open access is not supposed to be seen as an unconsidered, magical solution that instantly resolves historical displacement. Uploading a complex Revit file or a large QGIS data base onto GitHub does not necessarily comfort a displaced population. Another form of exclusion arises for the displaced Nubian community of Old Dakka *(Pselkis)*—for whom the temple and its surrounding water-based landscape evoke their ancestral birthplace and original place of being—a raw data store requiring

expensive equipment, customary software licenses, and extreme technical learning curves (Blouin, 2004, p. 298; Fernea, 1980, pp. 66–69; Müller, 2021, pp. 12–15; Ward & Wisnicki, 2019, pp. 201–202). True democratization consists of breaking down technological and economic barriers, not replacing digital colonial barriers over physical ones (Müller, 2021, pp. 45–46; Ward & Wisnicki, 2019, p. 202). Both aspects of this problem can be solved by switching to purposefully structured, accessible and understandable formats instead of raw data dumps. It ensures the structural stability of specialized spatial data from misuse and minimizes the challenge to access for the specific displaced Nubian community whose collective memory and spatial identity are based on the lost landscape of Dakka (Fernea, 1980, pp. 66-69; Müller, 2021, pp. 4-5, 45-46; Ward & Wisnicki, 2019, pp. 201-203).

3.3.3 Digital Repatriation: Overcoming Spatial Severance by Returning Architectural Assets to a Diaspora

The physical repatriation is a major geopolitical blockage. We cannot drain Lake Nasser and we certainly cannot remove the physical temple at New Wadi es-Sebua to drag its fragile, cement-damaged stones back to coordinates that now are buried deep underwater. The physical removal of the monument from its original landscape is permanent. Digital repatriation, however, provides a quiet way of bypassing these rigid material constraints. We can break the monopoly of centralized state museums and foreign research institutes by giving back ownership of the architectural narrative to the generations of the community through high-resolution 3D assets, semantic databases, and spatial maps. Delivering smart, digital copies of the Dakka temple straight to the hands of the Nubian diaspora makes the model a decentralized cultural property—something a fragmented community can actually use to teach their children, host virtual events, and reclaim their historical space on their own terms.

However, we have to be honest about the limitations. A hyper-technical HBIM model or a raw point cloud can be highly confusing. The average person in the Nubian diaspora is not going to open up Revit and look at a cross section and maybe it is unnecessary for them. The real value for the community is the visual and spatial legibility of these assets; The younger generation, quite digitally savvy though, has difficulty relating to ancient historical myths or dry archaeological text. But a lively digital reconstruction is interactive and changes the dynamics. These architectural

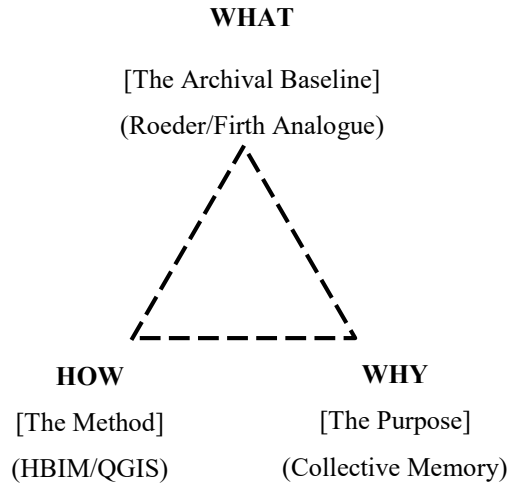
assets are inherently modular and upgradable and can therefore evolve over time. Here architecture is the gathering of collective memory in its most genuine form: it anchors intangible heritage in a tangible, geometric form that was taken away generations ago. But let us not deflect ourselves into digital solutionism. A virtual reconstruction cannot heal the trauma of losing a homeland.

A 3D model will never replace a physical mudbrick village, the old palm groves, the actual soil on which ancestors walked, and surely this is not the aim of this project. We should not conceive of technology as a cure-all. We should consider this reconstruction rather as a catalyst, a collaborative open canvas for the community to layer their own living stories, vernacular names and personal memories back onto the lost geometry of Dakka.

3.4 Synthesis: Architecture as the Catalyst for Collective Memory

3.4.1 Reconciling the Theoretical Triad: Synthesizing the *"What, How, and Why"* of Nubian Heritage Reclamation

Before we dive straight into the technical nuances of software workflows, we need to bring the entire theoretical framework into focus. The Dakka temple reconstruction is framed by a close-knit triad of questions:



- The **What**: This is our structural basis—the measurements held in the analogue archives of Roeder and Firth; the raw data of what the temple was, before it was removed from its spatial context.

- The **How**: The architecture itself and the different prospects of it for the revival of the lost history. This is our technical translation layer the strategic execution of HBIM metadata, Revit parametric modeling and QGIS historical terrain synthesis that enables the transformation of fragmented 2D sheets into a smart spatial environment.
- The **Why**: This is the final engine of the project, the main objective of the integration of the digital architectural assets and the historical archives. It is an ethical necessity to be sensitive to the trauma of displacement, to help protect transgenerational identity, and to serve as a digital point of reference for the collective memory of a diaspora.

To handle this triad of fundamental questions is to understand that it is merely possible to have one without the other two. If you make a model of the temple without the strict criteria *WHAT* of the archive, you are creating an inaccurate historical fantasy. If you build it without the ethical *WHY*, you are producing an empty, soulless tech-demo model. The architecture is supposed to be the active catalyst that attaches all three sides of this triangle together.

3.4.2 The Conceptual Bridge: Handing over Theory to Digital Architectural Reconstruction

This brings us to our methodological leap. Theory is essential, but theory alone cannot reconstruct a collapsed pylon or trace a submerged Nile waterline. To turn these concepts of memory, loss, and diaspora into a spatial asset, we have to translate our theoretical ideas directly into technical actions. I have tried to establish a conceptual bridge where our theory informs our software settings:

- Our commitment to preserving **suppressed local memories, the chronological construction, and technical expansions over time** translates into a database strategy in Revit: I have built a custom Shared Parameters within our HBIM environment to embed traditional Nubian linguistic data, place names, and historical texts directly into the parametric stone components.
- Our critique of the lost **Nilotic Axis** translates directly into a technical task in QGIS: we have aligned historical Corona satellite imagery to create a Historical DEM (Digital Elevation Model) to digitally place the temple on its original location in Dakka area in addition to isolate and trace the old waterlines to simulate the inundations over time. Then

I used the modern DEM to demonstrate the current situation of Dakka temple in its new location.

- Our insistence on **absolute metric fidelity to the archive** translated into a strict geometric modeling workflow: I have forced Revit's rigid, modern parametric engine to adapt to the historical anomalies, switchback staircases, and irregular masonry passes drafted by Roeder in 1913.

Chapter 4:

Methodology and Digital Reconstruction Workflow

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4.1 Introduction to the Workflow: "Multidisciplinary" Aspect of Architecture

For a displaced historical monument like the Dakka Temple, traditional architectural frameworks are quite inadequate. The standard BIM workflows are built to construct commercial buildings from scratch, not to capture the layered, traumatized history of a Nubian temple that fell down, was rebuilt miles away, and was finally separated from its original Nilotic home. This method therefore has a dual function for me: to be not just an architect, but also a multidisciplinary examiner and translator by taking advantage of the Historical archives and documents and integrating them into the common BIM workflow, this procedure is shifted one step forward through its ultimate aim.

Within this scientific framework, architecture is an essential bridge between the cold, numerical records of historical archives and the dynamic requirements of archaeology and history. In this part, I argue that the digital workflow is not merely a mechanical exercise in 3D computer-aided design, but an active, critical act of translation. Architecture functions as an anchor that transforms flat, fragmented 2D archival drafts (e.g. Günther Roeder and C.M. Firth's 1913 metric surveys) into a dynamic, multi-dimensional database that is capable of handling complex spatial geometries, precise scientific data and the living memories of a diaspora.

4.1.1 Translating Conceptual Memory into Parametric Reality: The Collective Memory Framework

Architecture has always been given a huge weight: it has provided a permanent physical anchor to the deepest messages of a culture. A monument like the Dakka Temple is not a simple collection of stone blocks. It is an ecosystem of historical narrative and environmental interconnection. But what happens if that ecosystem is harmed?

The 1960s UNESCO salvage effort saved Dakka's physical stones from being submerged by Lake Nasser, but the decision was not without costs to the temple's intangible heritage. It lost its relation to the landscape, its particular orientation to the Nile, the immediate context that gave meaning to

its geometry. That is exactly where digital reconstruction is put into action. We are not only creating an attractive 3D model for an archive with BIM software, but we are establishing a new responsibility for architecture. If the physical building can no longer be in its original birth place to tell its story, the parametric model is the new translator.

To build this in a parametric environment forces us to confront how collective memory survives environmental disruption. We are fueling in coordinates, material depths, and structural relations, keeping the form, and its duty as a narrator of culture. The beauty of architecture is that it can express these deep philosophical meanings through things we can see, touch and build. Digital heritage continues that transmission, ensuring that the memory of the site survives the unpredictable conditions of our changing world.

4.1.2 The Double Anchor: Linking Local Lifeworlds with the Roeder and Firth Archival Datasets

The technical process is based on a dual foundation, the cold one, metric precision of early 20th century archaeology and the warm, intangible narratives of the Nubian communities that lived alongside the temple before the inundation. We call this the ‘double anchor’.

The first is Günther Roeder’s 1913 documentation, Der Temple von Dakke, and the other, the records of Cecil Firth’s archaeological survey. Roeder's work is very detailed with carefully drafted plans, cross-sections and individual stone measurements. But these papers are completely detached from human experience; they make the temple into an actual dead sample.

And the second anchor brings the human characteristic back in. The use of Roeder’s metric sheets together with the intangible lifeworlds of local Nubian heritage, place names, oral histories of the landscape and records of the UNESCO salvage campaign ensure that the technical reconstruction is ethically grounded.

But this is not just an abstract philosophical assumption, yet it applies directly the way we understand the digital architecture. Collective memory is not static. It is produced through movement, ritual and spatial progression. Thus, when we look at Roeder’s harsh two-dimensional plans of the pylons of Dakka, we are not just looking at stone walls and empty voids. We are looking at the architectural paths of a living temple.

By inserting Roeder's data in the human history of the site, we stop trying to view the special architectural features of the temple—its isolated interior chambers or the tight, purposeful switchbacks of its pylon staircases—as geometric puzzles. Instead they are thresholds that physically manage sight, sound and sacred access. The metric archive tells us where the walls are, but the collective memory of the landscape tells us how those spaces were experienced. This intersection is what allows us to look beyond the raw numbers and analyze the actual spatial syntax and the sacred paths of the temple.

4.1.3 Spatial Syntax: *How Architectural Geometry Materializes Invisible Narrative Landscapes*

In order to understand this translation properly, one has to look at the internal spatial relations of the temple. To attempt to read Dakka by today's architectural standards is to miss the whole point. We can look at an entrance gate and wonder why it is so big, or look at an inner chamber and wonder why it is so tightly small. But these amounts are not accidental. The small chamber was small because it was secret, a very respected, private connection to an older, spiritual space. The constriction of the architecture in physics was the immediate symbol of the spiritual exclusivity of the ritual within.

This rigid spatial syntax becomes interestingly complex if you try to model it according to historical archives. For instance, use the pylon staircases as they are noted in the historic records of Günther Roeder. In mapping the interior layout, one is immediately impacted by a complicated switchback logic. The physical direction of travel is not random. First flight is West-to-East. After a sharp ninety-degree turn, the main direction of travel is South-to-North.

But the real puzzle is when you look at these travel routes in conjunction with historical plans for the internal chambers inside the pylons. There is a significant contradiction in the way the spaces are mirrored. Historically, these secret chambers are usually shown on the complete opposite side of the staircase from where our structural logic and observations of the site today would suggest.

This is not just a technical challenge for someone trying to draw a clean family in Revit, it is a brilliant example of spatial syntax in conflict. Is the difference a mistake in early documentation or is it deliberate architectural layering meant to fool the unaware? Thus we are not only

documenting the walls, but the real story of the temple's ancient visitors, through the precise geometric faults in our workflow.

4.2 Digital 3D Reconstruction Phase (Revit)

4.2.1 Modeling the Temple Geometry: Pylons, Massive Masonry, and Internal Passageways

The Dakka temple macro-geometry was a challenge to reproduce, as it had to transform massive organic stone forms into a digital workspace that loves clean, straight lines. Interestingly, the most difficult technical challenge was not the massive slanted walls of the sanctuary, chapel and pylons. The battered profile of the masonry was relatively easy to reproduce by establishing accurate work planes and using sweep voids. But where the default logic of the software ended and the manual labor began. Revit hates sloped surfaces. The software is based basically on a Cartesian coordinate system that assumes walls go straight up and down. The main masses of the temple are battered, so the default XY plane is pretty much useless.

For the special light slits and the fancy cornice moldings I could not just click and draw. The only way I could carve out a geometry was to either manually set a custom work plane for each and every sloped face or force the slopped face to act as the correct work plain. It was a tedious task, but it was the only way to get a modern BIM tool to devote sufficient consideration to ancient, non-vertical architecture.

The hard part was inside the structure. Inside the pylons, for example, are a maze of internal chambers and a switchback staircase with seventy-five individual steps. I chose not to cut these stairs directly out of the main pylon mass, so I could control the data set and modify the geometry when new archival data was available. Instead, I modeled the internal circulation system as a separate geometric network embedded in the shell. Section boxes let me break through the heavy masses and map the strangely tightened corridors connecting the eastern and western pylon chambers. The claustrophobia aspect of these paths probably means they were never intended for public use, a spatial limitation quickly made tangible in the digital model.

In the Pronaos, the logic of architecture becomes structural engineering; A series of the combination of Wide roof slabs rested on the East-West direction and two large North-Southern

architraves in between them. The loads transferring by them will be passed directly through the stone abacuses[1] to the columns. The arrangement of the structure clearly shows that the ancient builders understood the distribution of loads.

The building, specifically Sanctuary and Pylons, includes highly specialized light slits not only to deal with a harsh desert environment but also to give the place a sacred and ritual atmosphere. The opening of these windows, is tightly narrow on the outside, but the it gets gradually open wide on the inside. It is a smart adaptive design solution, limiting the severe heat and direct light of the Egyptian sun to keep the place dark and cool, protecting sacred spaces from the eyes of outsiders, and preventing desert sands from being blown into the interior of the temple.

4.2.2 Delineating Historic Chronology: Modeling the Ptolemaic Core and Roman Expansions

A digital reconstruction of a site that has gone through several phases cannot be viewed as a single event. It needs a clear structural hierarchy that respects the chronology of the building. I started the modeling process with the oldest standing core of the complex, the Chapel of Ergamenes II (Arqamani), interior chapel. It was only after placing this first layer that I started building the later Roman extensions. This chronological approach uncovered a spatial puzzle already at the beginning where the southern wall of the chapel meets the northern boundary of the sanctuary. They have one, shared, and the same structural line. Rather than modeling two duplicating, overlapping walls, I kept the chapel's wall as the main component on the northern part and projected the three remaining walls of the Roman sanctuary outward from it on East, West, and South of the Sanctuary's plan. The way the Romans handled this junction tells us a lot about how much they honored the sacred architecture that was already there. They did not tear down or ignore the older buildings; they dealt with them. The original cavetto cornice[1] of the chapel was, for example, actually preserved within the sanctuary wall. To obtain this I cut a specialized void through to expose the older chapel cornice from within the sanctuary space, mirroring the real

[1] A square stone plate with a thickness of ~50 cm sits above the column capitals, protecting their upper surfaces and managing the structural loads transferred from the roof slabs. The abacus stands as one of the remarkable elements demonstrating the engineering knowledge of ancient builders.

[1] Serving a dual purpose as both a decorative architectural finish and a functional roof parapet, the cavetto cornice defines the upper profile of the masonry walls. Its precise execution highlights the complex interplay between symbolic form and protective detailing in ancient construction.

physical overlay. In the areas where there were structural gaps between the two independent building phases, I modeled custom, irregular extrusions to represent the specific infill masonry the Romans used to fill in the gaps. This adaptive geometry can even be seen in the hidden western staircase where individual steps had to be cut out directly into the pre-existing thick masonry walls in a manner which naturally adapted to the slanted exterior face of the older chapel.

4.2.3 Parametric Rules for Historic Anomalies: Forcing Analogue Metrics into Digital Logic

Standard architectural software is made for perfect symmetrical construction and is a strict tool for expressing the raw realities of heritage architecture. Roeder's archives are captivated by a tension between the idealized forms of architecture and the unfinished or irregular conditions of the field. Where Roeder's measurements were exact or close to be exacted, I drew them to the millimeter. But often the historic metrics were at variance with digital logic, especially when two different components were too close together for Revit's geometric engine to process them efficiently.

This is obvious in the decorative moldings and Toruses[1] . The false door of the southern wall of the Sanctuary has a cavetto cornice in addition to an unfinished square Torus. The standard Roman way would have been a rounded profile, though Roeder's notes show that it was not carved. I decided to make this profile a square sweep instead of a circle. This was not a deception; it was a conscious decision to save. Keeping it square, the model notes the true state of labor when the old workers put down their tools and left the site. It makes the BIM model a record of human effort, not a nice, idealized 3D image.

The cavetto cornice of the Sanctuary also runs continuously along the southern and western faces, but splits into a totally separate line on the eastern side. Forcing this into a single automated sweep of the building would be an incorrect simplification, so I generated two separate sweep paths to respect the architectural break.

[1] The horizontal torus molding runs continuously beneath the cavetto cornice, framing the upper edge of the wall and visually binding the structural assembly together. The vertical torus molding defines the external corners of the pylon, pronaos, and chapel of Ergamenes, terminating upon a square base designed to protect the fragile curved stone carving below. This transition highlights the careful integration of decorative detailing and structural preservation in ancient masonry.

The Pylon details had a similar problem. Here the cavetto cornice serves a dual purpose, both a decorative finish and a functional roof parapet. The vertical torus at the corner of the pylon stands on a square base, meant to protect the fragile rounded stone carving above it. To model this, I had to combine two different void sweeps; The main vertical axis is a circular profile and the square profile where the stone meets the ground plane.

Where archival information was entirely absent or lacks something, my role switched from data entry to architectural interpretation. For example, Roeder's documentation does not provide total clear imagery or detailed breakdown of the specific decorative carving on the capitals of the Pronaos, however it was not always Roeder's fault, some parts of temple had been entirely destroyed, stolen or extremely damaged over time, even when Roeder arrived there. Instead of inventing details from my own mind, I decided to keep these capitals as plain, naked masses of structure. By treating these areas as simplified geometries, the model allows future modifications while honestly showing to the viewer exactly where historical certainty ends and archival absence begins.

4.3 The Heritage BIM (HBIM) Integration Phase

4.3.1 Defining Custom Metadata Parameters for Intangible Heritage Data

Today's BIM software is essentially obsessed with material specifications, estimations of costs and construction schedules. When you select a wall in standard Revit it requests a value for the fire resistance rating or thermal conductivity. But for a historical monument like Dakka, that information is pretty useless. To turn the model into a source of collective memory, I had to manipulate Revit's shared parameter system completely.

I did not simply put together a messy list of random characteristics; I tried to organize my custom parameters into three well-defined strategic categories. This keeps the database clean and makes sure it is talking to both academic researchers and the public:

Category 1: Structural & Archival Reality

- HBIM_Material_Composition
- HBIM_Internal_Spacial_Anomalies
- HBIM_Associated_Void_01 / _02 / _03 …

These parameters relate the digital geometry to the physical reality of the temple as it was. Buildings are not perfect shapes. They have voids, structural anomalies from shifting or sudden ancient alterations, different stone compositions in different chambers. The model does not look like a perfect, modernized rendering, because the associated voids are explicitly recorded. It makes the digital architecture respect the physical irregularities of the real temple.

Category 2: The Epigraphic & Textual Anchor

- HBIM_Logic/Roeder_notes
- HBIM_Roeder_Volume_Page
- HBIM_Epigraphy_Relief_ID
- HBIM_Iconographic_Notes

This is where the geometry directly connects to the historical archive. This whole reconstruction is built mostly on the foundation of Günther Roeder's documentation of 1913. The model is self-authenticating by directly placing such fields as HBIM_Roeder_Volume_Page into the relevant wall families. A curious local user or an expert who wants to know why a relief is designed in a certain way does not need to go to a library. They choose the wall, check the parameter, and know exactly which page in Roeder's volume justifies that design decision.

Category 3: Chronology, Conservation, and Certainty

- HBIM_Chronological_Phase
- HBIM_Conservation_Status
- HBIM_Intervention_History
- HBIM_LoK (Level of Knowledge / Certainty)

Dakka temple was not built in a day. It developed from a Ptolemaic foundation to a Roman expansion, and then was deconstructed and moved in the UNESCO salvage campaign. Those parameters are part of the lifecycle. Most importantly, HBIM_LoK provides the model with absolute clarity. If a block can be modelled with 100% accuracy from surviving blocks, then its Level of Knowledge is high. The LoK parameter indicates if a portion of the roof had to be constructed logically based on structural load paths.

Bridging to Intangible Heritage Data...?

What is the role of these technical features to protect the intangible heritage for the people?

In terms of cultural heritage, we are likely think of material stone and non-material stories as two totally separate things. But they are not. A relief is not just a carving; it is about a particular ritual, myth or the community's relationship to the Nile.

We can store the narratives of the people who interacted with these spaces over millennia through parameters like HBIM_Iconographic_Notes and HBIM_Intervention_History. For a local community displaced by the construction of Aswan High Dam, seeing an accurate digital asset is a powerful thing. But when they see a model where they can click on the Pylon and find notes on the ancient festivals, historical connections to the community, and the raw history of the temple's modern salvage, the dynamic changes entirely. It transforms a cold architectural asset into a live, open access database of collective memory**.**

4.3.2 Embedding the Synthesized Archive: Linking Nubian Linguistic Data and Historical Texts to 3D Geometry

Having a PDF of historical documentation open on a second monitor while modeling is one thing, embedding that data straight into the virtual stone is another thing entirely. This is where the core philosophy of the Historic Building Information Modeling (HBIM) really shows its true value. The traditional BIM is tracking physical objects. HBIM semantic enrichment applies something or a meaning to those objects.

However, a major blind spot of standard archaeological workflows is that they are almost entirely dependent on Western academic vocabulary. The people who had inhabited the Dakka temple for centuries had not used German or English[1] archaeological terminology to describe the spaces. The physical monument was cut from local Nubian place names, regional narratives, and linguistic relations to the land inundated by the Aswan High Dam.

There is real struggle here about preserving collective memory. Any digital heritage model that relies solely on Eurocentric or ancient classical names is engaged in the same elimination as the 1960's UNESCO salvage campaign. It disconnects the temple from the people who lived around it for generations.

[1] The Roeder's documentation is in German and Firth's is in English.

But I am not here as an architect to recreate Nubian linguistics or to insert a huge imaginary dictionary into the metadata of every single stone block. That kind of over technical oversight is not good for the project. I managed this instead by treating these local names as important contextual anchors rather than as detailed parameters. While specific Revit element metadata is lean and focuses on architectural attributes according to Roeder's records, the broader spatial descriptions and documentation narratives intentionally highlight the name *El-Dakka*. The use of these living names in the macro-level descriptions of the project helps to prevent the local identity of the site from being completely buried under a mountain of academic, classical terminology.

4.3.3 The Open-Source Transition Workflow: Breaking the Proprietary Barrier via IFC and WebGL Preparation

Let us be honest: Autodesk Revit is an expensive, closed-source ecosystem. If this project is truly about "Sharing Digital Cultural Heritage" and digital repatriation, then keeping the model inside a proprietary .rvt file format is a huge ethical contradiction. No local researcher, or diaspora, should have to own a premium workstation and a thousand-of-dollars software subscription to just interact with their own heritage.

This section covers the messy, challenging process of breaking the model out of its exclusive cage. I exported the entire HBIM database to an Industry Foundation Classes (IFC) format. It was not a clean and one click process. If you are not extremely careful with your export mapping files, Revit has a habit of removing out custom shared parameters during IFC translation. I had to manually create the property set definitions so the transfer would preserve the custom chronological labels, confidence levels, and some existed Nubian linguistic data.

Once set up as an open-source IFC file, the geometry and its rich metadata were then prepared for WebGL-based visualization frameworks. The technical goal was optimization—reducing polygon counts on complex moldings, cleaning up unnecessary nested families, so the model could eventually display smoothly in a standard web browser. The outcome is a data structure that is light weight, totally disconnected from exclusive software monopolies and ready for decentralized public use.

4.4 Spatial Synthesis and Landscape Integration (QGIS to Revit)

4.4.1 Grounding the Reconstruction: Topographic Realities and Spatial Coordinates

No matter how detailed the architecture of a 3D model is, it has to sit on a real piece of earth. Buildings do not float in space, and the Temple of Dakka certainly did not. When we are talking about a monumental site such as this, its original placement was not accidental. It was highly strategic, deeply connected to the Nilotic axis, ancient trade routes and the local settlements that grew up around it. But the UNESCO salvage campaign and the construction of the Aswan High Dam broke that link fundamentally. The stones of the temple were saved, but its landscape and the connection between them were lost. That is why reconstruction of the terrain, and dealing with Z coordinates or height elevations, is crucial to this project. We cannot talk about collective memory if we only consider the X and Y horizontal dimensions (longitudinal and latitudinal) of a map. We need the vertical factor too. In fact, this is where the Digital Elevation Model (DEM) becomes the absolute basis of the whole landscape reconstruction. It is simply not possible to generate the continuous contour lines that define a living, breathing topography without a DEM. Flat historical maps can only show you the surface of the earth, not its true volume. The DEM provides that absent mathematical dimension – the Z elevation. Without this vital vertical anchor, any digital terrain that we try to build would be fundamentally collapsed, turned into a flat guess, not a definitive historical reality.

By monitoring these heights, we can visually measure the hugeness of the inundation, showing exactly how the rising waters drained up the temple's original home. On the other hand, while we are not directly focused on tracking the total destruction of villages such as Dakka and Birba, the mapping of these elevations is a powerful record of another impacts of this catastrophe. It demonstrates the extreme severity of the disaster and reminds us why communities were forcibly displaced from their environments, even though it was not the best idea. Ultimately, a comparison of the elevation profiles of the original site and the modern relocation site reveals a painful truth: you can break apart a temple and rebuild it on higher ground but you cannot move its spiritual relationship with the natural environment. The modern site is another world. By creating the two terrains through our digital workflow, we can visually expose this extreme disconnect.

4.4.2 Processing the Modern Topography: Preparing Web-Sourced Digital Elevation Models in QGIS

I started with regional terrain data to map out the modern baseline where the temple stands today. For this I obtained a Digital Elevation Model (DEM) from the US Geological Survey (USGS). This kind of satellite data is very useful, but it comes in a huge, raw raster file that covers a vast portion of the Egyptian desert. It does not naturally interact with a BIM environment such as Revit, which expects certain building dimensions at a certain location instead of global coordinates[1] .

The first real challenge was translating this data to architectural scale. Raw USGS DEMs are typically in a global geographic coordinate system such as WGS 84 that measures points in angular degrees. Revit works in linear space (meters and millimeters), so if you enter direct global data into the project it will deform the geometry. I imported the raster dataset into QGIS and immediately re-projected the layer to local UTM (Universal Transverse Mercator) zone. It breaks the abstract global angles down to a flat metric grid that can be measured, where a meter in the geographic landscape is a meter in my architectural model.

When I finally got the projection worked out, I had to cut down the enormous amount of data. A regional DEM has millions of points which would for sure crash a standard architectural file. I cropped the raster to the micro-region around the present relocation site of the temple. From this I extracted vector contour lines at appropriate vertical intervals.

The thing is, Revit does not create terrain from smooth, continuous vector curves. It creates them from a grid of specific point coordinates. The last part of the data bridge was using QGIS to extract the specific vertices along those contour lines, and translate the geographic contours into a clean cloud of geometric nodes. Each node had a strict spatial identity: its horizontal location on the earth, and its exact elevation above sea level. I exported this vertex data as a structured comma-separated values (CSV) format, providing Revit with a clean, lightweight mathematical framework to automatically stitch together a highly accurate, real-world topographic surface.

[1] Global coordinates rely on a continuous geographic system across the earth's surface using latitude, longitude, such as WGS 84 or a regional UTM metric grid, to position data within a global framework. For the Dakka Temple, this is represented by its historical and modern geographical placement—such as its original pre-inundation coordinates on the Nile-North axis, tracking its historical elevations above sea level (a.s.l.), and its relocated coordinates at Wadi es-Sebua. In contrast, local coordinates operate on a closed Cartesian system (such as meters and millimeters in Revit) required by parametric modeling software and designed for internal architectural modeling. Translating a global QGIS raster into a local Revit workspace requires careful re-projection to prevent geometric distortion and bridge the gap between regional scale and architectural precision.

4.4.3 The Historical Terrain Paradox: Reconstructing Lost Topographies from Archival Photography

A modern DEM can be easily downloaded from an online database with a public domain. But try to find a high resolution digital elevation model of the Nubian valley on the very beginning of the twentieth century, at the same time of the construction of the Aswan Dam? That is a complete paradox. There is not actually any data on any modern server because the landscape it describes has been under Lake Nasser for decades or affected by the inundation of the river caused by the Aswan Dam. To reconstruct the original context of the Dakka Temple I had to find a way to build a historical DEM from a blank canvas, using old, flat records. That is where the archival investigations came in. With the help of my tutor Professor, Professor Wendrich, we managed to obtain a very useful set of historical aerial photographs, old maps and early photogrammetric records of the Dakka area from a private collection. These aerial photos were taken decades ago from high-level planes, so they show the topography of the valley when the temple was still in its original home. But looking at these old photos, the beginning of the process was a huge challenge. There were full of visual data, but they had no digital Z coordinates at all, which are required for modern geographic information systems. You cannot just drop a vintage 2D airplane photo into QGIS or Revit and make it automatically recognize the contours of the hills or the depth of the riverbanks.

The workflow then became a reverse-engineering procedure to solve this. By the advice of Professor Wendrich, I began working with Dr. Dalton, who had a wealth of knowledge in historical photogrammetry, to process these flat images to extract spatial depth. Drawing on the aerial high-altitude photos, Dr. Dalton overlaid the areas and linked them to the known historical survey markers on the maps to create a continuous, three-dimensional surface raster:

"A DEM of the now-flooded Dakka area was created by tracing lake and river shorelines from a variety of aerial and satellite imagery taken before and during the filling of Lake Nassar.

A base map of the study region was first created from Corona spy satellite imagery acquired in July 1963 (Figure.17)*, when the Aswan reservoir was at an exceptionally low level and the former banks and floodplains of the Nile in Lower Nubia were visible. This image was georeferenced in*

QGIS using a thin-plate spline transformation, with control points taken from topographic features located above the 182 m contour, corresponding to the maximum level of Lake Nasser. These included numerous small islands, representing former hilltops, such as Jebel Allaqi.

Imagery acquired on known dates was then georeferenced against this base map, and corresponding river and lake shorelines were digitally traced. The imagery sources ranged from reconnaissance photographs taken by the Royal Air Force in 1934, to Second World War United States Army Air Forces Trimetrogon mapping photography showing the reservoir impounded by the Aswan Low Dam, and later Corona imagery from the 1960s and 1970s and Landsat imagery from the 1970s to the present.

Water-surface elevations for each traced shoreline were derived from 10-day averages of lake level above mean sea level at Alexandria, published in The Nile Basin, Volume 3, Supplements 2–13. For post-1992 imagery, lake levels were derived from NASA satellite altimetry records (https://earth.gsfc.nasa.gov/gwm/lake/331).

A vertical interval of approximately 5 m between shoreline contours was aimed for and was generally achieved. However, the lack of imagery from the early months of the lake's filling resulted in a maximum gap of 13.75 m between the 118 m and 131.75 m a.s.l. contours. A 15 m resolution DEM was generated from these shoreline contours using the ArcGIS Topo to Raster tool. This DEM was then merged with the ALOS global 30 m DEM above the 182 m contour to create a seamless surface extending from the pre-impoundment Nile level to the present exposed topography.

The resulting DEM should therefore be regarded as an approximate reconstruction, particularly in areas now submerged by Lake Nasser, where horizontal control is limited and the interpolated surface cannot be independently validated against modern exposed terrain."

DEM methodology

Dr. Matthew Dalton, University of Western Australia/University of Oxford

mat.dalton@uwa.edu.au

Acknowledgements

Thanks to the G.A. Wainwright Fund (University of Oxford) and Wolfson College, University of Oxford, for providing funding to purchase and digitize some historic imagery sources. The UK Centre for Ecology & Hydrology (Wallingford) kindly provided access to volumes of The Nile Basin.

We basically built a historical DEM from scratch_ or rather, out of old paper and silver halide prints. The new data set provided us with the precise elevation heights of the ancient villages of Dakka and Birba, the natural contours of the edge of the Nile and the specific plateau on which the temple once stood.

Yet this is not enough, there must be a way to clearly demonstrate the real vertical movement of the water through time and the subsequent impacts of that on the Dakka temple and its surroundings. Having established a fixed historical terrain and after dereferencing it to its true historical coordinates on the generated historical DEM and then importing the Revit 3D model into QGIS, I decided to create a series of temporal "water-level planes" in QGIS to visualize the hydrological impact of the Aswan Dam over time. With this approach I could trace the chronological development of the inundation:

Phase 1: 1902 — The Aswan Low Dam Baseline Inundation

- Suggested QGIS Elevation Input: ≈108.00 m to ≈110.00 m a.s.l.
- The Architectural Visual: At this initial height, the water line rises 3 to 5 meters above the natural riverbanks. It will completely drown the lower foundations of the *Zugangsstrasse* (Access Street) and cross over the temple courtyard floor. The main structures—the Pylon, Pronaos, and inner rooms—remain dry inside, but are completely surrounded by water on the map landscape.

Phase 2: 1908–1909 — The Barsanti Restoration Phase and 1912 Firth Survey Map Baseline

- **Layer A: 1908–1909 — The Barsanti Restoration Phase**
  - Suggested QGIS Elevation Input: ≈113.00 m to ≈114.00 m a.s.l.
  - The Architectural Visual: Following the first heightening of the dam, the winter storage level deepens significantly.

- At ≈113.50 m a.s.l., the water reaches exactly 8.5 meters above the ancient threshold base.
- This height will completely submerge the Pronaos (Hypostyle Hall) ceiling slabs, which top out vertically at 6.43m above the courtyard level.
- The water will climb up the face of the Great Pylon, partially drowning the central portal opening (which stands 7.32m high). Only the upper third of the Pylon towers will remain visible above the blue water polygon (in QGIS)



Figure 10. General view of the village near the Temple of Dakka (1906). *Photograph by John Garstang. Glass plate negative, Garstang Museum of Archaeology, University of Liverpool (Catalogue Ref: JG/K/3/6/3).*



Figure 11. Map El_Dakka, 1909. *PRIVATE COLLECTION*

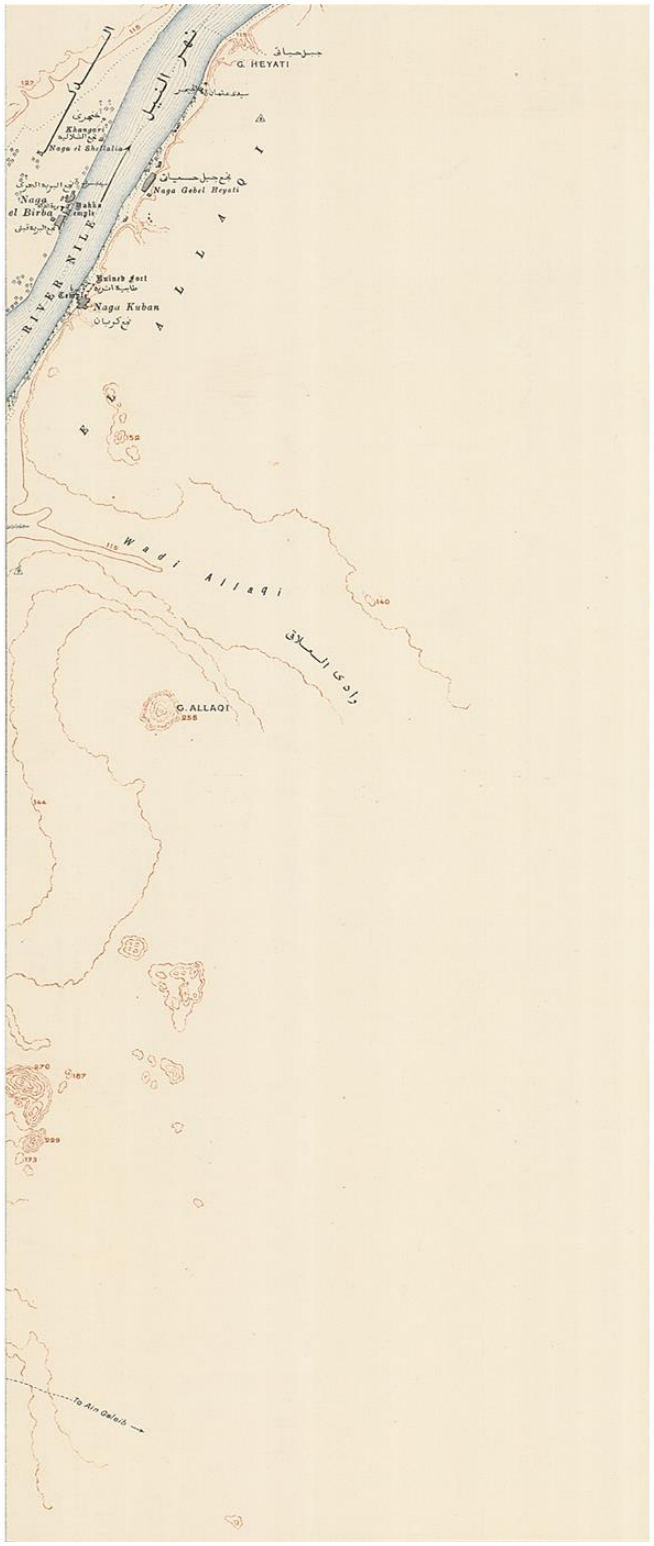


Figure 12. Map El_Allaqi, 1909. *PRIVATE COLLECTION*



Figure 13. Map Gerf Hussein, 1909. *PRIVATE COLLECTION*



Figure 14. Map El Dakka, El Allaqi, and Gerf Hussein showing the Lower Nubian area, 1909. *PRIVATE COLLECTION*

- **Layer B: 1912 Firth Survey Map Baseline**
    - Suggested QGIS Elevation Input: ≈115.00 m to ≈115.50 a.s.l
        - Peak Winter Pool: At this level, the reservoir completely inundates the domestic Nagas (villages) traced on Firth's map. The water line climbs up the Pylon face, submerging the lintel of the main portal (7.32m high). The lower temple house is flooded near its roofline.

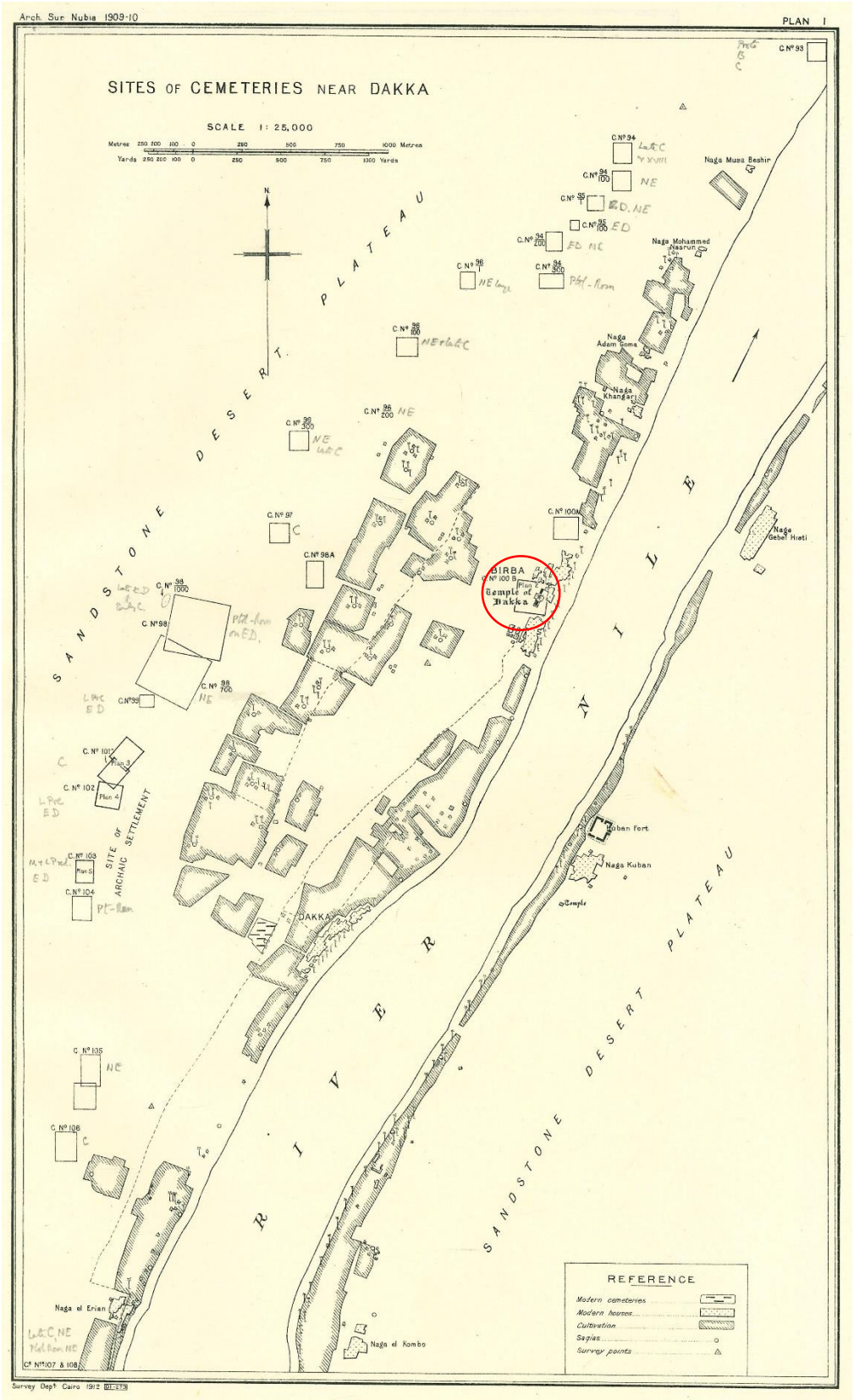


Figure 15. Plan 1: Sites of Cemeteries near Dakka (Scale 1:25,000). From *C. M. Firth, The Archeological Survey of Nubia: Report for 1909–1910 (Cairo: Government Press, 1915).*

Phase 3: 1934 — The Royal Air Force Flight Parameter

- Suggested QGIS Elevation Input: ≈116.50 m a.s.l.
- The Architectural Visual: This elevation marks the completion of the second heightening of the Aswan Low Dam. A height of ≈116.50 m a.s.l. places the water line roughly 11.5meters above the temple base.
    - The water will now sit directly flush with the topmost lips of the Pylon's cavetto cornice, which has a maximum surveyed height of 11.62m. The entire temple house is completely submerged; only a tiny island of masonry from the pylon summits will break through the transparent blue polygon layer (in QGIS).

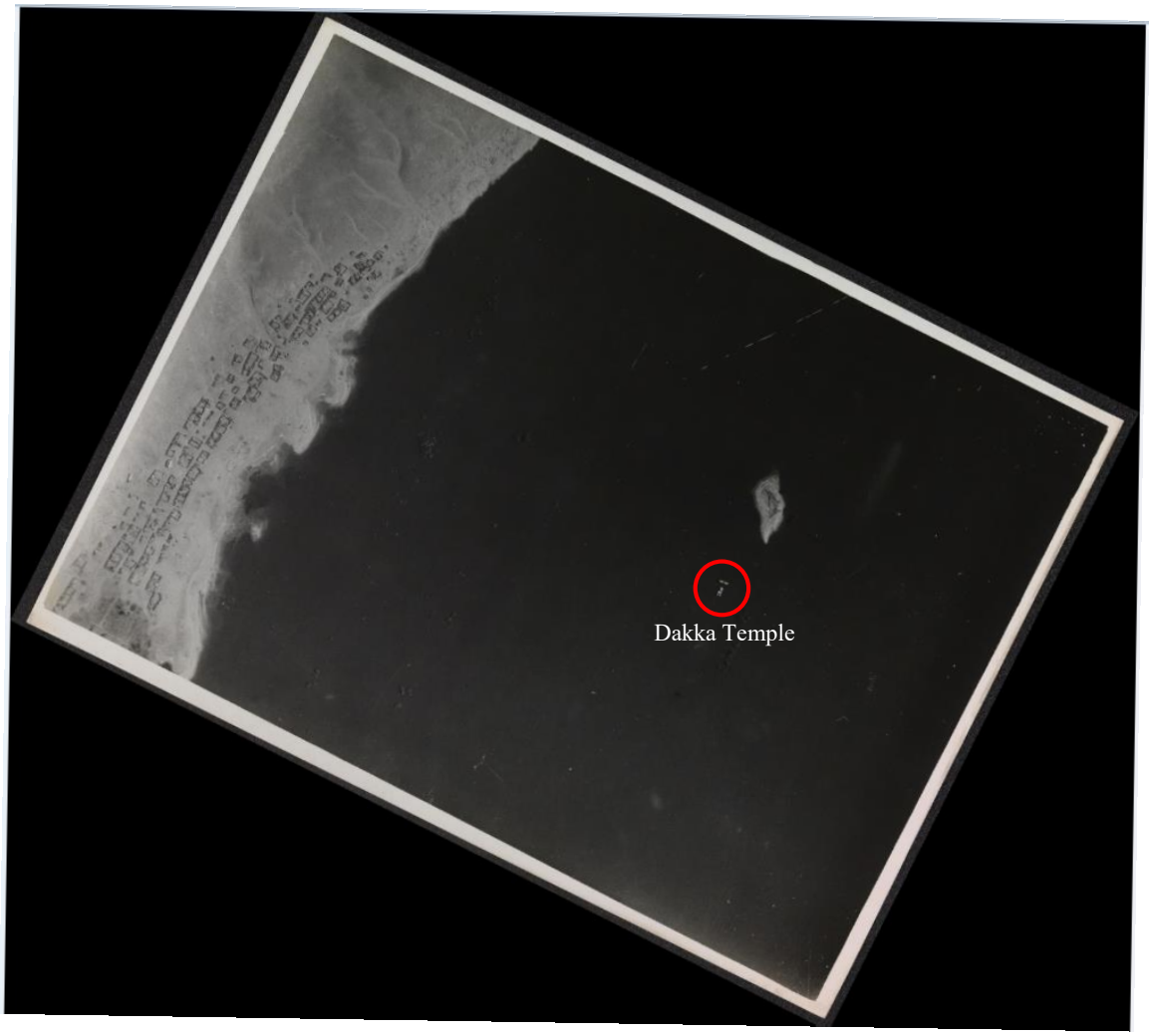


Figure 16. Reconnaissance aerial photograph of the Dakka area, 1934. *Produced by the Geographical Section, General Staff (GSGS), British War Office. Sourced via the Oriental Institute / CAMEL collections (University of Chicago), courtesy of Dr. Matthew Dalton.*

Phase 4: 1944 — Peak Low Dam Storage Cycle (Dual Layers)

To properly map the seasonal fluctuation, in the aerial imagery, it is necessary to create two separate sub-layers for this phase:

- **Layer A: Winter High Pool (From October 1943 to April 1944)**
    - Suggested QGIS Elevation Input: ≈121.00 m to ≈125.00 m a.s.l.
    - The Architectural Visual: The temple is completely drowned under several meters of water.
        - The entire Revit model will sit beneath the transparent blue sheet in the 3D view (in QGIS), visually representing the total winter submersion of Lower Nubian heritage.
- **Layer B: Summer Drawdown (July 1944)**
    - Suggested QGIS Elevation Input: ≈114.50 m a.s.l.
    - The Architectural Visual: Matches the aerial photo of July 5, 1944 captured by RAF.
        - The water drops just enough to expose the upper 2.5 to 3 meters of the Pylon towers, while keeping the lower roof of the Pronaos (6.43m high) completely hidden beneath the waves.

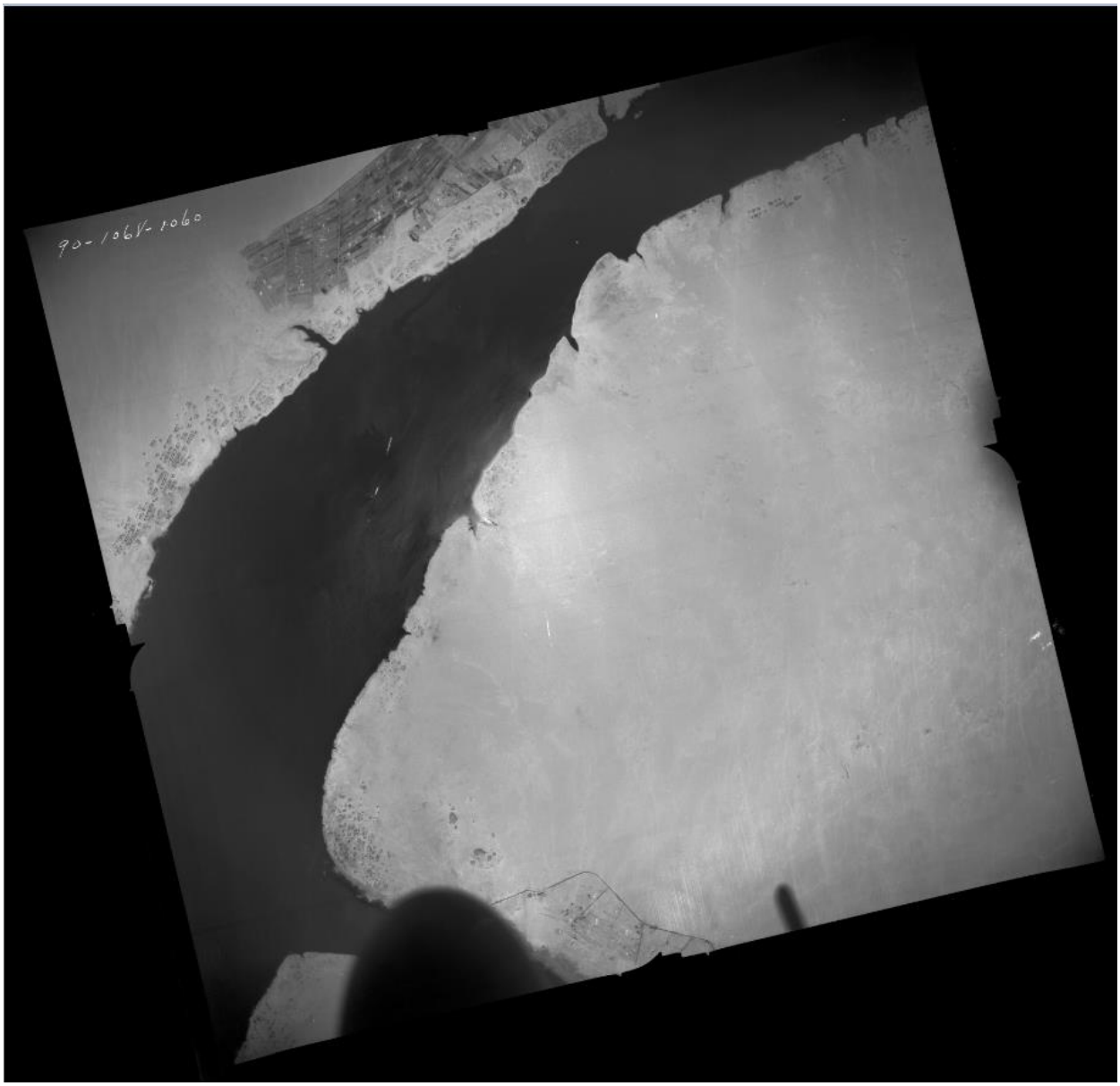


Figure 17. United States Army Air Forces Trimetrogon mapping photography, captured July 5, 1944. *Provided courtesy of the National Archives and Records Administration (NARA / NACP), courtesy of Dr. Matthew Dalton.*

Phase 5: July 1963-Corona spy satellite imagery

Captures a moment when the Aswan reservoir was at an unusually low level, making it possible to clearly observe the former banks, floodplains, and shallow channels of the Nile in Lower Nubia.[1] [8]

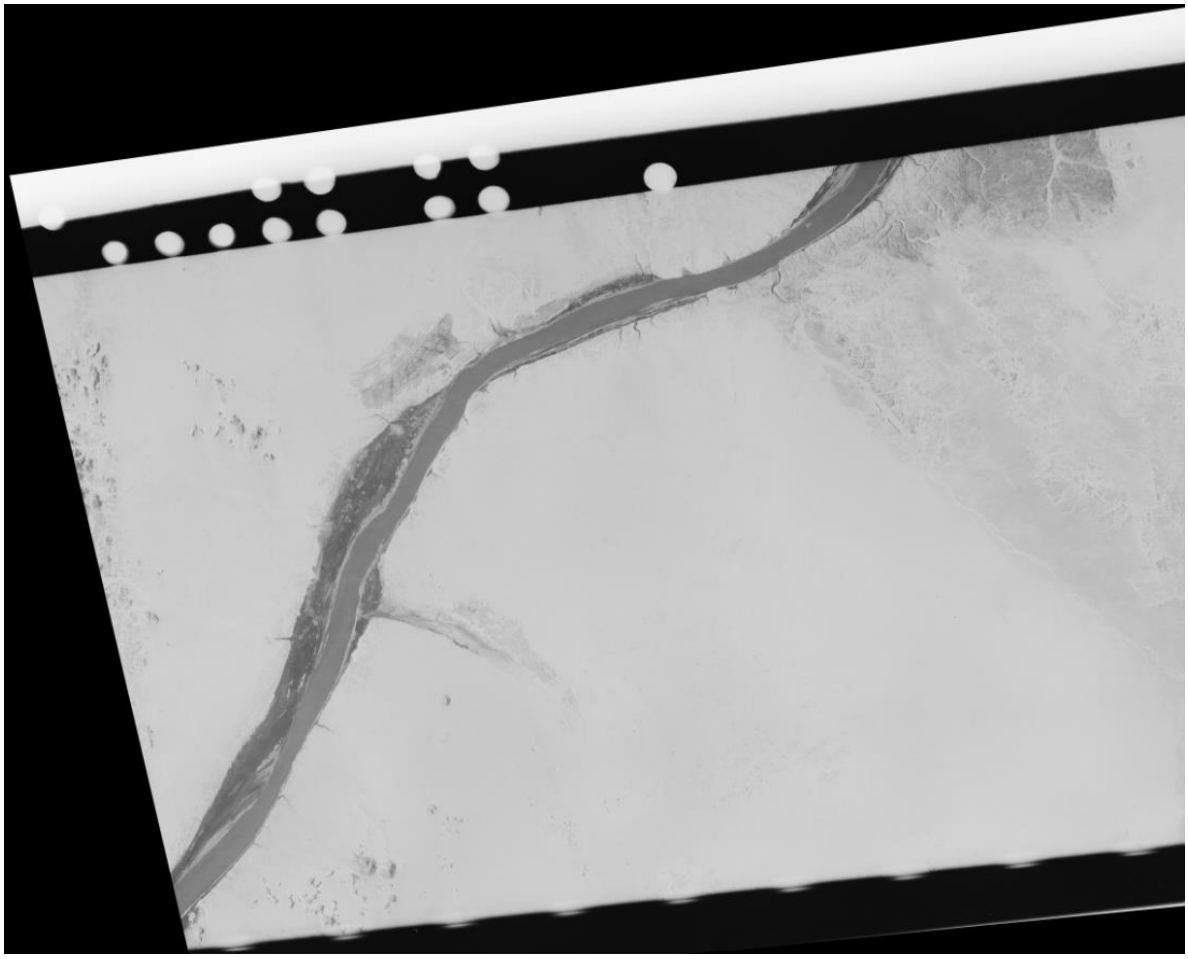


Figure 18. Corona satellite imagery of the Dakka region acquired in July 1963. *Provided courtesy of the National Archives and Records Administration (NARA / NACP), courtesy of Dr. Matthew Dalton.*

[1] For the references of these series of temporal "water-level planes" in QGIS to visualize the hydrological impact of the Aswan Dam over time, see:
-For General Hydrological Elevation Data & Historical DEM Methodology:
Derived from historical lake-level data and water-surface elevations published in The *Nile Basin, Volume 3, Supplements 2–13* (processed via historical aerial/satellite imagery ranging from 1934 RAF reconnaissance flights to 1960s Corona imagery
-For Temple Architectural Heights, Thresholds, and Structural Baselines (Pylon, Pronaos, and Courtyard):
Roeder, G. (1930). Der Tempel von Dakke (Tome Premier: Texte & Tome Second: Planches). Cairo: Institut Français d'Archéologie Orientale.
-Original Ground Elevation and Inundation Windows Prior to High Dam Impoundment:
UNESCO. (1960). A Common Trust: The Preservation of the Ancient Monuments of Nubia (p. 32)

It was so hard to watch these layers come to life, to watch the water rise up to systematically drown the monument. However, this digital synthesis proves power of reconstruction. This workflow allows us not only to reclaim a lost landscape, but also to preserve the collective memory of a place that would otherwise have been lost to nothingness, no matter the magnitude of the trauma that is documented in the narrative of displacement.

4.4.4 A Bidirectional Interoperability Pipeline: Integrating Architectural BIM and Geospatial Analysis

The integration of architectural BIM data with regional geospatial datasets required a directional interaction process rather than a linear data import. The modern topography, generated from USGS data in QGIS, was imported into Revit to provide a baseline context for the temple's current placement. The primary analytical challenge consisted of the visualization of the historical phases of the hydrology. Finally, the finalized Revit 3D model was exported into an environment specifically designed for spatial analysis: QGIS.

The dual-environment approach was determined by the specific analytical needs of the data:

- The Revit-First Workflow: For the architect, Revit is still the primary workspace, which contains the high-fidelity structural data, parametric metadata and chronological phase standards required for the HBIM reconstruction of the temple.
- The QGIS-Analysis Workflow: For the archaeologist and the landscape researcher, QGIS is the main engine of hydrological simulation or any other relative data. The temple was georeferenced to its exact historical coordinates on the photo-reconstructed historical DEM after importing the Revit 3D model into QGIS, and finally specific hydrological algorithms in QGIS (derived from historical archives such as Roeder's VOL.I and Firth documentations) simulate the seasonal water-level fluctuations described in previous sections.

This dual-directional connection ensures that the model is a “smart” asset, which means it can serve different research requirements, depending on the user. The architect uses the Revit environment to check for structural and parametric integrity, and the researcher uses the QGIS environment to execute landscape-scale analysis and visualize the interaction between the monument and the flooded terrain. By keeping this constant synchronization between the

architectural model and its geographical context, the pipeline successfully bridges the gap between static monumental recording and dynamic environmental simulation.

4.5 Chapter Synthesis: The Creation of the Smart 3D Model from the Analog Archive

4.5.1 From Analogue Fragmentation to Spatial Synthesis: Translating 2D Archival Drafts into a Living HBIM Asset

The documentation of the Temple of Dakka by Günther Roeder is a significant attempt to record its final collapsed state before this site became inaccessible due to modern environmental disasters and governmental intervention. Roeder's survey from 1913 remains the one of a kind archival anchor, but the limitations of his time did not allow for a comprehensive, three-dimensional synthesis. His task was to preserve data in the form of two-dimensional, metric documentation, and he did so with absolute precision. However, as Roeder would probably be the first to admit, these two-dimensional drafts are a collection of information rather than a practical spatial experience. Without a three-dimensional framework, the archival record is a "body without breathing" – a static collection of measurements detached from the real-life reality of the temple's original Nilotic setting.

The passage from 2D archival documentation to dynamic HBIM environment is a transition from data entry to the reconstruction of historical narrative. In the century since Roeder's campaign, the rise of digital tools—in particular the integration of parametric modeling in Revit with geospatial data in QGIS—has offered the technical capacity to synthesize what were once scattered observations into a coherent whole. It was not simply a matter of archiving geometry for Roeder; he provided the essential fragments for a future "rebirth" of the monument.

This digital synthesis aims to go beyond the structural shell and reconstruct the "story of living." We map out the narrative of the site, moving from passive observation to active engagement, provoking a deeper awareness of the "loss of heritage." Only a semantically sound 3D model can make legible the complex, layered history of Dakka: the arrival and departure of successive kingdoms and the transition of religious cults, to the physical trauma of geological and hydrological catastrophes. This digital reconstruction is not a replacement for the archive, but an

attempt to breathe life into it, to make the historical, cultural, and environmental story of Dakka possible to tell, imaginable, and fundamentally recognizable for a contemporary audience.

4.5.2 Honoring the Archive: Achieving Absolute Geometric Fidelity to 1913 Metric Records

As noted in the previous section, while the documentation of Günther Roeder remains a vital metric reference, its rigid format cannot effectively demonstrate the intangible heritage or the actual spatial relationships that defined the original Dakka temple. As an architect, my job is not just to reproduce the geometry but to recreate these spaces so that the user immediately understands their intended function, the "why" behind the form. The best example is the staircase hidden in the western wall. The dimensions alone are not sufficient; the claustrophobia and isolation built into the design must be simulated. It is difficult to understand what this private passage looks like from Roeder's descriptions in the text, and it is a challenge to model in Revit.

The goal of this reconstruction is not only to improve the visual quality of the digital model. A hidden stairway is not necessarily more "beautiful" than the detailed foliage of the pronaos capitals or the harmonious geometry of a cavetto cornice. Rather, to model these details is to commit oneself to the integrity of the archival source and to pay honor to the person who recorded it. Roeder's archives, however, are not without confusions and gaps. As an architect, my job is to be critically faithful to these records, to know their errors and to fill in the gaps by analyzing them in comparison with other monuments of the same period and architectural judgment.

In this workflow, the model and the architect function as the essential link between the original archival record and the generations of historians, archaeologists, and anthropologists who have engaged with it since, and the present-day audience. The story of Dakka, begun by its ancient builders and later written down by Roeder or any other colleagues of him, is a living, continuous conversation. I am contributing to a cycle of preservation that makes this history accessible, by adding further layers of digital analysis and spatial interpretation. For an architect, the digital recreation of the temple is a fundamental fulfilment of the task of carrying this narrative forward, making sure that the spatial language structure of Dakka is preserved for future generations.

4.5.3 Methodological Foundation for Comparative Spatial Assemblies: Setting up the Dual-File Environment

The Temple of Dakka is still standing, even in pieces, even when it was moved to its current artificial location, or submerged in the seasonal floods which caused the forced migration of the settlements, the temple remains a physical object. But its original life, the deep organic connection between the monument and its surroundings, has been lost. In this reconstruction I do not want only to describe what "is" or "was" there, but to imagine a fundamental "absence" that now describes the site. Although the original Nilotic landscape has faded away, it stays alive through the oral traditions, stories and shared lived experiences of the Nubian people.

The trauma caused on the Dakka region should be understood not as a top-down phenomenon (from the monument to the people), but as a bottom-up process (from the earth itself). The soil, water, and the desert plateaus were the first to crumble. The Nile, once the main reason for the temple's orientation and cosmic alignment, has been dramatically altered by the construction of the Aswan High Dam and the subsequent formation of Lake Nasser. The water that once preserved the temple has now become an unhappy and constant reminder of this loss. The site's memory is therefore gradually taken over by the catastrophe of its destruction, rather than by the deep spiritual significance of the Nilotic axis which originally dictated its placement.

By synthesizing the historical DEM—reconstructed through layers of 20th-century water-heightening data—with the modern DEM of the Lake Nasser basin (from USGS), this dual-file environment seeks to achieve its ultimate aim: the reclamation of "Collective Memory". This memory is not only of the stone and of the water. It is of history and above all of the local communities whose lives and whose backgrounds were permanently impacted by what happened. For decades, the trauma of this landscape has performed as the major historical actor, but this digital reconstruction is an open opportunity for new actors and new directions. By providing this spatial platform we propose a re-engagement with the site, converting the memory of loss into the basis for vibrant, future oriented cultural reconstruction.

Chapter 5:

Results, Spatial Analysis, and Digital Outputs

Chapter 5: Results, Spatial Analysis, and Digital Outputs

5.1 Macro-Scale Geometry: Introduction to the Dakka Temple and Its Structural Parts

This section illustrates the overall spatial framework of the Dakka Temple. The macro-scale composition of the Dakka temple *(Pselchis)* has been mapped using comparative site plans and historical survey (Mostly Roeder's 2D documentations) layouts. It describes the main architectural zones – such as Chapel of Ergamenes II (Arqamani), Sanctuary *(Adytum)*, Pronaos *(Vorhalle)*, Pylon towers and etc. – which helps in establishing the basic geometric baseline for the whole digital reconstruction.[1] [9]

5.1.1 Comparative Analysis of the Dakka Temple 3D Model and Roeder and Firth's 2D Plans

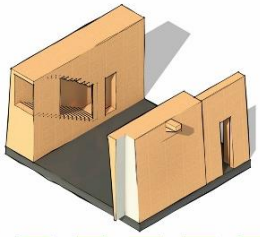
[1] For the baseline metric surveys[9] and archaeological condition records, see *Günther Roeder, Les temples immergés de la Nubie: Der Tempel von Dakke, Vols. 1–2 (Le Caire: Imprimerie de l'Institut Français d'Archéologie Orientale, 1930);* and *C. M. Firth, The Archæological Survey of Nubia: Report for 1909–1910, Part I: Report on the Work (Cairo: Government Press, 1915).*



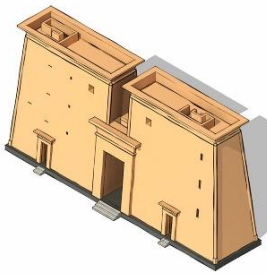
The Sanctuary *(Adytum)*



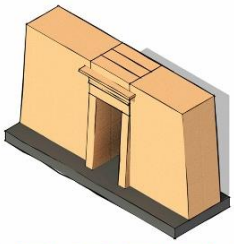
The Chapel of Ergamenes (Arkamani) *(Ergamenes Kapelle)*



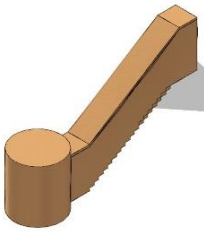
The Roman Expansions



The Pylons



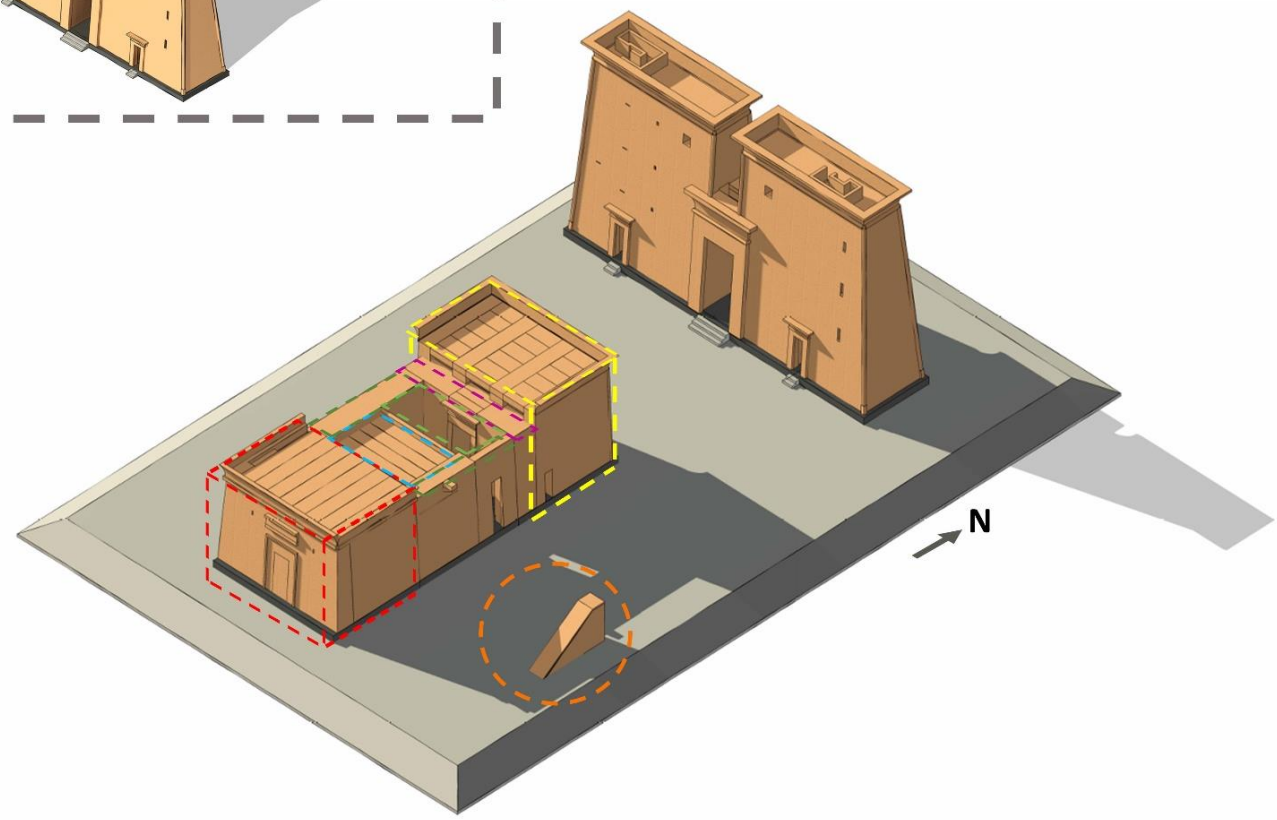
The Ptolemaic Monolithic Gateway



The Courtyard Well Basin *(Brunnen)*



The Pronaos *(Vorhalle)*

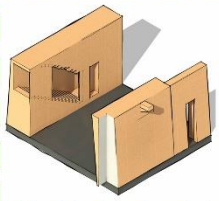




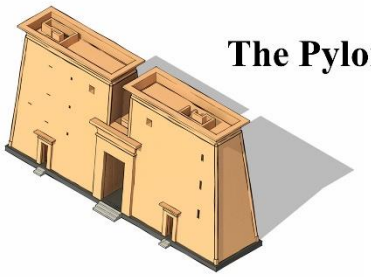
The Sanctuary *(Adytum)*



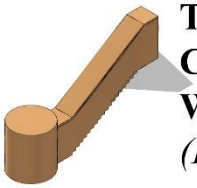
The Chapel of Ergamenes (Arkamani) *(Ergamenes Kapelle)*



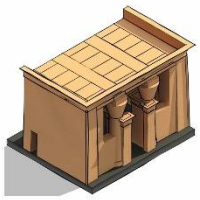
The Roman Expansions



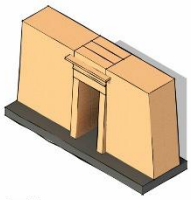
The Pylons



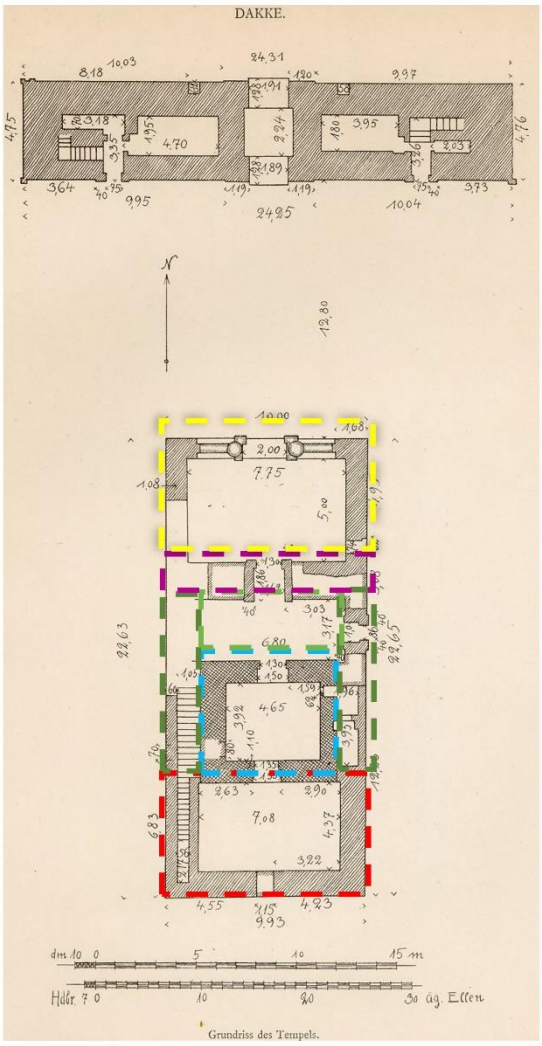
The Courtyard Well Basin *(Brunnen)*



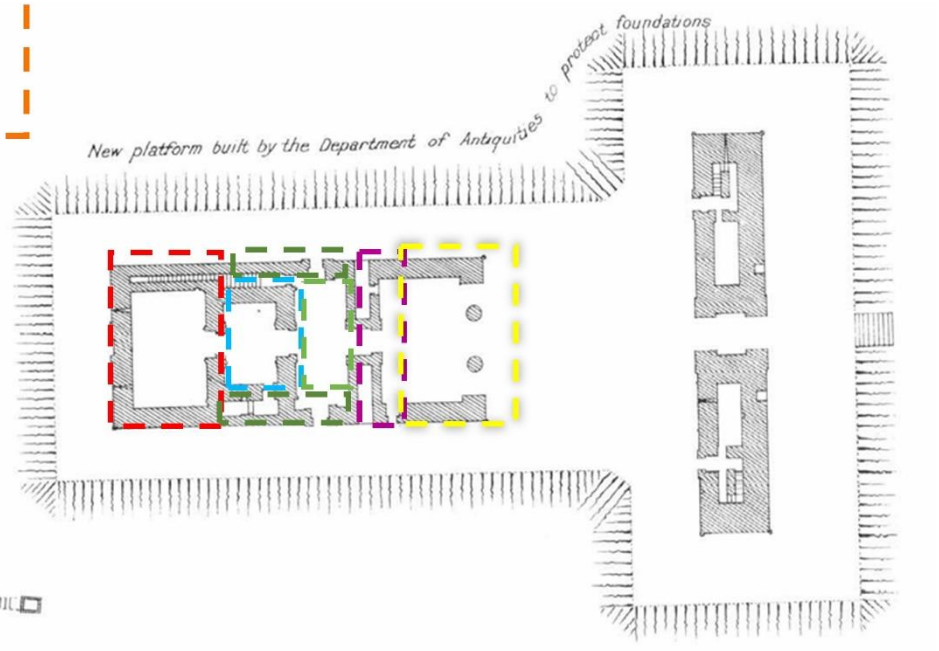
The Pronaos *(Vorhalle)*

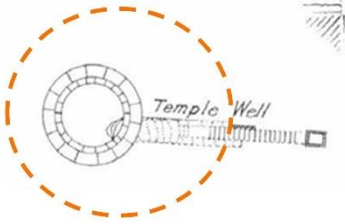


The Ptolemaic Monolithic Gateway

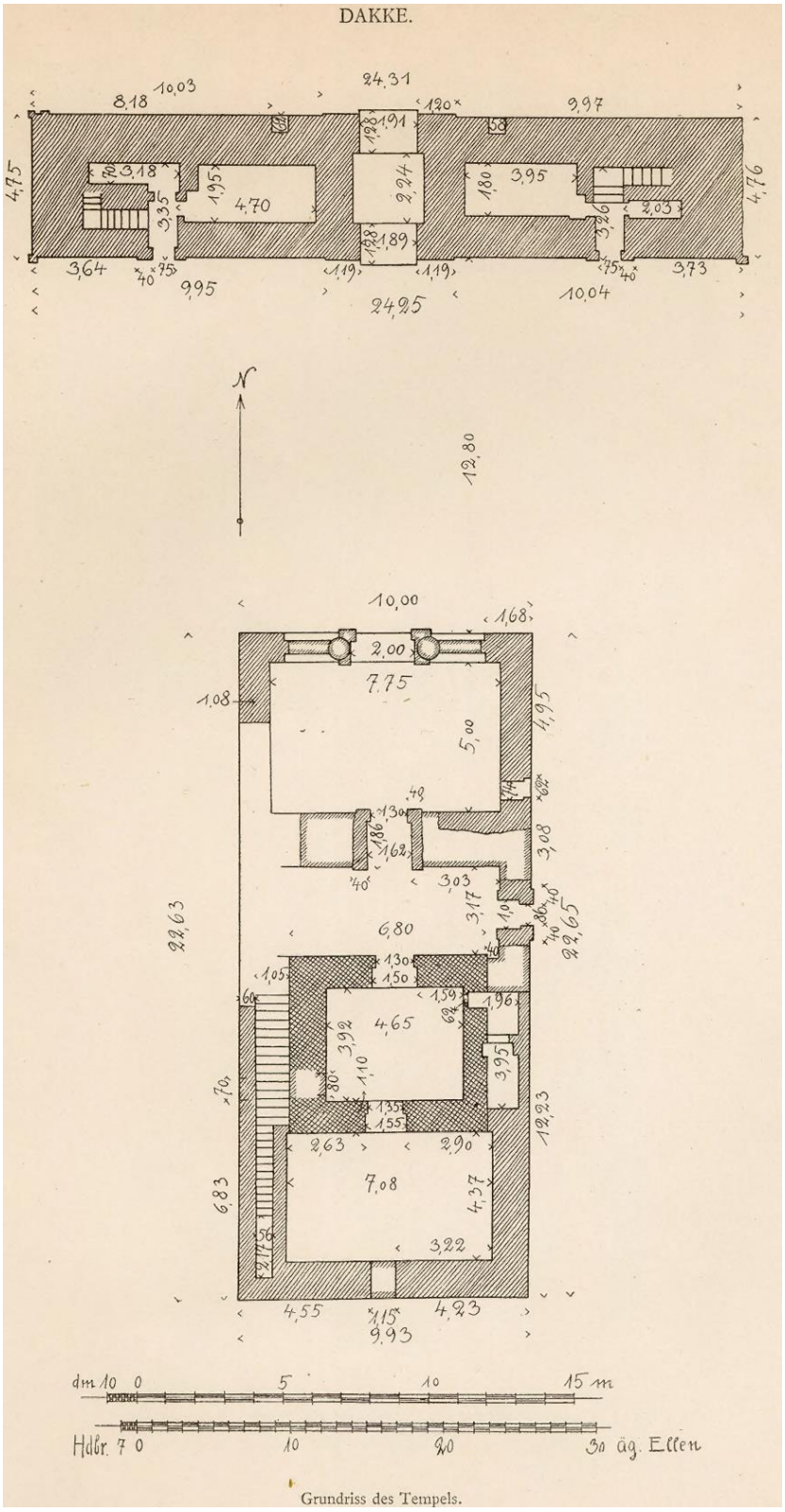


Roeder's Plan





Firth's Plan



Grundriss des Tempels.

Figure 19. Roeder's plan of the Dakka Temple

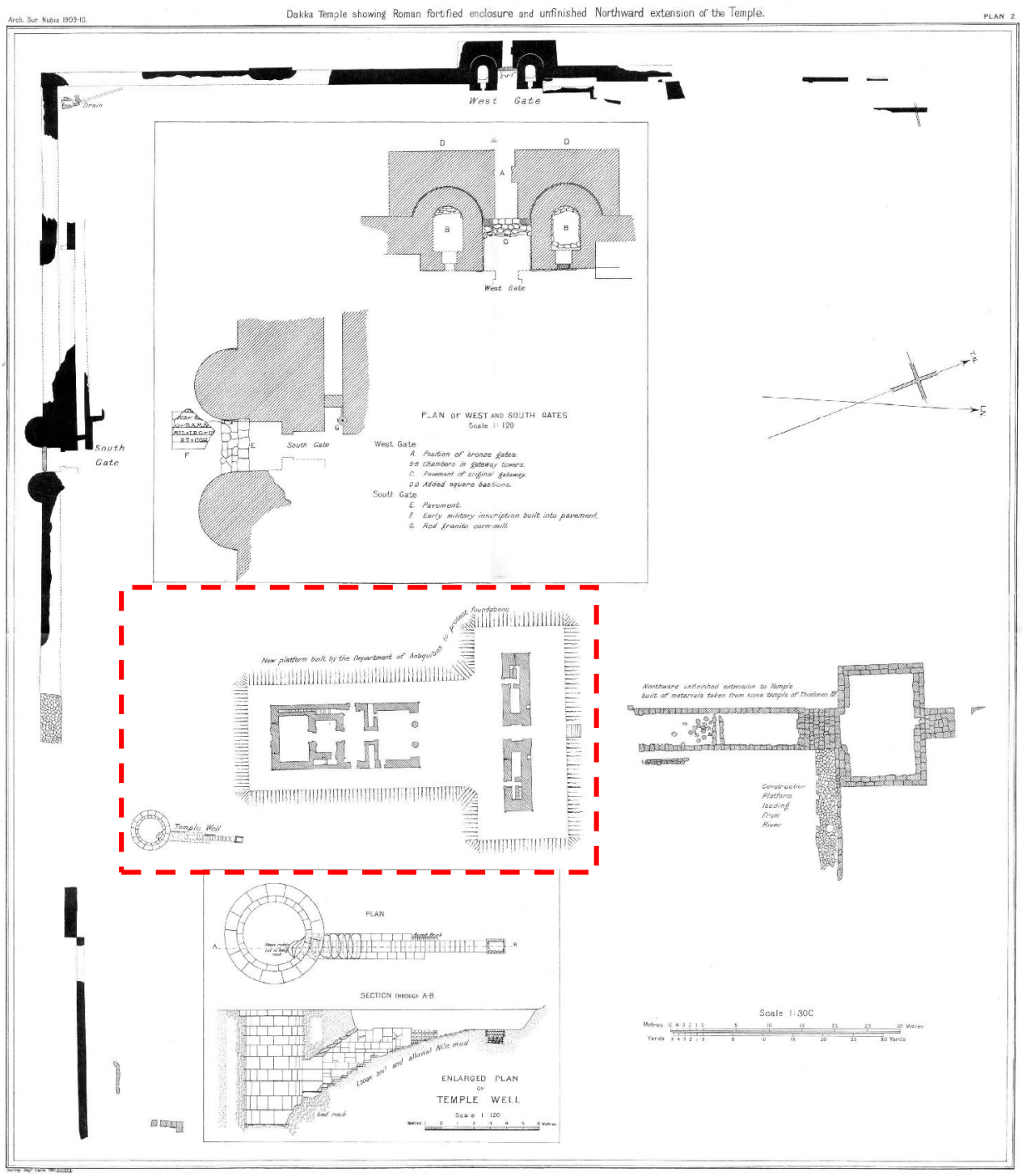


Figure 20. Firth's plan of Dakka temple

5.1.2 Spatial Correlation Between the 3D Model and the Reconstructed Geometric Plans Derived from Roeder's Survey

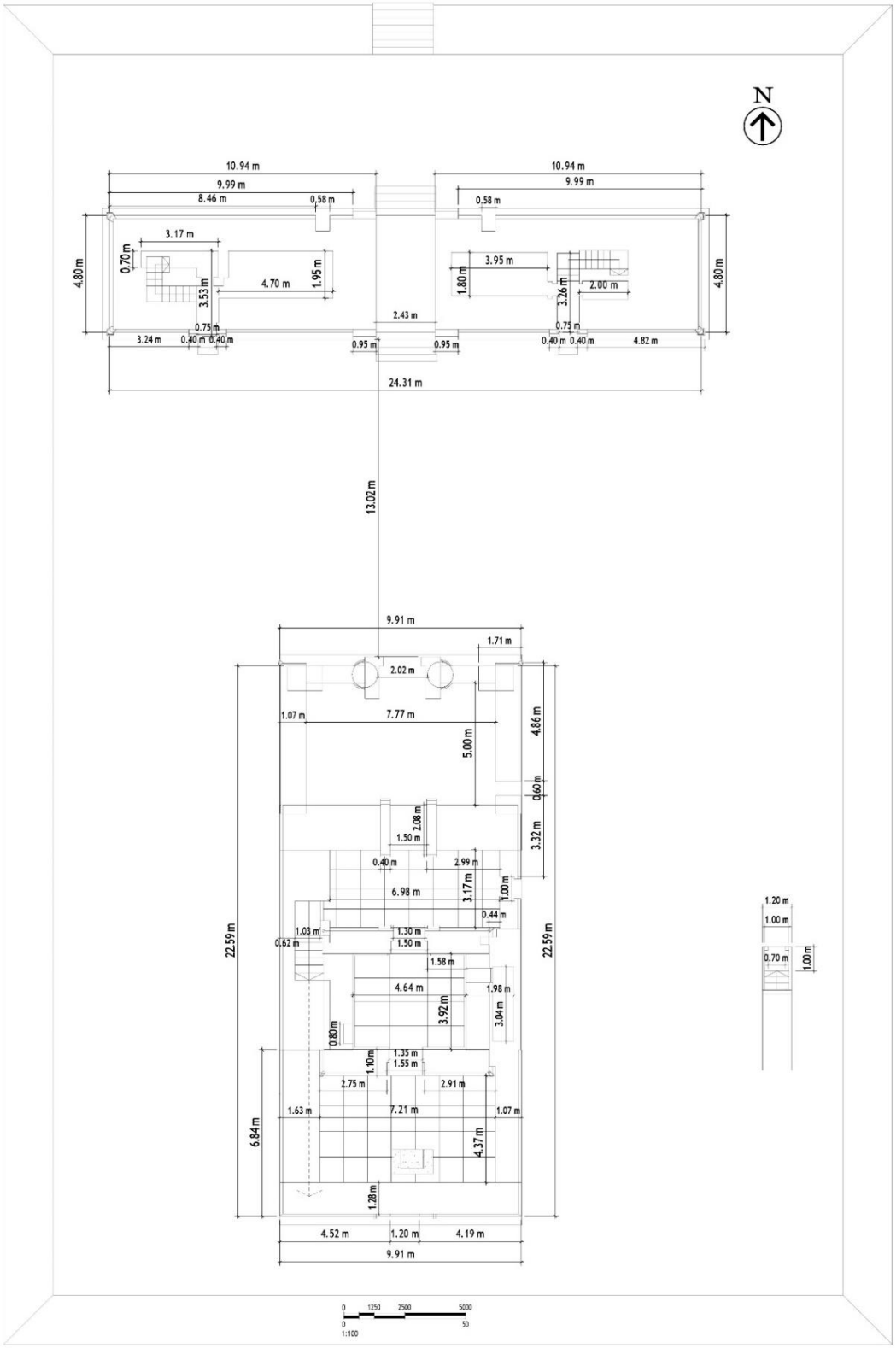


Figure 21. The Geometric floorplan of Dakka temple developed in Revit based on Roeder's plan

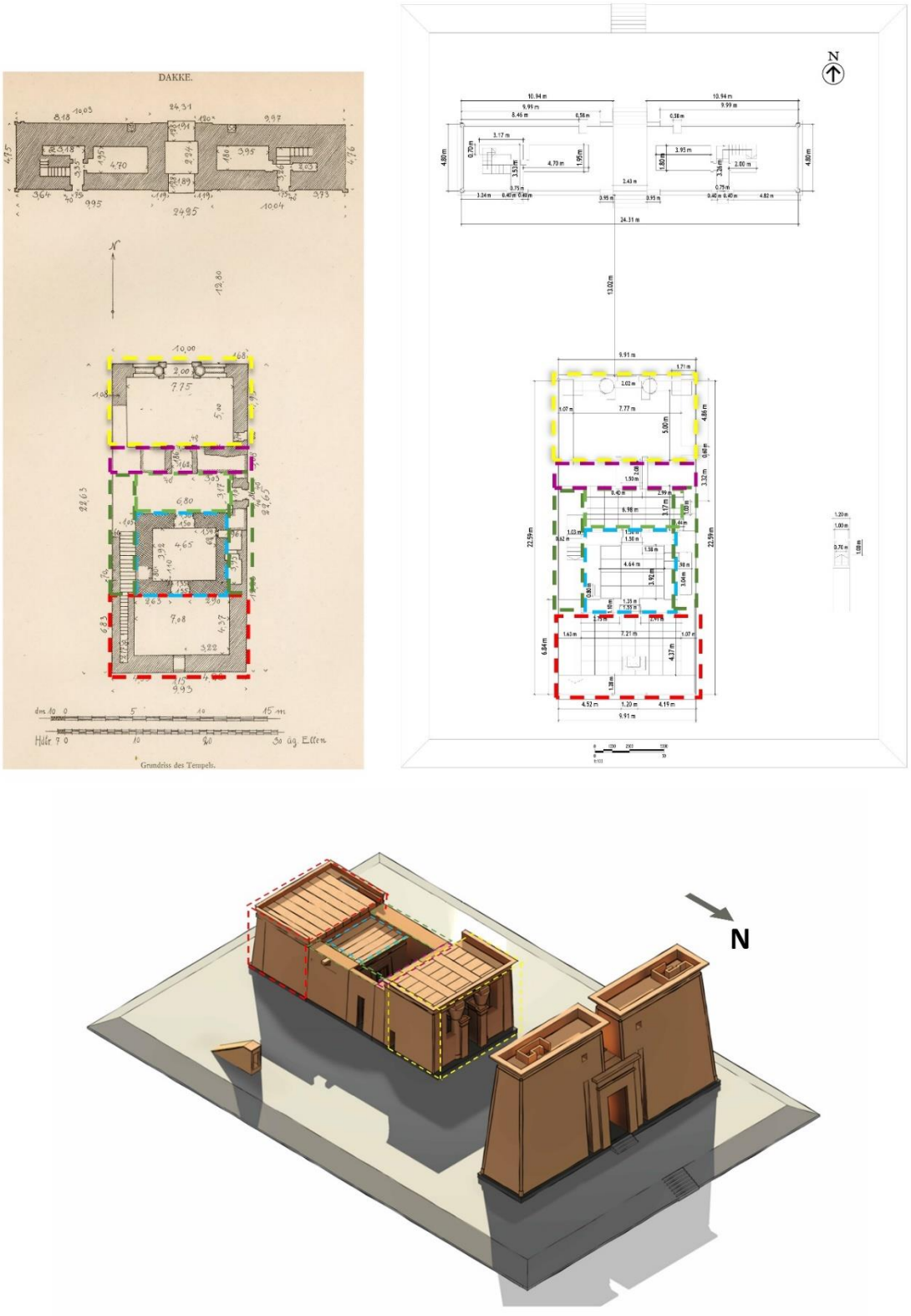


Figure 22. Comparison of the generated floorplan in Revit and the floorplan of Reoder, including the Isometric view of the entire temple

5.1.3 Complete Volumetric Reconstruction of the Temple Core and Photographic Cross-Referencing

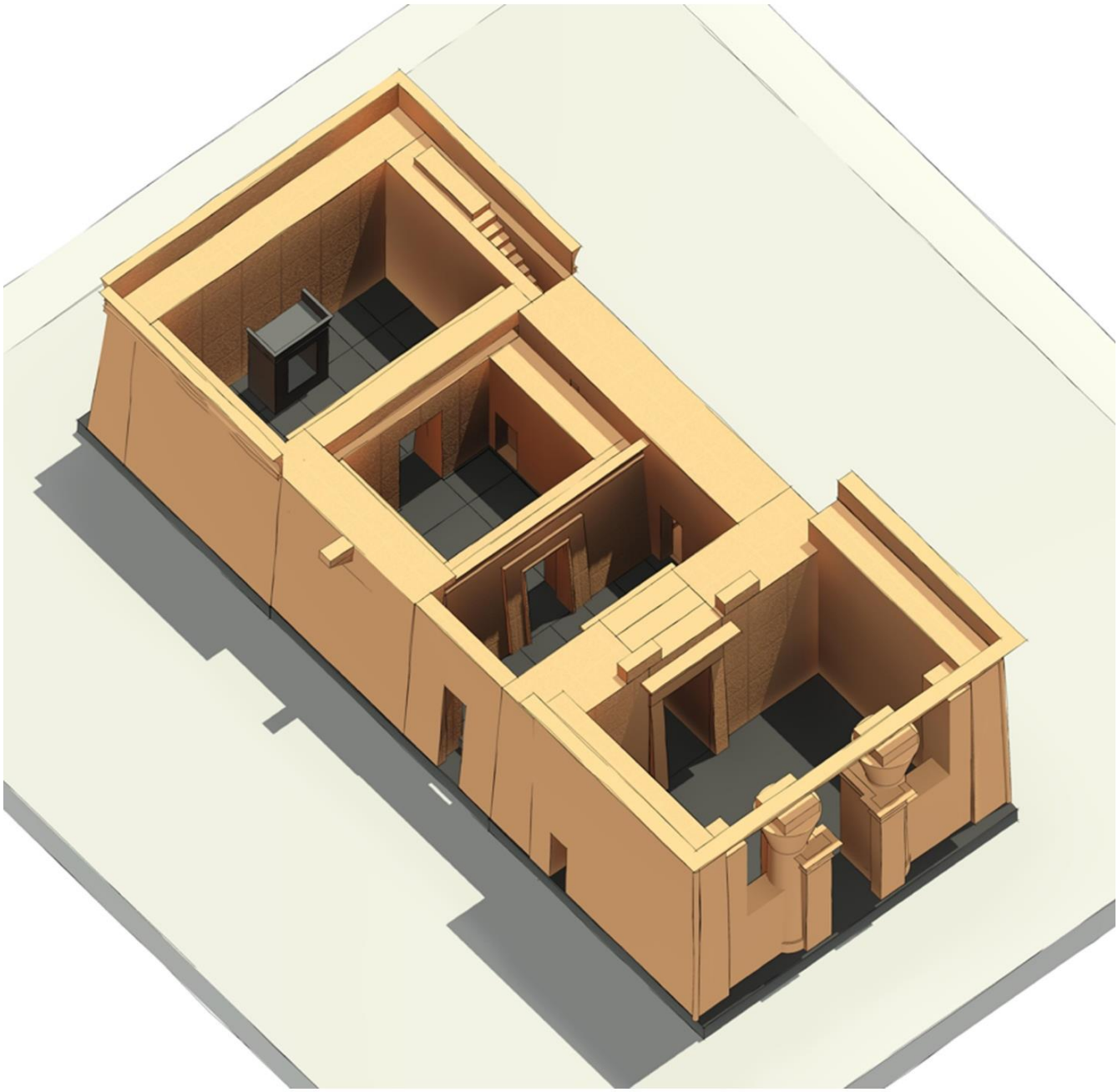


Figure 23. The Internal spatial relations/circulations

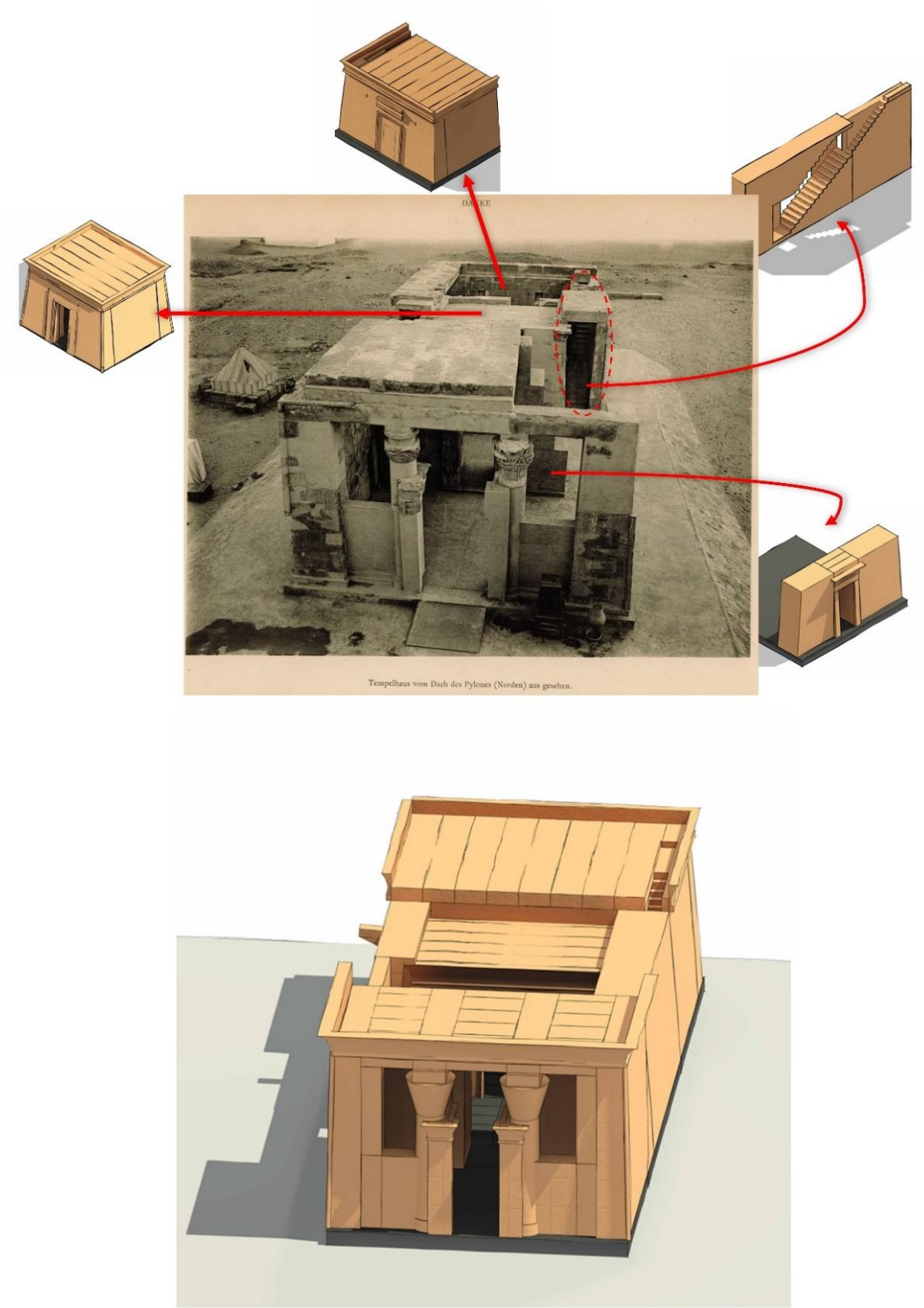


Figure 24. The comparison between the photo of temple taken by Roeder's team and the reconstructed 3D model in Revit

5.2 Micro-Scale Architectural Details and Parametric HBIM Integration

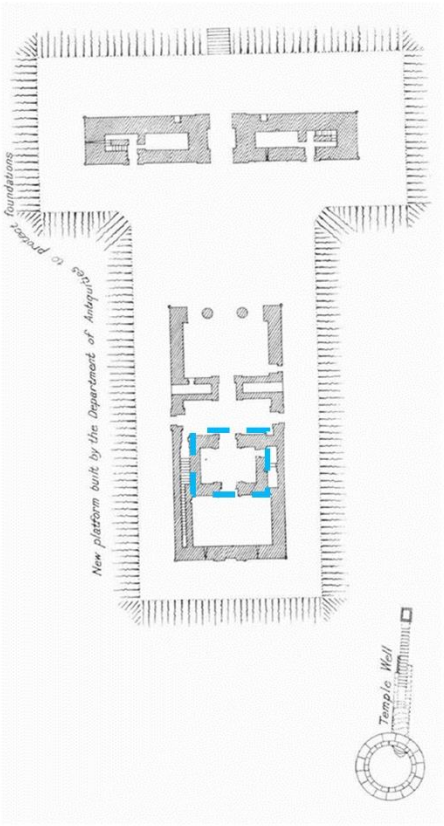
In this section, the micro-scale Revit 3D modeling outputs are integrated with the embedded HBIM semantic database, analyzing every single architectural component with their corresponding metadata parameters (such as HBIM_Roeder_Volume_Page, HBIM_Chronological_Phase, HBIM_Conservation_Status, HBIM_LoK, etc.).[2]

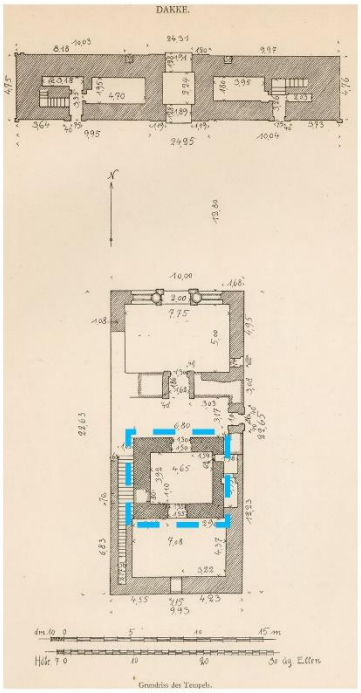
5.2.1 The Chapel of Ergamenes (Arqamani) (*Ergamenes Kapelle)*:

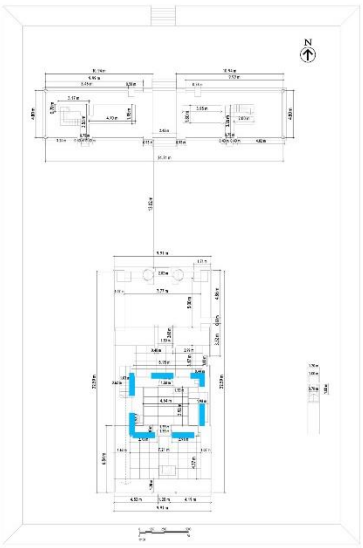
Meroitic Core, Walls, and Roof Assembly and its Architectural Moldings

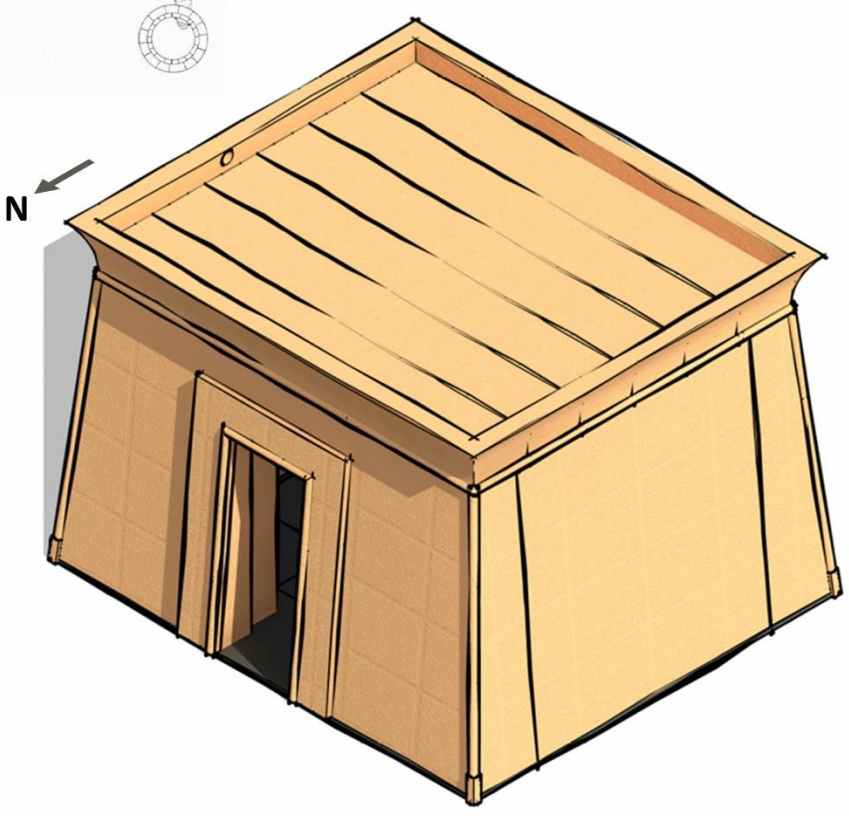
- Analyzes the oldest preserved core of the temple based on exploded axonometric models of the floor assemblies, the Cavetto Cornice *(Hohlkehle)* and the Torus molding *(Rundstab)* and the Roman secret chapel.
- Looks at the structural integrity of the Northern and Southern (shared with Sanctuary) Meroitic walls, the Eastern and Western, the integration of custom shared parameters, and the surviving in-situ roof architraves.

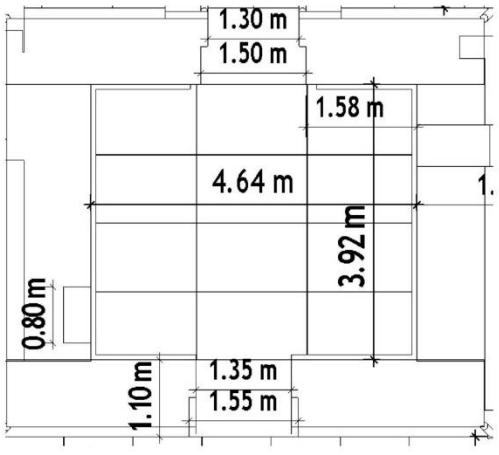
[2] For the baseline metric surveys and archaeological condition records, see *Günther Roeder, Les temples immergés de la Nubie: Der Tempel von Dakke, Vols. 1–2 (Le Caire: Imprimerie de l'Institut Français d'Archéologie Orientale, 1930);* and *C. M. Firth, The Archæological Survey of Nubia: Report for 1909–1910, Part I: Report on the Work (Cairo: Government Press, 1915).*


New platform built by the Department of Antiquities to protect foundations
Temple Well


DAKKE.
Grundriss des Tempels.




N


1.30 m
1.50 m
1.58 m
4.64 m
3.92 m
0.80 m
1.10 m
1.35 m
1.55 m

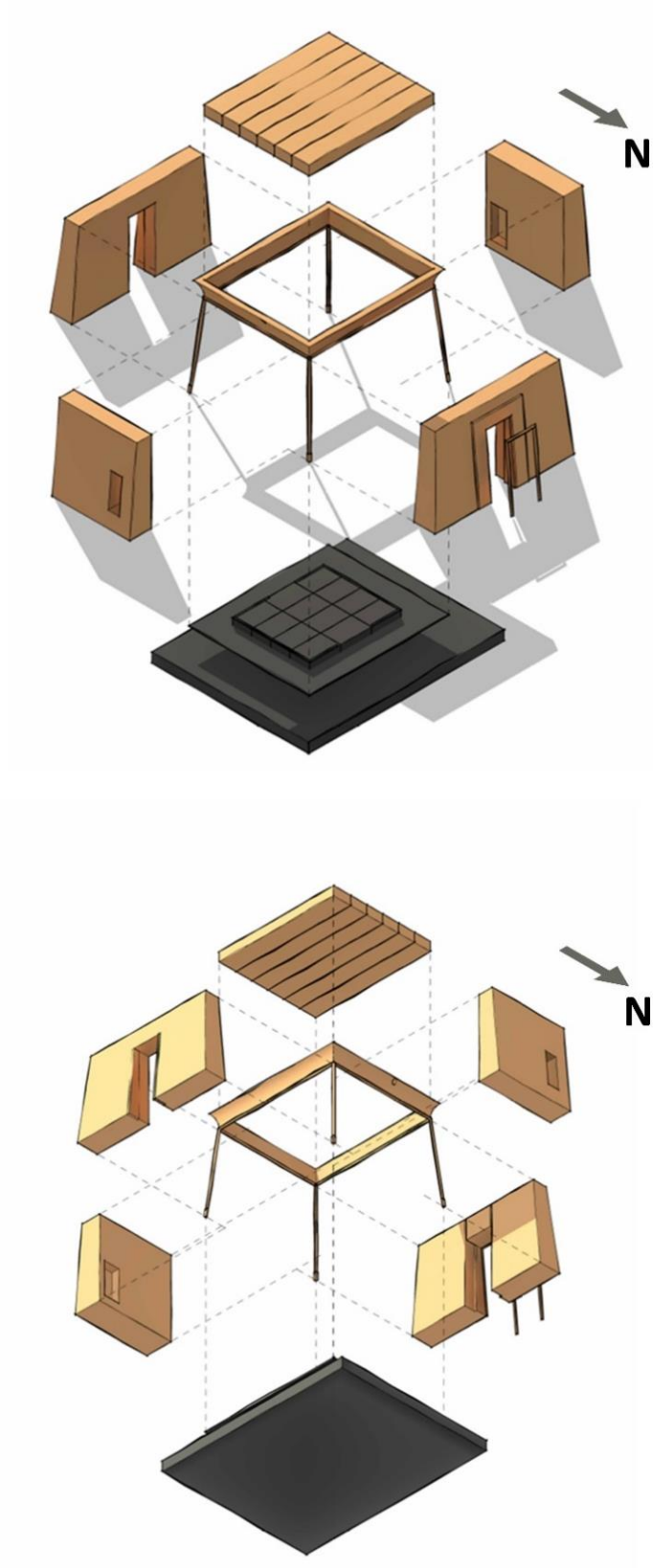
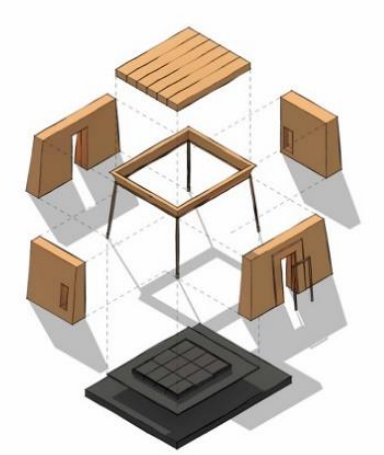
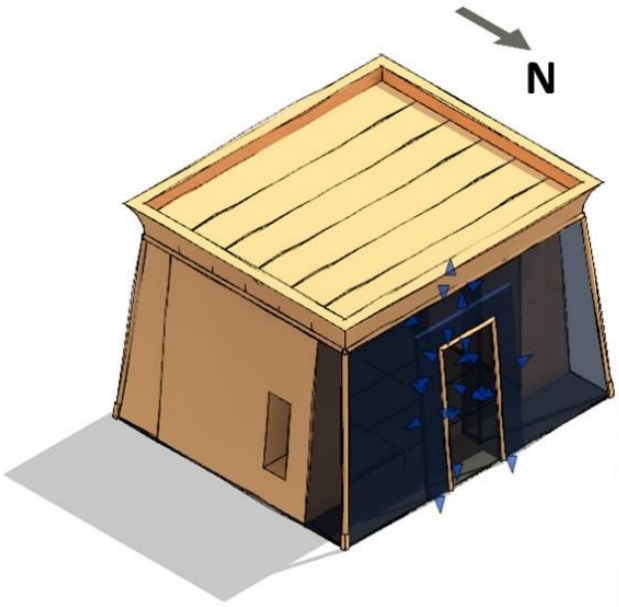


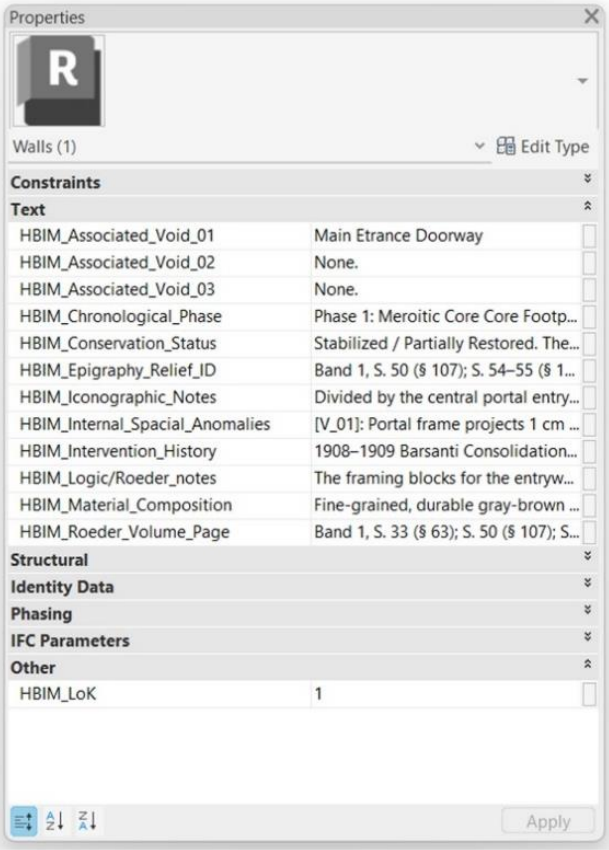
Figure 25. The Chapel of Ergamenes with displaced elements



Chapel of Ergamenes *(Ergamenes Kapelle)*:

Northern wall and HBIM parametric values







1. HBIM_Associated_Void_01: Main_Etrance_Doorway
2. HBIM_Chronological_Phase: Phase 1: Meroitic Core Core Footprint (Ergamenes Phase).
3. HBIM_Conservation_Status: Stabilized / Partially Restored. The wall suffered significant structural distress following the collapse of the front of the temple; however, the lower portions remain as original Pharaonic ashlar masonry. The upper sections, including the cornice area, required systematic reassembly by Barsanti using original block fragments supplemented by modern cement stabilization to ensure the structural cohesion of the chapel's northern facade.
4. HBIM_Epigraphy_Relief_ID: Band 1, S. 50 (§ 107); S. 54–55 (§ 113); S. 202 (§ 459–484).
5. HBIM_Iconographic_Notes: Divided by the central portal entry frame. Flanking wall zones show baseline sumpf-pflanzen (swamp plant) incisions beneath three horizontal high-relief scenes. Lintel features a detailed twin-register horizontal block recording the royal cartouches and names of Ergamenes.
6. HBIM_Internal_Spacial_Anomalies: [V_01]: Portal frame projects 1 cm clear of the wall plane and stands 3.65 m tall. Entry width was radically altered to 1.30 m by ancient modifications, completely breaking away the original Meroitic stone lintel and destroying its structural frame.
7. HBIM_Intervention_History: 1908–1909 Barsanti Consolidation. This wall was a primary focus of the 1908–1909 restoration program directed by Alessandro Barsanti. Intervention involved the removal of accumulated debris, the mechanical consolidation of unstable blocks using modern cement injections, and the re-setting of loose masonry blocks into a stabilized mortar bed to recreate the chapel's original architectural profile.
8. HBIM_Logic/Roeder_notes: The framing blocks for this entryway show massive dynamic reuse during the Roman period, when new relief scenes tracking Tiberius and later unnamed Caesars were systematically superimposed directly over the Meroitic frames.
9. HBIM_Material_Composition: Fine-grained, durable gray-brown sandstone blocks. Average block layer height is uniformly 51–52 cm, representing an exact ancient Egyptian cubit. The outer wall surfaces are flawlessly smooth to the touch.
10. HBIM_Roeder_Volume_Page: Band 1, S. 33 (§ 63); S. 50 (§ 107); S. 54-55 (§ 113); S. 56 (§ 116–117); S. 171-191 (§ 400–436).
11. HBIM_Lok: LOK 1.

The Northern wall of the Ergamenes Chapel is a primary, evidence-based structural component recorded by Roeder during his onsite surveys. The wall's geometry, including the integration of the main entrance portal, was precisely documented, allowing for a high-confidence geometric reconstruction.

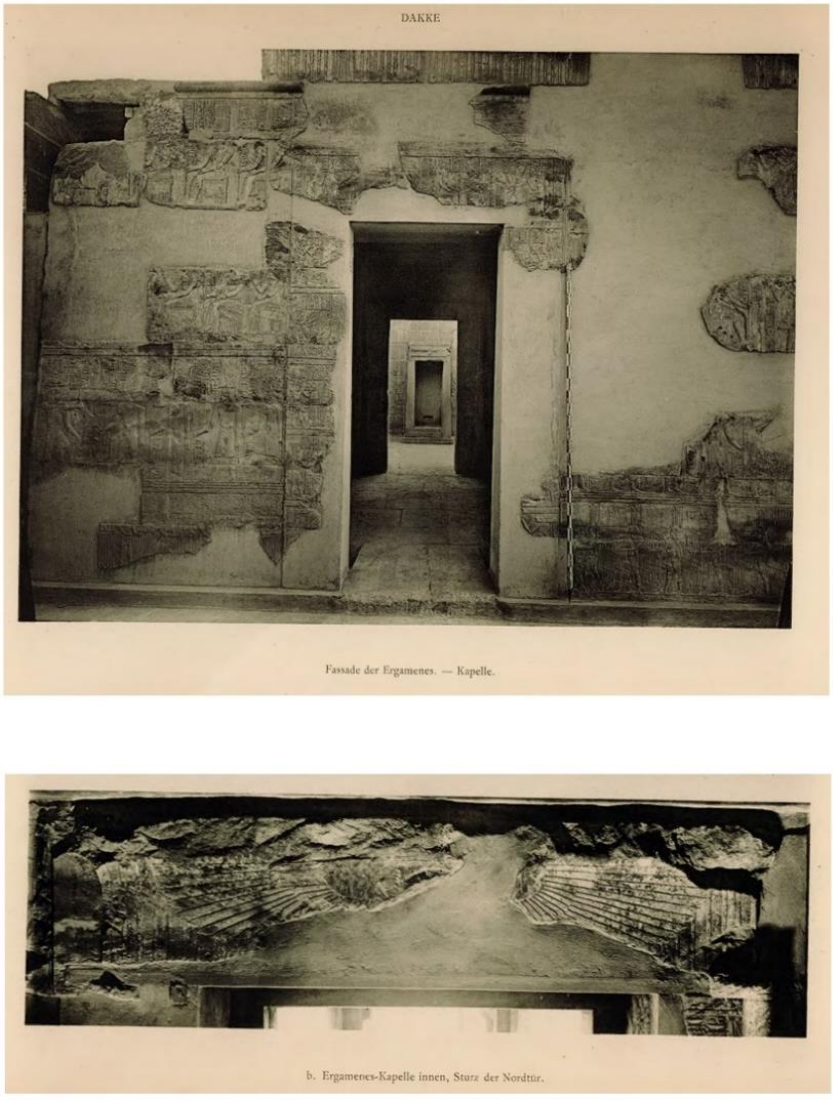
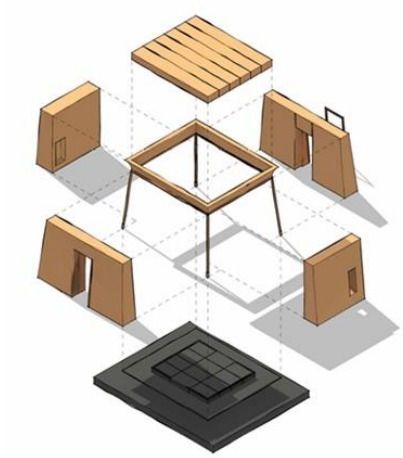
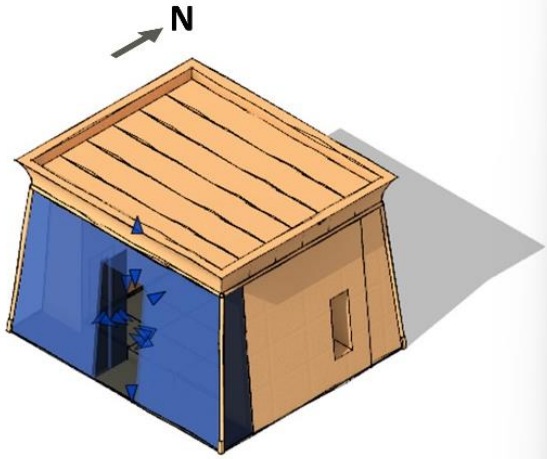


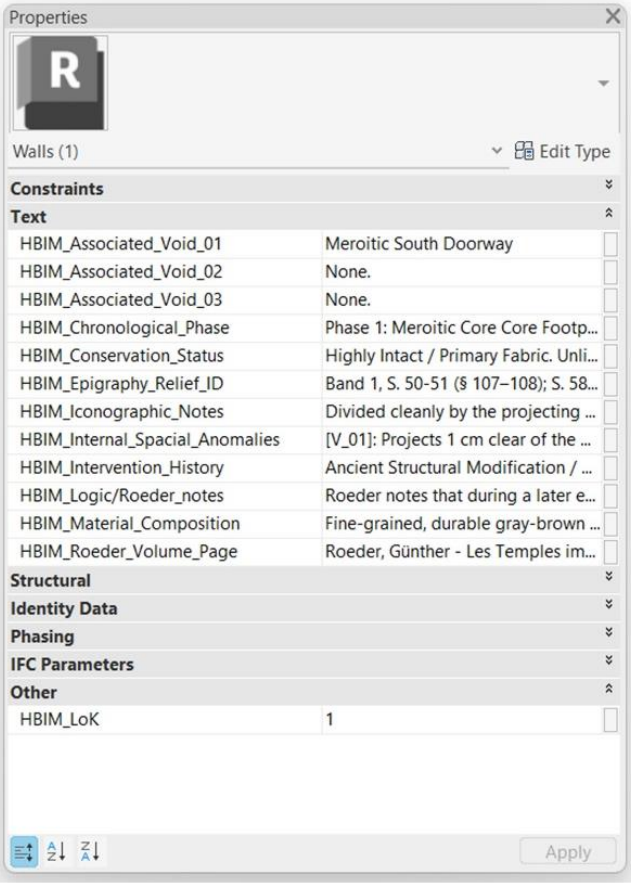
Figure 26. Chapel of Ergamenes: Roeder's photos vs. the Revit's 3D model.



Chapel of Ergamenes *(Ergamenes Kapelle):*

Southern wall and HBIM parametric values

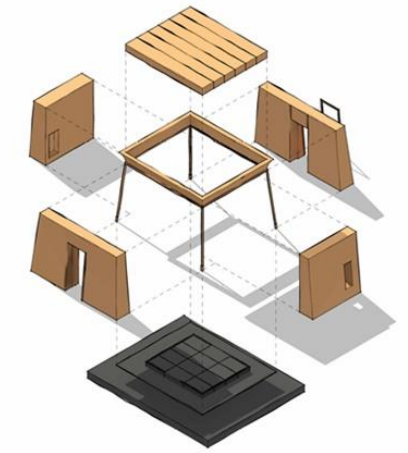






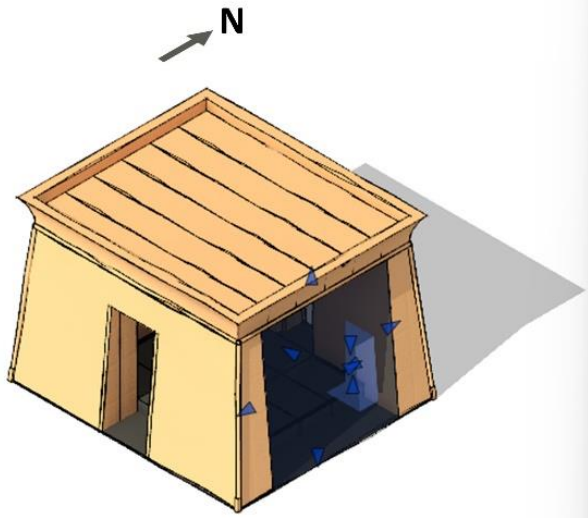
1. HBIM_Associated_Void_01: Meroitic South Doorway
2. HBIM_Chronological_Phase: Phase 1: Meroitic Core Core Footprint (Ergamenes Phase).
3. HBIM_Conservation_Status: Highly Intact / Primary Fabric. Unlike the exterior Roman Sanctuary modifications, the Southern wall of the Ergamenes Chapel represents the original Pharaonic/Meroitic structural integrity. While the surface reliefs have suffered localized erosion and the original doorway was crudely widened in antiquity, the core sandstone ashlar masonry remains largely preserved in its original configuration.
4. HBIM_Epigraphy_Relief_ID: Band 1, S. 50-51 (§ 107–108); S. 58 (§ 120); S. 236–267 (§ 525–567).
5. HBIM_Iconographic_Notes: Divided cleanly by the projecting southern doorway. Both the eastern and western masonry wings contain a low stone baseline socket followed by three horizontal registers of painted high-reliefs detailing the nubian king Ergamenes making offerings directly before specialized solar and underworld iterations of Thot.
6. HBIM_Internal_Spacial_Anomalies: [V_01]: Projects 1 cm clear of the wall plane. Torus molding displays a plain, unsulkpired surface. Doorway opening measures exactly 1.30 m wide and 3.20 m high. Pivot pin sockets are explicitly preserved on the western side of the stone threshold floor, with a locking bar cavity cutting into the eastern doorjamb face.
7. HBIM_Intervention_History: Ancient Structural Modification / 1908–1909 Barsanti Stabilization. The wall underwent a major ancient modification when the original narrow doorway was structurally breached and widened to accommodate larger cultic traffic. In 1908–1909, Alessandro Barsanti performed essential consolidation work, injecting cement mortar into the ancient masonry joints and stabilizing the structural shoulders of the wall near the doorway breach to prevent collapse.
8. HBIM_Logic/Roeder_notes: Roeder notes that during a later expansion phase, the central doorway aperture was purposefully widened and heightened, cutting away the inner edges of the original Meroitic jamb decoration blocks and lopping off a 20.5 cm high horizontal band from the primary lintel zone.
9. HBIM_Material_Composition: Fine-grained, durable gray-brown sandstone blocks. Standard block height follows the uniform 51–52 cm cubit line, though the 5th course from the foundation layer measures 63 cm and the 7th course measures 59 cm. Outer Meroitic face is highly polished and smooth.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 33 (§ 63); S. 50-51 (§ 107–108); S. 58-59 (§ 120–122); S. 337 (§ 740).
11. HBIM_Lok: LOK 1.

The Southern wall of the Ergamenes Chapel is an original, primary structural component of the oldest portion of the Dakka temple complex. Its dimensions, relief placement, and geometric relationship to the doorway axis were physically surveyed and documented by Roeder, providing an evidence-based foundation for the HBIM model.



Chapel of Ergamenes *(Ergamenes Kapelle)*:

Eastern wall and HBIM parametric values



Properties

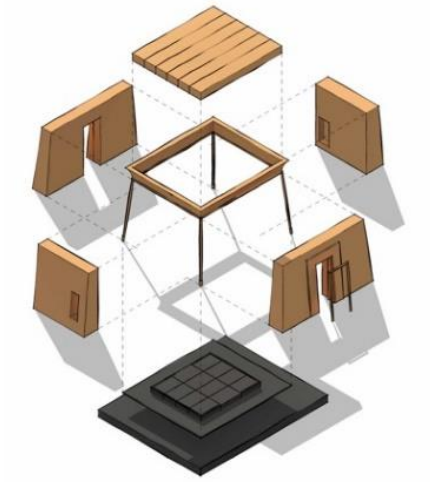
Walls (1) Edit Type

Constraints	
Text	
HBIM_Associated_Void_01	Roman Chapel Side Door
HBIM_Associated_Void_02	None.
HBIM_Associated_Void_03	None.
HBIM_Chronological_Phase	Phase 1: Meroitic Core Footprint (...
HBIM_Conservation_Status	Fragmentary / Intervened. The wal...
HBIM_Epigraphy_Relief_ID	Band 1, S. 57 (§ 119); S. 202-215 (§...
HBIM_Iconographic_Notes	Saturated with high-relief scenes ...
HBIM_Internal_Spacial_Anomalies	The structural face is perfectly vert...
HBIM_Intervention_History	Roman Period Portal Insertion / 1...
HBIM_Logic/Roeder_notes	Roeder notes that Parthey discove...
HBIM_Material_Composition	Polished gray-brown sandstone bl...
HBIM_Roeder_Volume_Page	Roeder, Günther - Les Temples im...
Structural	
Identity Data	
Phasing	
IFC Parameters	
Other	
HBIM_LoK	1

Apply

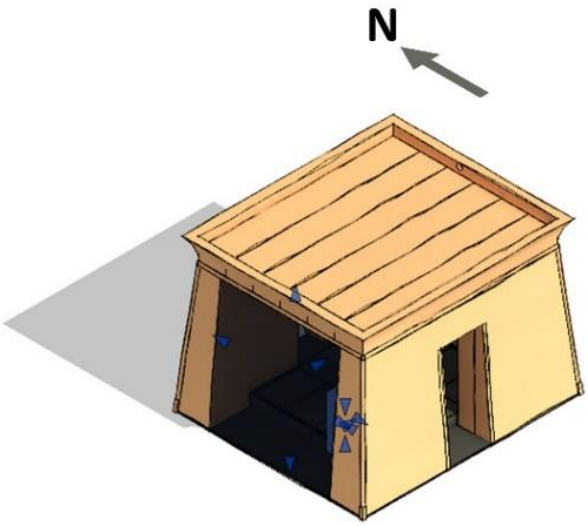
1. HBIM_Associated_Void_01: Roman Chapel Side Door
2. HBIM_Chronological_Phase: Phase 1: Meroitic Core Footprint (Ergamenes Phase)
3. HBIM_Conservation_Status: Fragmentary / Intervened. The wall fabric is original, but the structural continuity was compromised by the insertion of the secondary Roman doorway. The surface reliefs are heavily abraded, particularly around the secondary doorway breach, where original Meroitic iconography was lost to accommodate the later structural opening.
4. HBIM_Epigraphy_Relief_ID: Band 1, S. 57 (§ 119); S. 202-215 (§ 459–484).
5. HBIM_Iconographic_Notes: Saturated with high-relief scenes prioritizing the goddess Isis and the deities of the First Cataract (Osiris, Horus, and Nephthys). The north end contains a late secondary doorway cutout measuring 62 cm wide and 1.67 m high, stepping up 37 cm above the floor line. It completely shears through the pre-existing Meroitic hieroglyphic registers.
6. HBIM_Internal_Spacial_Anomalies: The structural face is perfectly vertical internally, but its outer face buried inside the Roman wrap-around shell retains its original architectural battery slope (Böschung).
7. HBIM_Intervention_History: Roman Period Portal Insertion / 1908–1909 Barsanti Stabilization. The original Eastern wall was cut to insert the door leading to the Roman side-chapel—a critical structural shift. Barsanti's team later stabilized this breach using cement grout to secure the loose stones around the lintel and jambs, which were failing due to the structural stress of the Roman-era modification.
8. HBIM_Logic/Roeder_notes: Roeder notes that Parthey discovered this wall door (V_01) was once systematically walled up with stone blocks. It completely lacks traditional framing or architectural headers, proving it was punctured through under Augustus to link the Chapel directly to the newly constructed exterior Roman rooms.
9. HBIM_Material_Composition: Polished gray-brown sandstone blocks following the standard 51–52 cm course line.
10. HBIM_Roeder_Volume_Page:Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 33 (§ 63); S. 50 (§ 108); S. 57 (§ 119).
11. HBIM_Lok: LOK 1.

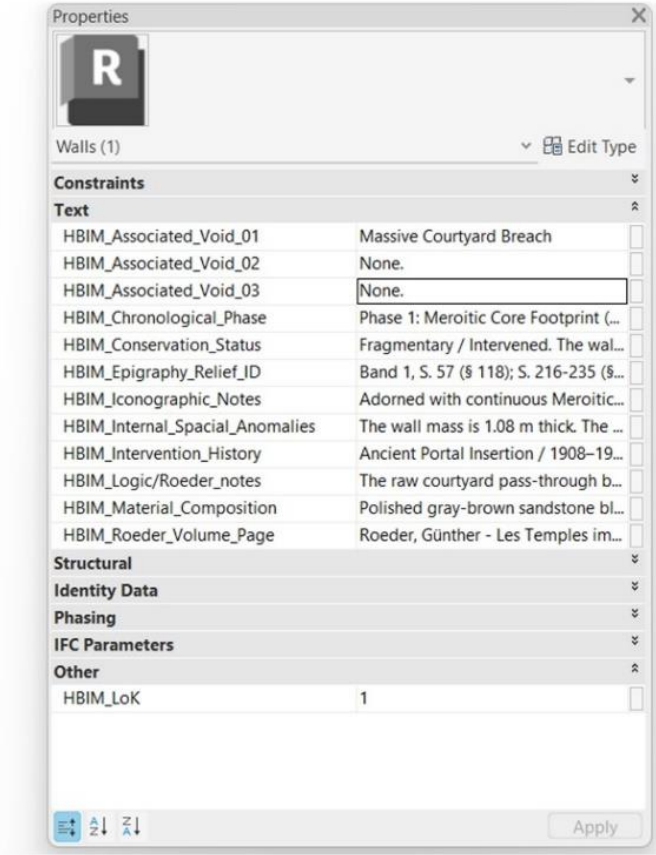
This wall constitutes the eastern vertical boundary of the original Ergamenes structure, featuring a primary doorway that was modified in the Roman period to provide access to the later, smaller eastern chapel.



Chapel of Ergamenes *(Ergamenes Kapelle):*

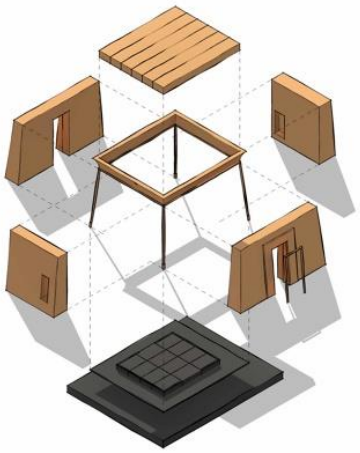
Western wall and HBIM parametric values





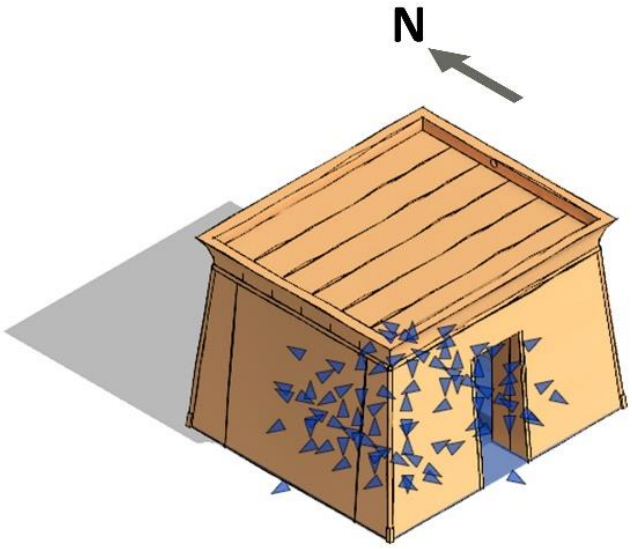
1. HBIM_Associated_Void_01: Massive Courtyard Breach
2. HBIM_Chronological_Phase: Phase 1: Meroitic Core Footprint (Ergamenes Phase)
3. HBIM_Conservation_Status: Fragmentary / Intervened. The wall fabric is largely original, but its structural integrity was compromised by the insertion of a secondary doorway breach in antiquity, intended to provide access between the Ergamenes Chapel and the external space. Significant abrasion is present on the relief surfaces surrounding this ancient door breach.
4. HBIM_Epigraphy_Relief_ID: Band 1, S. 57 (§ 118); S. 216-235 (§ 485–524).
5. HBIM_Iconographic_Notes: Adorned with continuous Meroitic registers heavily emphasizing the god Thot (depicted in the first and last segments of the lower row, and the start of the upper row). The scenes document the physical handover of the temple to its divine master. A secondary doorway breach (V_01) measuring 80 cm wide and 1.66 m high breaks through the southern half.
6. HBIM_Internal_Spacial_Anomalies: The wall mass is 1.08 m thick. The raw breach cuts completely through this masonry core straight out to the west outer wall, completely bypassing the adjacent roof staircase cavity.
7. HBIM_Intervention_History: Ancient Portal Insertion / 1908–1909 Barsanti Stabilization. The wall was significantly modified in antiquity by cutting through the original ashlar masonry to create a passage. During the 1908–1909 restoration, Alessandro Barsanti performed structural consolidation to the masonry surrounding this breach to mitigate instability resulting from the loss of structural continuity in the original wall fabric.
8. HBIM_Logic/Roeder_notes: The raw courtyard pass-through breach has been completely filled in and stabilized with modern structural masonry by Barsanti during the 1908 preservation interventions.
9. HBIM_Material_Composition: Polished gray-brown sandstone blocks following the standard 51–52 cm course line.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930),Band 1, S. 33 (§ 63); S. 50 (§ 108); S. 57 (§ 118).
11. HBIM_Lok: LOK 1.

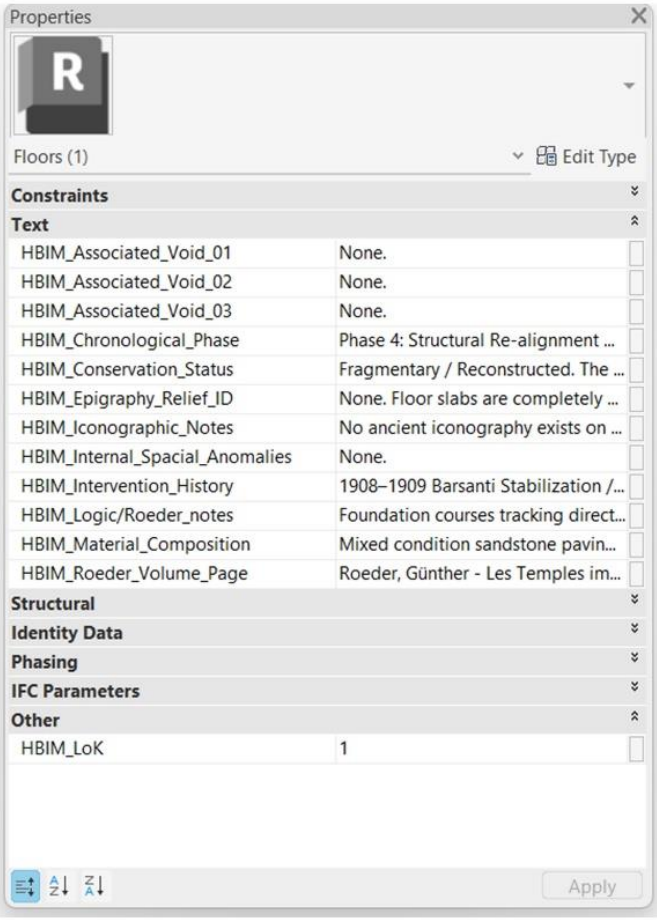
The Western wall forms the primary structural enclosure of the Ergamenes Chapel's western axis. Its position relative to the central chapel axis is established by the original Ptolemaic structural survey documented in the records of Günther Roeder.



Chapel of Ergamenes *(Ergamenes Kapelle):*

Floor system and HBIM parametric values

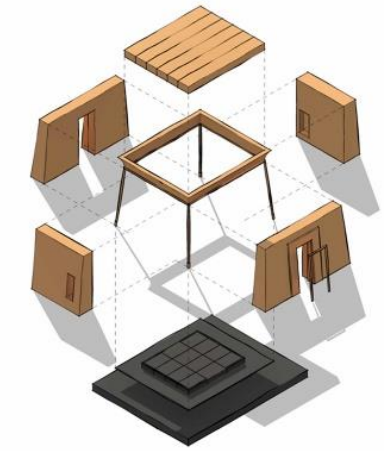






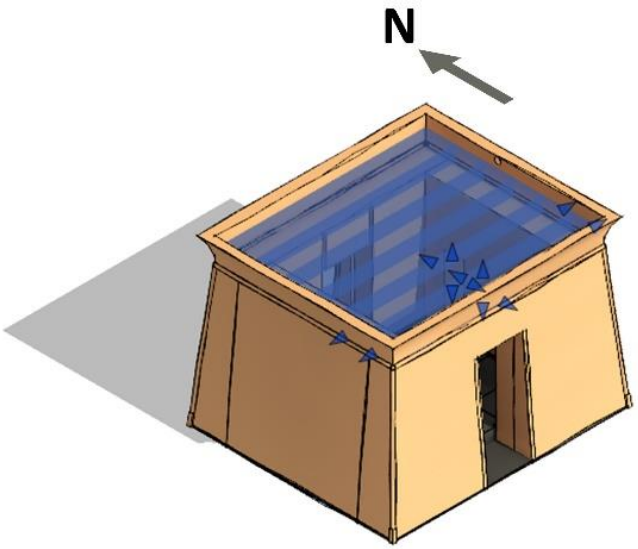
1. HBIM_Chronological_Phase: Phase 4: Structural Re-alignment Window (Sandstone floor flagging).
2. HBIM_Conservation_Status: Fragmentary / Reconstructed. The original stone floor slabs were largely removed or disturbed in antiquity. The current floor level is a result of the 1908–1909 conservation efforts, where modern fill and mortar bedding were introduced to provide a stable, level surface for the structural reassembly of the chapel walls.
3. HBIM_Epigraphy_Relief_ID: Keine (None). Floor slabs are completely uninscribed.
4. HBIM_Iconographic_Notes: No ancient iconography exists on the floor planes.
5. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization / Modern Filling. During the restoration, Barsanti's team stabilized the underlying sub-foundation of the chapel. No original paving remains in situ; therefore, the current floor is effectively a modern structural interpretation, lacking the original stone pavement identified in earlier, less invasive surveys.
6. HBIM_Logic/Roeder_notes: Foundation courses tracking directly beneath the finished floor level reveal a massive, rough-cut subterranean masonry setting course extending 4 to 5 cm clear of the low southern wall base layout.
7. HBIM_Material_Composition: Mixed condition sandstone paving slabs. Barsanti repositioned a substantial portion of these ground slabs during the 1908 reconstruction mapping.
8. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 55 (§ 114).
9. HBIM_Lok: LOK 1.

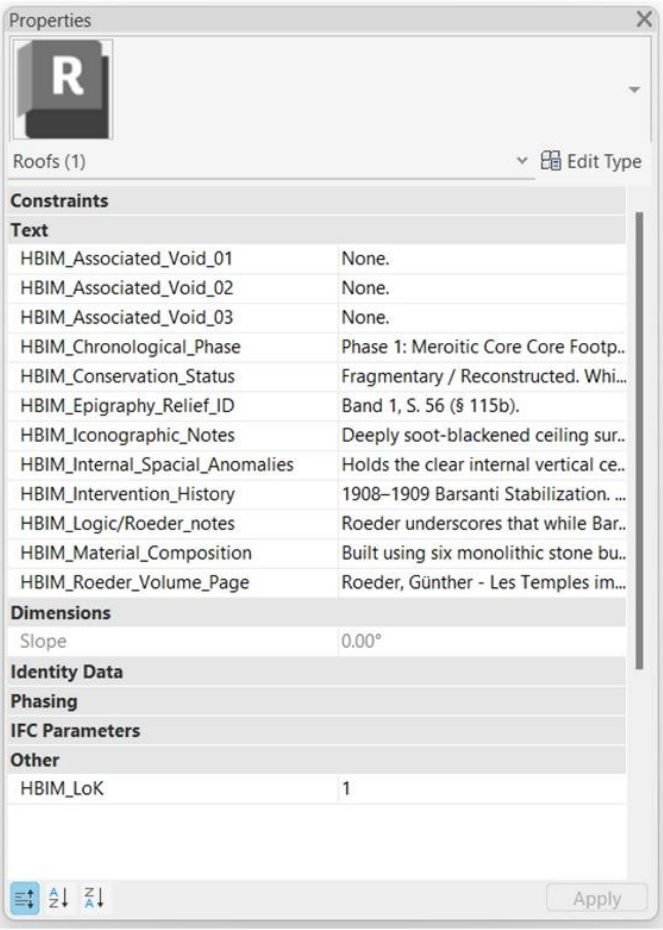
The floor system of the Ergamenes Chapel serves as the structural foundation for the oldest interior chamber of the temple. Its physical extent is bounded by the primary northern and southern ashlar wall foundations.



Chapel of Ergamenes *(Ergamenes Kapelle):*

Roof system and HBIM parametric values

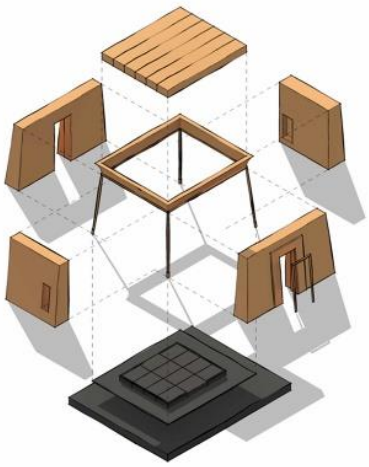






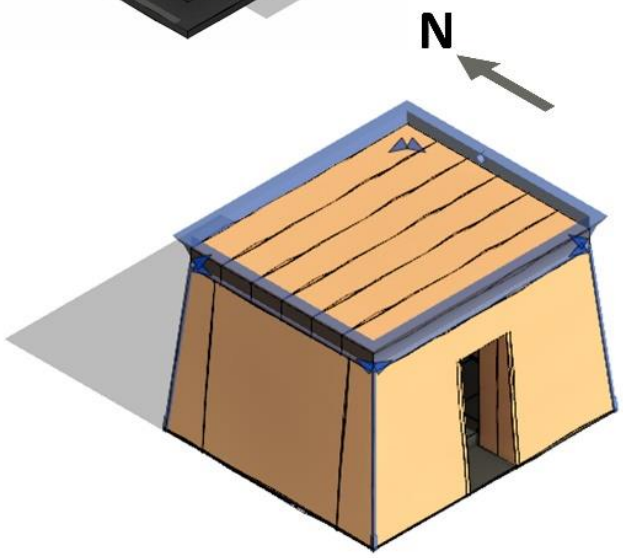
1. HBIM_Chronological_Phase: Phase 1: Meroitic Core Core Footprint (Ergamenes Phase).
2. HBIM_Conservation_Status: Fragmentary / Reconstructed. While the structural span is original, the ceiling surface suffered significant collapse. The current state includes reassembled beams and modern stabilization, with loss of original decorative surface integrity in the central and northern spans.
3. HBIM_Epigraphy_Relief_ID: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930),Band 1, S. 56 (§ 115b).
4. HBIM_Iconographic_Notes: Deeply soot-blackened ceiling surfaces hosting a painted sky canopy map. The central band traces rows of flying vultures winging due south, bordered by horizontal text ribbons recording the Meroitic king's title rings. Outer fields host a formal star grid painted in deep yellow with fine red borders dropped against a pure blue ground.
5. HBIM_Internal_Spacial_Anomalies: Holds the clear internal vertical ceiling distance to a precise height of 3.75 m above the floor tracking line. An offset channel measuring 15 cm above the finished roof plane tracks horizontally into the outer wall to establish a rainwater exit run.
6. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Only the two southernmost beams were identified in situ by Barsanti's team during the 1908–1909 intervention. The remaining four beams were re-laid using modern structural support to secure the chapel's internal volume, supplemented by cement stabilization of the beam-bearing surfaces along the wall tops.
7. HBIM_Logic/Roeder_notes: Roeder underscores that while Barsanti found only the two southernmost ceiling beams perfectly intact in situ, the remaining four collapsed beams were safely recovered and re-hoisted into their ancient seating grooves, meaning the original layout is fully verified.
8. HBIM_Material_Composition: Built using six monolithic stone building beams measuring nearly 6.00 m long, running horizontally on a straight East-West orientation track.
9. HBIM_Roeder_Volume_Page: Band 1, S. 55 (§ 114–115b); S. 59 (§ 123).
10. HBIM_Material_Composition: Built using six monolithic stone building beams measuring nearly 6.00 m long, running horizontally on a straight East-West orientation track.
11. HBIM_Lok: LOK 1.

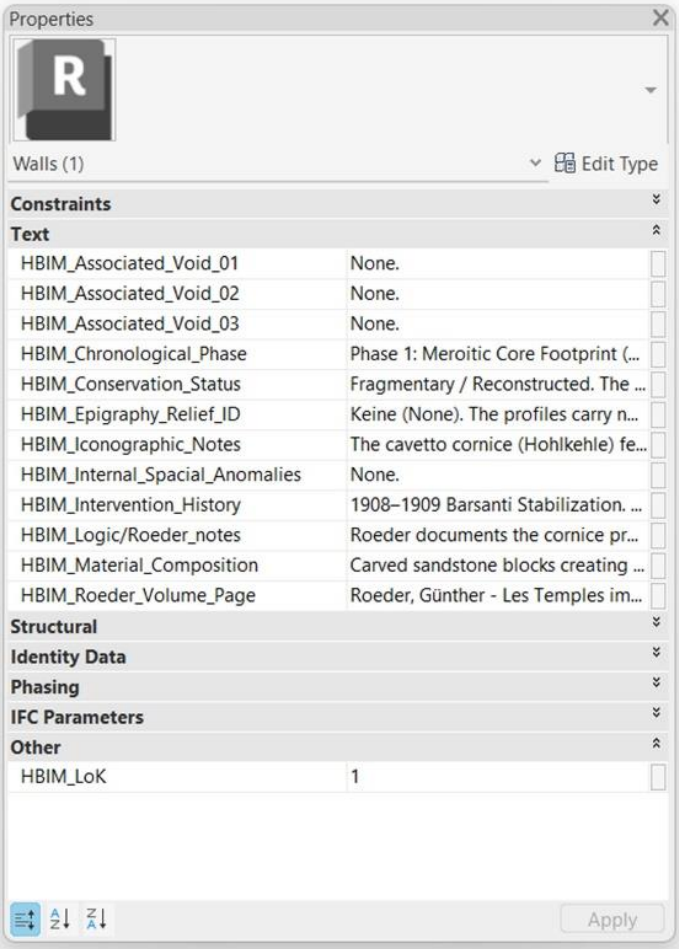
The roof system is composed of six primary stone beams (architraves) spanning in the East-West direction, resting upon the northern and southern ashlar wall structure.



Chapel of Ergamenes *(Ergamenes Kapelle):*

Cavetto Cornice and Torus Molding including HBIM parametric values





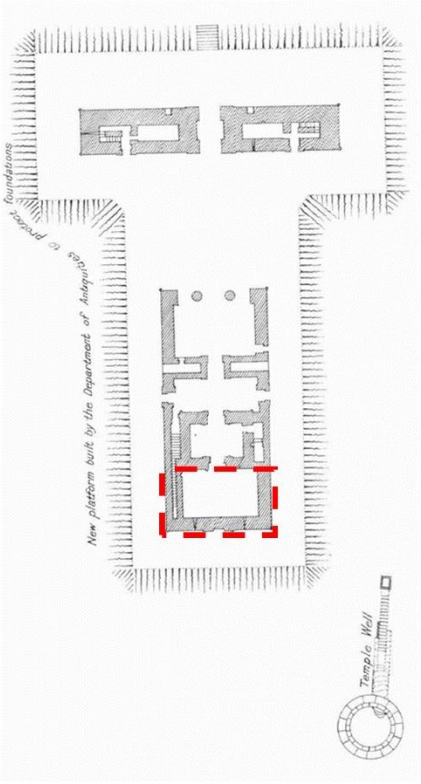
1. HBIM_Chronological_Phase: Phase 1: Meroitic Core Footprint (Ergamenes Phase)
2. HBIM_Conservation_Status: Fragmentary / Reconstructed. The cornice was severely impacted by the chapel's partial collapse; while portions remain, much of the structural integrity of the cavetto profile has been restored using modern mortars and synthetic consolidants during the early 20th-century conservation phase.
3. HBIM_Epigraphy_Relief_ID: Keine (None). The profiles carry no texts.
4. HBIM_Iconographic_Notes: The cavetto cornice (Hohlkehle) features a standard incised feather pattern (Federmuster) painted in alternating strips of brilliant blue, green, and red. The torus molding (Rundstab) underneath is carved with a classic wrapped-band pattern (Bandmuster).
5. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Alessandro Barsanti's intervention included the careful reassembly of the cornice blocks. Significant sections of the cavetto profile and the associated Uraeus frieze were reinforced with cement bedding to prevent further detachment from the underlying masonry course.
6. HBIM_Logic/Roeder_notes: Roeder documents the cornice profile specifically for the Ergamenes Chapel as a classic Egyptian *Hohlkehle* (cavetto) often paired with the *torus* (rundstab) molding below it. This cornice wraps completely around the top perimeter blocks of the original independent Meroitic building box. When the Roman builders wrapped Room I and the Query room around it, this cornice became completely interiorized. It is perfectly visible inside the upper open staircase tunnel on the west and inside the upper register of the secondary Roman chapel on the east, where the Roman sculptors explicitly chiseled a Meroitic band pattern over it to blend it with their new rooms.
7. HBIM_Material_Composition: Carved sandstone blocks creating a 70 cm high cavetto cornice profile projecting 26 cm over a rounded 15 cm diameter torus molding.
8. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930),Band 1, S. 51 (§ 108); S. 59-60 (§ 123-124); S. 62 (§ 128).
9. HBIM_Lok: LOK 1.

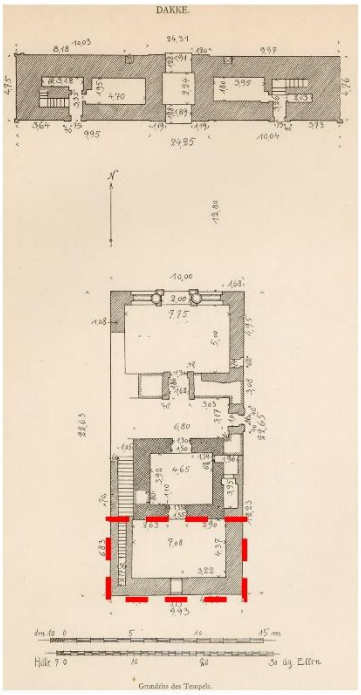
The cornice is positioned at the superior edge of the Ergamenes Chapel walls, serving as the crowning architectural member (Bekrönung) that defines the transition to the roof structure.

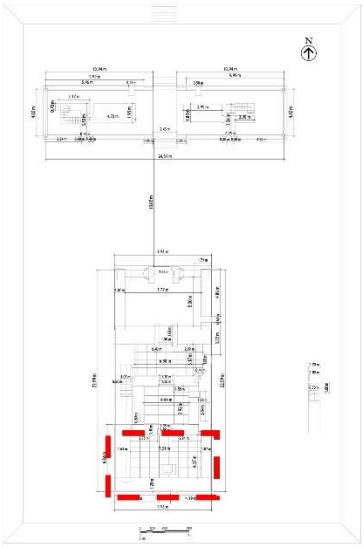
5.2.2 The Sanctuary *(Adytum)*:

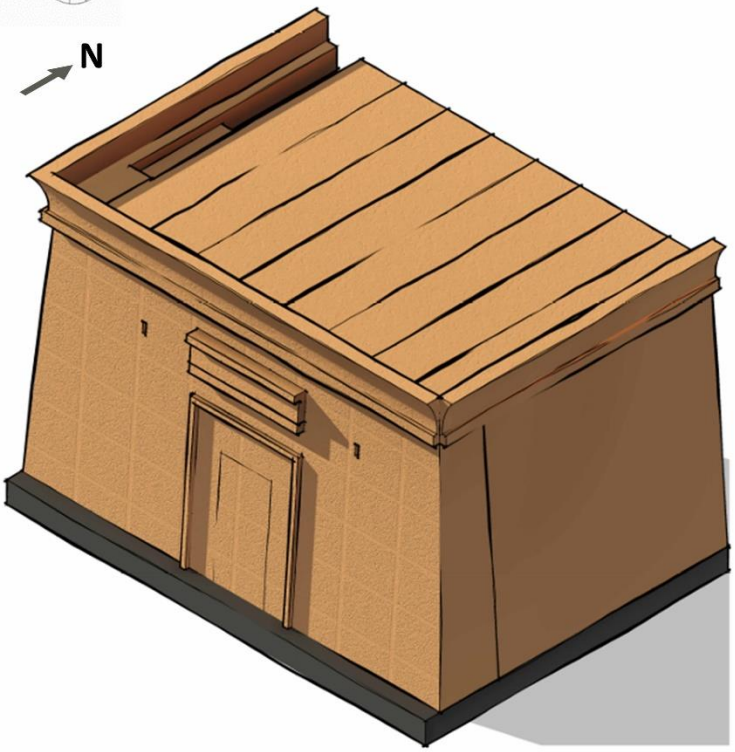
False Door, Monolithic Naos, Structural Junctions, and the Architectural Moldings

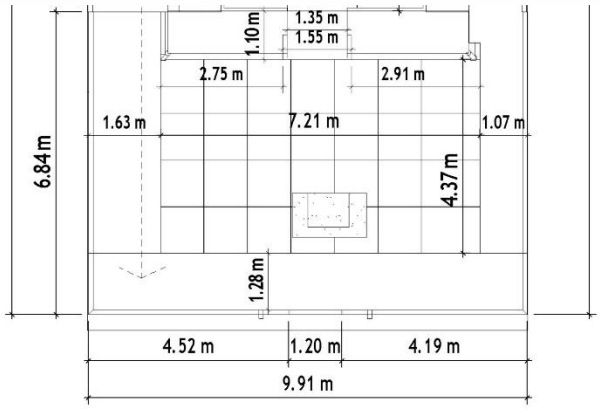
Outlines the inner sacred space of the temple, the joints of the false door (*Die Scheintür*), the pink/grey granite monolithic naos, the structural junctions where Roman perimeter walls enclose the earlier Meroitic core and the Architectural Cavetto Cornice and Torus moldings.


New platform built by the Department of Antiquities
foundations of pronaos
Temple Well


DAKKE.
Grundriss des Tempels.




N


1.10 m
1.35 m
1.55 m
2.75 m
2.91 m
1.63 m
7.21 m
1.07 m
6.84 m
4.37 m
1.28 m
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1.20 m
4.19 m
9.91 m

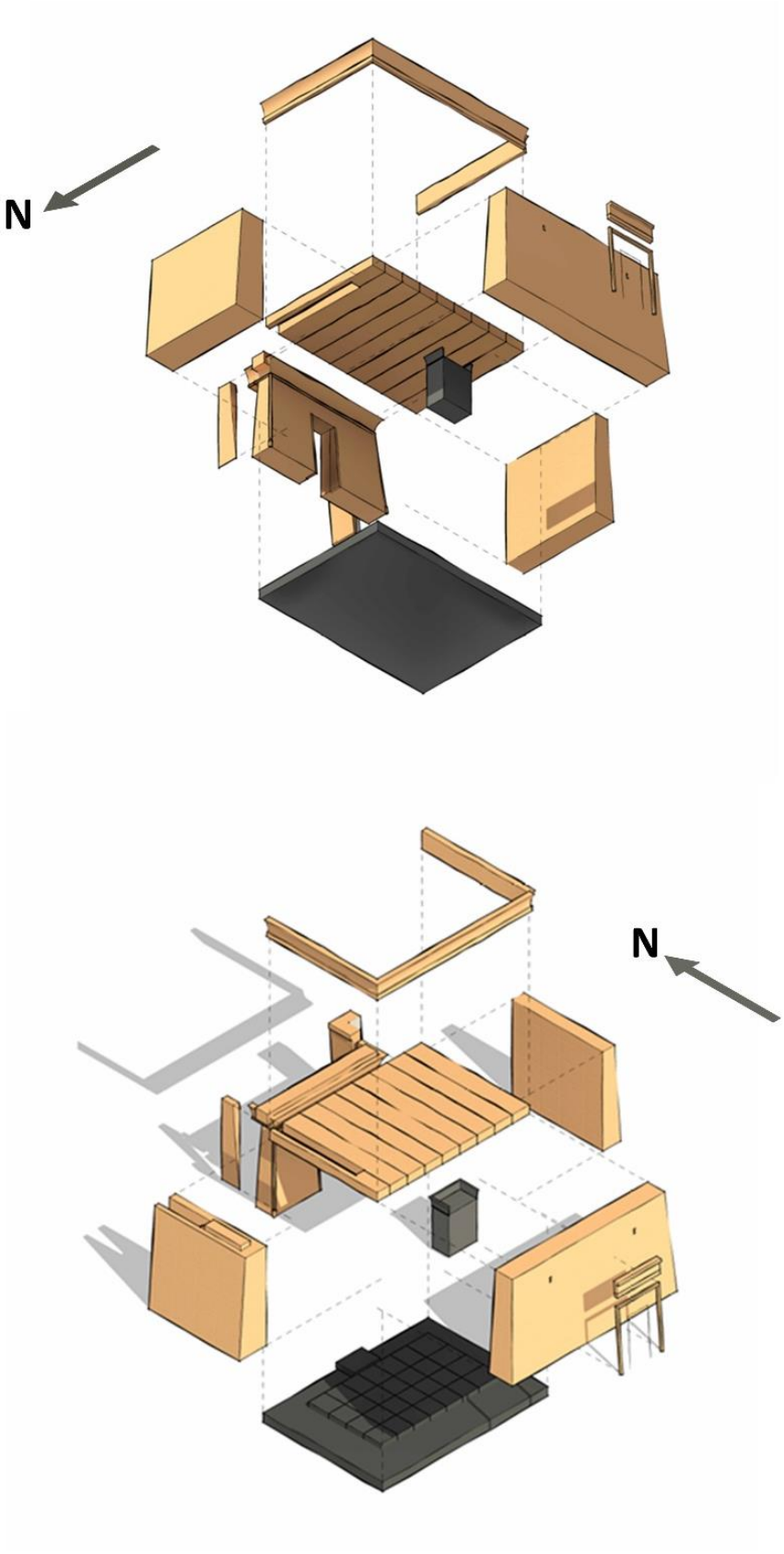
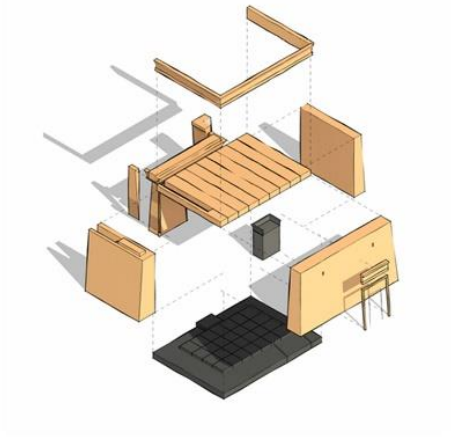
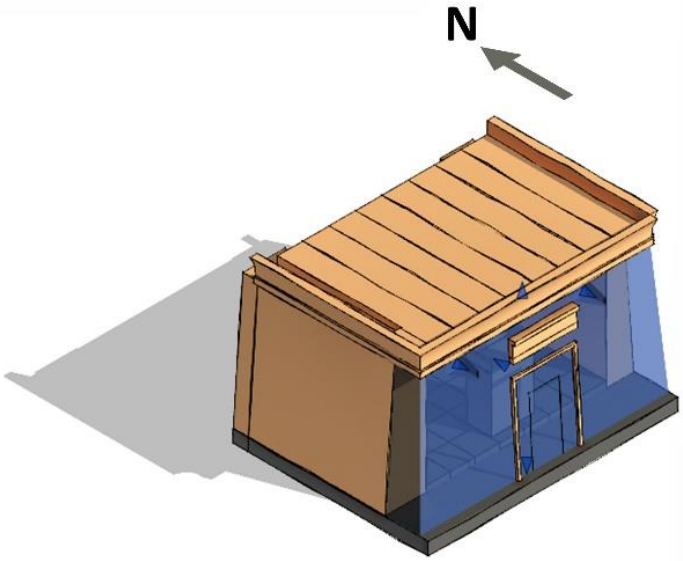


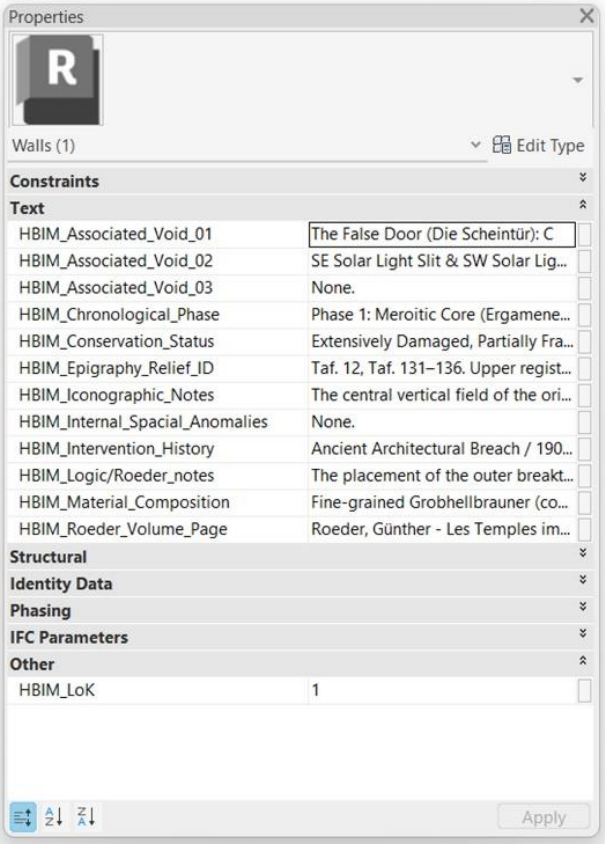
Figure 27. The Sanctuary with displaced elements



The Sanctuary *(Adytum)*:

Southern wall and HBIM parametric values







1. HBIM_Associated_Void_01: The False Door (Die Scheintür): Central Axis Entry Doorway

[Dimensions & Descriptions]: Post-Ptolemaic axially centered breakthrough cut. Meaurements: 1.03 m wide x 2.25 m high on exterior face; splayed to 1.07 m wide x 2.67 m high on internal Sanctuary face. Destroys lower register of Meroitic False Door. Offset error: Shifts 28.5 cm west of the true internal Sanctuary centerline because the West wall is thicker than the East wall to accommodate the hidden stair system.

2. HBIM_Associated_Void_02: SE Solar Light Slit & SW Solar Light Slit:

[Dimensions & Descriptions]: High-level splayed window apertures sitting 75 cm below ceiling line. Interior openings measure 61 cm high x 46 cm wide, tapering down through the wall core to narrow exterior slots. Sills are flat; upper lintels slope steeply upward to optimize solar capture.

3. HBIM_Cronological_Phase: Phase 1: Meroitic Core (Ergamenes) / Phase 3: Roman Extension Era (Augustan construction window).
4. HBIM_Conservation_Status: Extensively Damaged, Partially Fragmented, and Smashed Core Matrix. The central zone of the southern wall is structurally fractured due to the historical breaching of an external entryway directly through the ancient masonry. The original high-relief iconographic decoration of Thot of Pnubs was largely obliterated. Only the upper elements of the Roman-era design survive in situ: the high-relief top edge of the divine crown's distinct four smooth feathers, a 30 cm section of the raised hieroglyphic border column, the lower outline of the celestial sky-sign curve, the single-rolled framing cavetto cornice (Hohlkehle), the framing torus molding (Rundstab), and the raw, uncarved stone platform block reserved for the protective uraeus-frieze alignment.
5. HBIM_Iconographic_Notes: The central vertical field of the original Meroitic facade featured a high-relief depiction of Thoth of Pnubs standing on a papyrus stand, wearing his characteristic four-feathered crown. A 30 cm wide block space was left forward for an accompanying two-line vertical hieroglyphic caption. The lower half of this entire iconographic composition was completely destroyed when the post-Ptolemaic doorway was broken through the axis.
6. HBIM_Epigraphy_Relifes_ID: Taf. 12, Taf. 131–136. Upper register retains fragmented text lines flanking the cavetto cornice. Lower register details a sequence of moving Nilgötter (Nile deities) bearing localized regional offerings.
7. HBIM_Intervention_History: Ancient Architectural Breach / 1908–1909 Barsanti Structural Mass Infill. Initially constructed as a solid, sacred boundary wall featuring an outer false door projection (Scheintür) to house localized liturgies, a 2.23 m high by roughly 1.30 m wide structural portal was subsequently hacked straight through the central axis of the niche to allow physical access to the rear temple court. To stabilize the catastrophic lean of the shifting wall masses and prevent structural failure during the early 20th-century preservation campaign, Alessandro Barsanti completely bricked up and filled the interior and exterior openings of this secondary threshold with flush cement and plain masonry block work.
8. HBIM_Logic/Roeder_notes: The placement of the outer breakthrough doorway dictates that the builders aligned the opening from the outer court axis first, resulting in a structural misalignment inside the inner chamber.
9. HBIM_Material_Composition: Fine-grained Grobhellbrauner (coarse, light yellow-brown) sandstone blocks. Surface finish left rough-hewn with building bosses intact. Total external base thickness is 9.90 m across.Pavement shifts up by exactly 42 cm compared to the external courtyard floor layer.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 41–42 (§ 82–83); S. 337–349 (§ 740–777)
11. HBIM_Lok: LOK 1

Dimensions and positions were physically recorded and surveyed by Roeder.



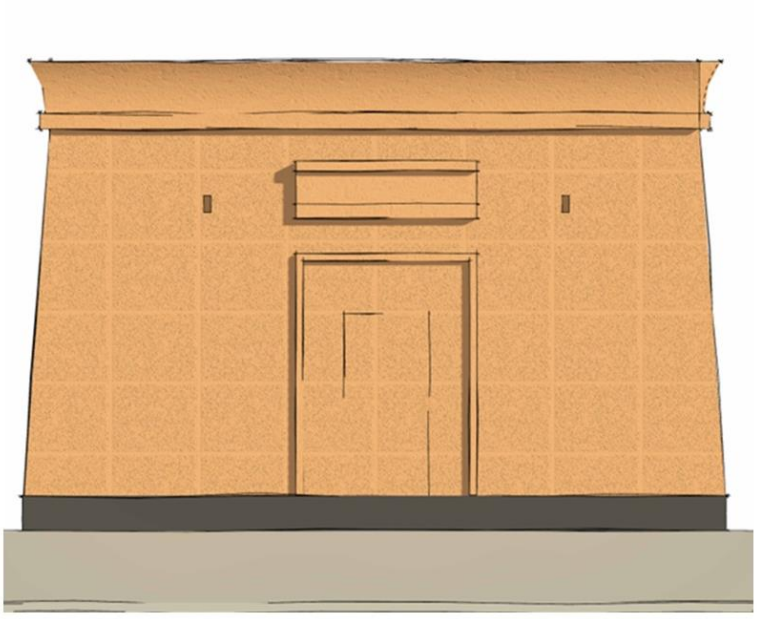
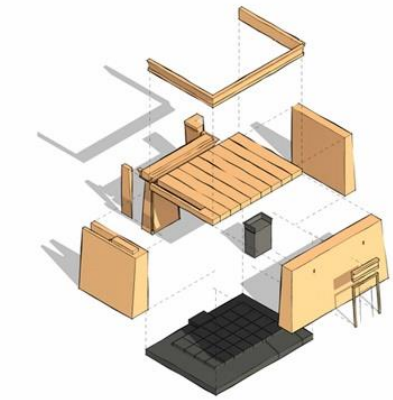
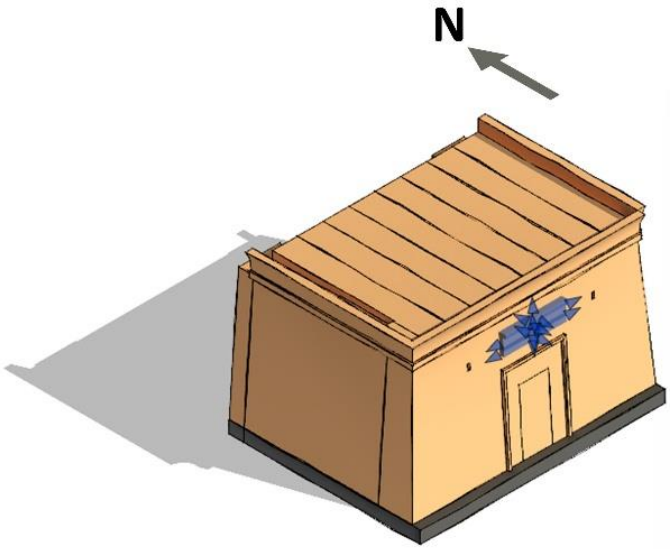


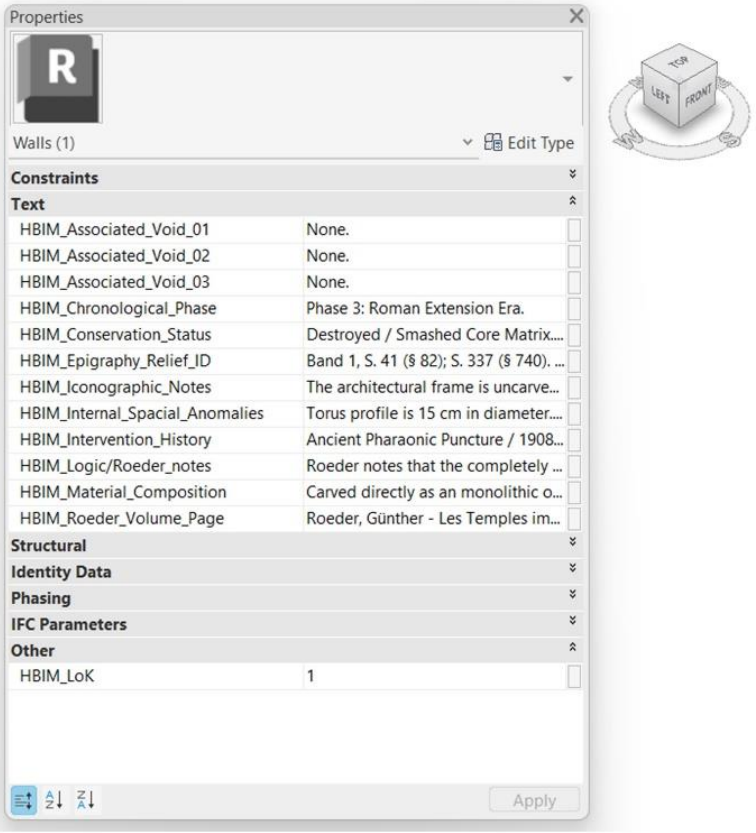
Figure 28. The Sanctuary: Roeder's photos vs. the Revit's 3D model.



The Sanctuary *(Adytum)*:

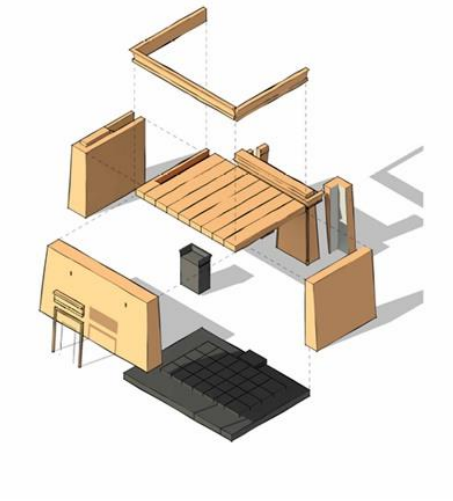
Cavetto Cornice and Torus Molding of the False Door including HBIM parametric values





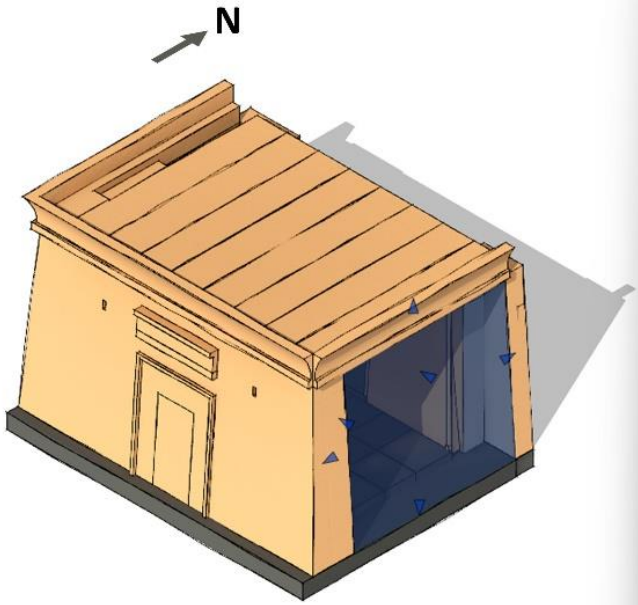
1. HBIM_Chronological_Phase: Phase 3: Roman Extension Era.
2. HBIM_The Conservation_Status: Destroyed / Smashed Core Matrix. The lower portion of the false door (Scheintür) was completely broken out and physically demolished when a standard entry door was retroactively hacked through the rear wall of the temple shell. Only the upper architectural profile remains intact. This includes the top section of the central recessed field, the framing vertical lines, the torus molding (Rundstab), the cavetto cornice (Hohlkehle), and the raw, uncarved stone mass intended for the protective uraeus-frieze panel.
3. HBIM_Epigraphy_Relief_ID: Band 1, S. 41 (§ 82); S. 337 (§ 740). Cross-reference with standard architectural drawings under Taf. 19
4. HBIM_Iconographic_Notes: The architectural frame is uncarved. The torus molding (Rundstab) and cavetto cornice (Hohlkehle) are completely smooth and completely devoid of traditional text strings or patterns. The 48 cm high rectangular stone field sitting directly above the cornice was structurally blocked out to receive a carved frieze of protective cobras (Uraus-Fries), but it remains entirely unskulpiert (undecorated)
5. HBIM_Internal_Spacial_Anomalies: Torus profile is 15 cm in diameter. Flares out into a standard Egyptian cavetto profile that projects exactly 4 cm clear of the wall plane.
6. HBIM_Intervention_History: Ancient Pharaonic Puncture / 1908–1909 Barsanti Structural Wall Infill. After the false door was carved and decorated with a high-relief depiction of Thot of Pnubs during the Roman era, a physical gateway measuring 2.25 m high and 1.03 m wide was cut straight through its central vertical axis to establish an opening to the outer precinct courtyard. During the early 20th-century consolidation campaign, Alessandro Barsanti completely filled and blocked this destructive doorway with blank sandstone block work to stabilize the structural integrity of the listing southern facade.
7. HBIM_Logic/Roeder_notes: Roeder notes that the completely uncarved, rough-hewn state of the master moldings proves that this monumental architectural frame was constructed during the original building phase but left unskulpiert (unfinished) by the ancient masons. This creates a direct tangible record of an aborted building timeline, which is a powerful asset for your thesis when displaying the complex history of the Meroitic layout
8. HBIM_Material_Composition: Carved directly as an monolithic outcropping projection from the face blocks.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 41 (§ 82).
10. HBIM_Lok: LOK 1

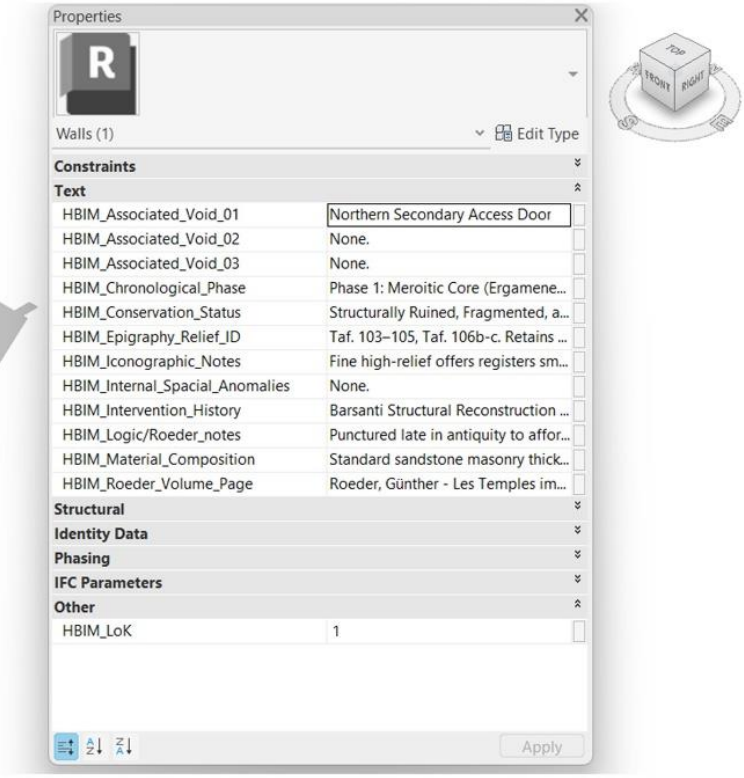
Structural profile and location documented; serves as a primary architectural anchor.



The Sanctuary *(Adytum)*:

Eastern wall and HBIM parametric values





1. HBIM_Associated_Voids_01: Northern Secondary Access Door

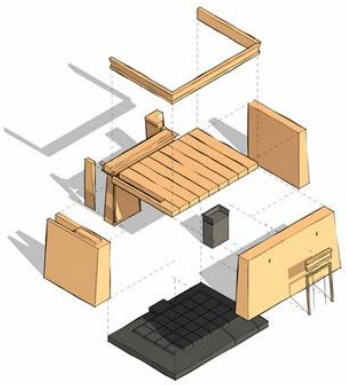
[Dimensions &_Descriptions]: Raw, completely unadorned rectangular Roman breakthrough doorway cutting through earlier hieroglyphic bands. Measures exactly 62 cm wide x 1.67 meters high. Northern jamb starts exactly 37 cm south along the internal wall face from the NW sanctuary corner junction. No lintel, cavetto cornice, or framing moldings present.

2. HBIM_Associated_Voids_02: Roman Chapel Passage

[Dimensions &_Descriptions]: Lower east wall puncture forming a 62 cm wide, 1.67 m high un-profiled opening that steps up 37 cm above the baseline floor to grant axis entry into the secondary Roman Rooms built flush against the temple exterior.

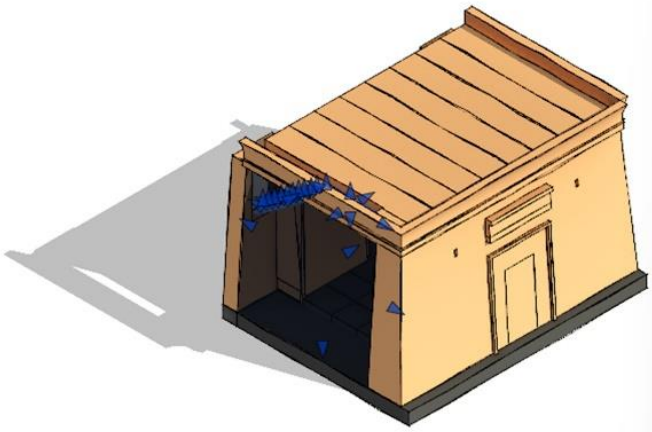
3. HBIM_Cronological_Phase: Phase 1: Meroitic Core (Ergamenes Construction) / Altered in Phase 3 (Roman Augustan Secondary Doorway Breakthrough)
4. HBIM_Conservation_Status: Structurally Ruined, Fragmented, and Reconstructed Core Matrix. The entire northern section of this wall assembly had completely collapsed prior to modern intervention. The only original pharaonic structural core piece recovered from this section was the heavily weathered door lintel block (Türsturz) of the primary side-portal. The adjacent stone surfaces flanking this portal are severely eroded with minor missing ashlar blocks.
5. HBIM_Epigraphy_Relifes_ID: Taf. 103–105, Taf. 106b-c. Retains three rows of fine high-relief scenes showing the king offering before the local pantheon, broken abruptly by the later Roman doorway cut.
6. HBIM_Iconographic_Notes: Fine high-relief offers registers smashed violently across their borders by the late Roman door cut.
7. HBIM_Intervention_History: Barsanti Structural Reconstruction (1908–1909) / Modern Material Substitution. Following the total collapse of the northern expanse of this layout, Alessandro Barsanti completely rebuilt the missing masonry parameters block-by-block using salvaged ancient fragments alongside heavy cement replication layers to stabilize the frame. Because the original structural vertical profiles of the eastern portal's side jambs (Pfosten) were entirely lost, Barsanti completely fabricated a new doorway framework (measuring exactly 86 cm wide by 3.23 m high, located 6.10 m south of the northeastern outer corner alignment) using raw, smooth cement infill to safely host and support the recovered ancient ptolemaic lintel block overhead
8. HBIM_Logic/Roeder_notes: Punctured late in antiquity to afford functional circulatory interconnectivity into the secondary Roman rooms built against the temple shell.
9. HBIM_Material_Composition: Standard sandstone masonry thickness at exactly 1.08 m. Spliced against a 1.20 m offset relative to the ancient Meroitic front wall line.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 41–42 (§ 83); S. 39 (§ 75–76); S. 57 (§ 119); S. 63 (§ 131)
11. HBIM_Lok: LOK 1

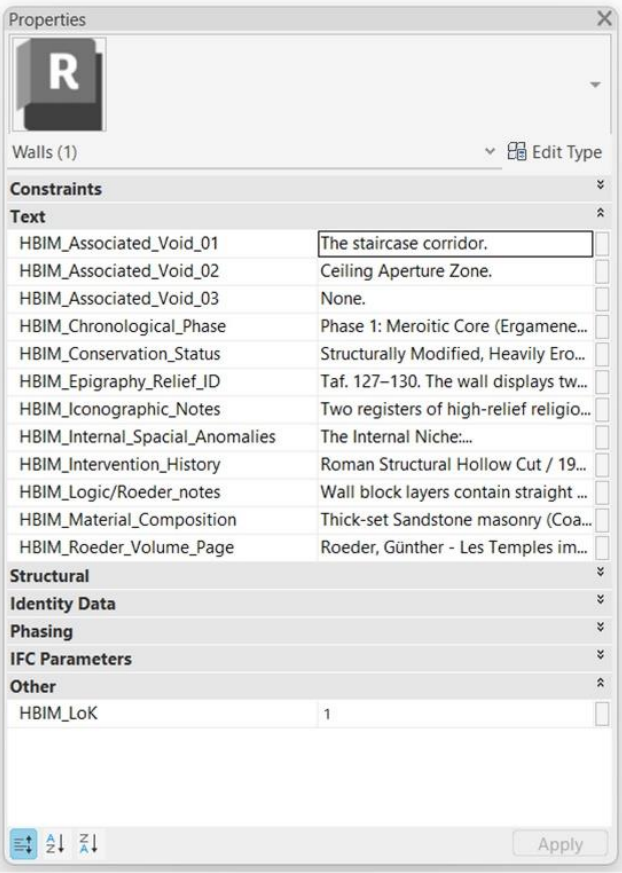
Dimensions and positions were physically recorded and surveyed by Roeder.



The Sanctuary *(Adytum)*:

Western wall and HBIM parametric values





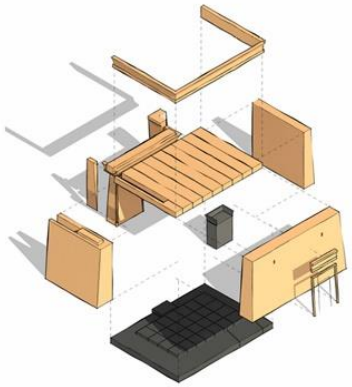


1. HBIM_Associated_Voids_01: The staircase Corridor.
2. HBIM_Associated_Voids_02: Ceiling Aperture Zone.
3. HBIM_Chronological_Phase: Phase 1: Meroitic Core (Ergamenes) / Phase 3: Roman Extension Era (Augustan wrap-around construction): Staircase modifications completed in Phase 3 (Roman Expansion)
4. HBIM_Conservation_Status: Structurally Modified, Heavily Eroded, and Partially Intact Core Matrix. The main block mass remains upright and standing in its original alignment, but its structural core was significantly manipulated in antiquity to hollow out the internal path for the rooftop staircase (Treppe zum Dach). The lower masonry courses are mostly intact, while the upper-most stone layers are completely missing or severely weathered, leaving the topmost section of the internal staircase cavity exposed to the open sky. The interior face of the wall retains visible plaster remnants (Kalktünche).
5. HBIM_Epigraphy_Relifes_ID: Taf. 127–130. The wall displays two complete rows of reliefs depicting the Pharaonic ruler making offerings to localized manifestations of Horus and the wider Osirian triad.
6. HBIM_Iconographic_Notes: Two registers of high-relief religious offering scenes showing the king presenting ritual options before Osiris, Isis, and specialized forms of Horus. Epigraphic boundaries gracefully curve to accommodate the structural niche.
7. HBIM_Internal_Spacial_Anomalies: The Internal Niche:

[Dimensions & Descriptions]: Located in the lower register of the Western Wall. It measures exactly 57 cm wide, 53 cm high, and punches 76 cm deep into the masonry core. Lower west wall contains a Rectangular low-level ritual storage cutout. The text and scene layouts of the surrounding Ptolemaic-Roman relief registers smoothly adjust their borders to wrap around this physical opening, indicating the niche was a planned structural requirement of the room's liturgical workflow.

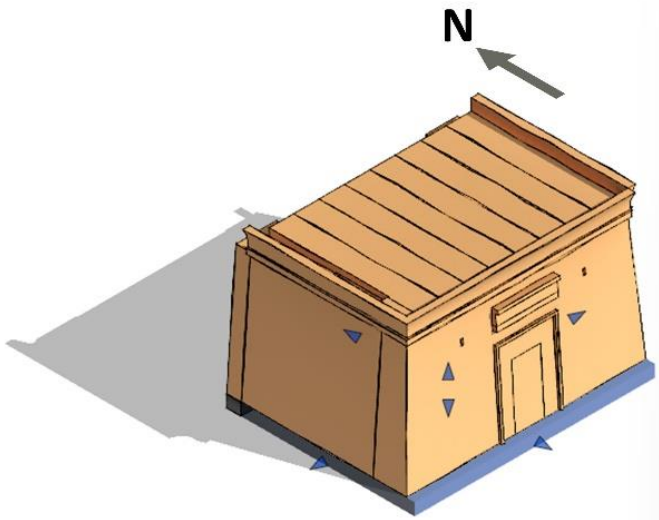
8. HBIM_Intervention_History: Roman Structural Hollow Cut / 1908–1909 Barsanti Cement Consolidation. During the Roman Imperial extension campaign, the wall thickness was purposefully constructed to a massive 1.08 m width to encapsulate the continuous ascending flight of steps. With the building's expansion, the wall plane became a shared partition line, with its wider western side bounding the staircase while its eastern face was stepped back by 55 cm to form the vertical structural enclosure of the inner Sanctuary chamber. During the early 20th-century preservation work, Alessandro Barsanti stabilized the dangerously worn stone steps and structural masonry joints by executing extensive surface injections and leveling patches with modern cement mortar.
9. HBIM_Logic/Roeder_notes: Wall block layers contain straight vertical joins where they meet the older core, validating separate construction layers/ Roeder specifies that the low-level niche was an original structural inclusion meticulously planned by the early builders, whereas the courtyard pass-through is a raw, non-framed breach added long after the Meroitic construction window was closed
10. HBIM_Material_Composition: Thick-set Sandstone masonry (Coarse-grained Kertassi) block-bonds, significantly wider than the eastern wall with Solid wall section spans 10.10 m long from the corner to the northern ptolemaic construction joint, structurally thickened to accommodate the internal roof-access staircase stair-well.
11. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 37 (§ 70–74); S. 63 (§ 132); S. 328 (§ 718–739).
12. HBIM_Lok: LOK 1

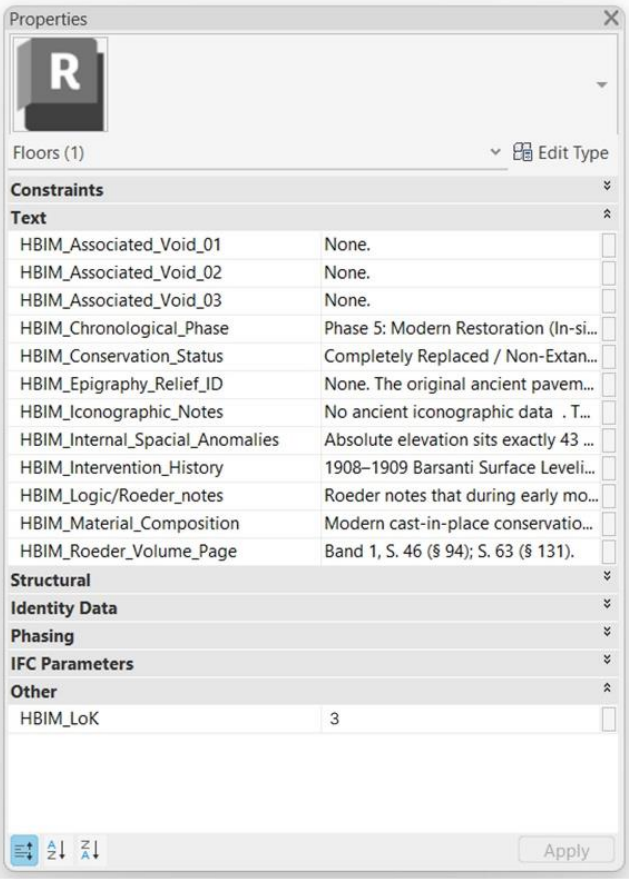
Dimensions and positions were physically recorded and surveyed by Roeder.



The Sanctuary *(Adytum)*:

Floor system and HBIM parametric values

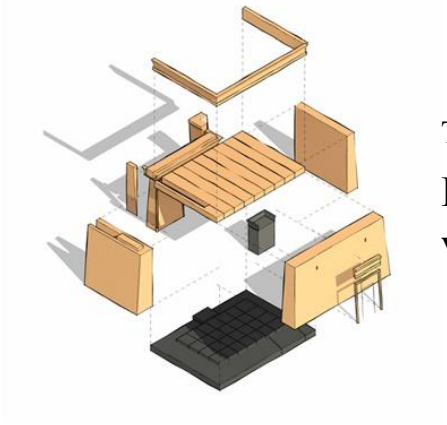






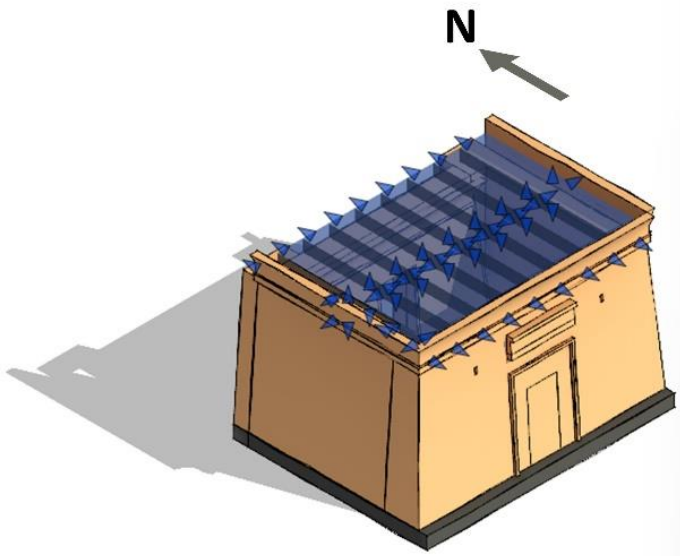
1. HBIM_Cronological_Phase: Phase 5: Modern Restoration (In-situ original paving missing).
2. HBIM_Conservation_Status: Completely Replaced / Non-Extant Ancient Fabric. The original stone floor slabs of the Sanctuary were entirely removed or lost due to centuries of exposure and subsequent environmental disturbance before the modern era. No original paving stones (Steinplatten) remained in situ for Roeder to record. The current floor surface is a modern, artificial construction consisting of a uniform layer of cement leveling (Zementestrich) applied to fill the void and provide a stable base for the site's preservation.
3. HBIM_Epigraphy_Relief_ID: (None). The original ancient pavement is completely missing; no reliefs, inscriptions, or paving lines survive from antiquity
4. HBIM_Iconographic_Notes: No ancient iconographic data. The current floor is a blank, modern cement consolidation layer poured by early 20th-century conservators to stabilize the foundations
5. HBIM_Internal_Spacial_Anomalies: Absolute elevation sits exactly 43 cm higher than the outer court floor foundation baseline.
6. HBIM_Intervention_History: 1908–1909 Barsanti Surface Leveling. During the early 20th-century conservation efforts directed by Alessandro Barsanti, the entire floor area of the Sanctuary was cleared of debris and leveled with a modern cement mortar infill. This intervention was designed to seal the floor against moisture ingress and provide a clean, horizontal datum for site visitors, effectively masking any potential archaeological floor bedding that may have existed beneath the lost paving.
7. HBIM_Roeder_Notes/Logic: Roeder notes that during early modern preservation campaigns, the entire original stone floor of the Sanctuary was found to be completely gone. The floor layout you see today is a modern cement slab poured by early conservators such as Barsanti, during the 1908-1909 structural consolidation project to secure foundation stabilization. documenting this is critical: it proves that the baseline layer of the digital heritage space is a modern reconstruction, not an ancient footprint.
8. HBIM_Material_Composition: Modern cast-in-place conservation concrete. Original ancient sandstone floor flags completely missing across the entire room area.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 46 (§ 94); S. 63 (§ 131).
10. HBIM_Lok: LOK 3

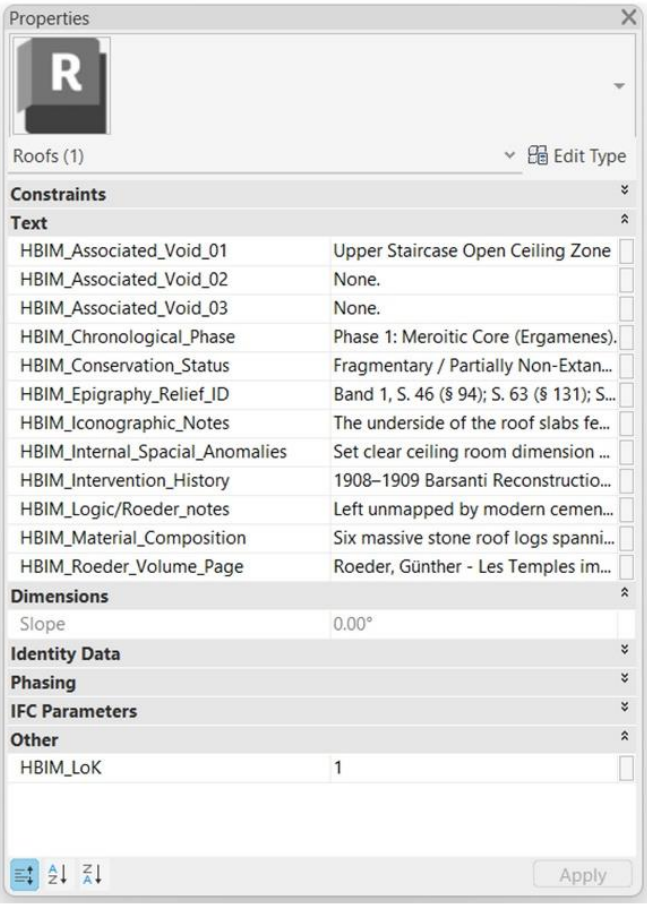
Original is non-extant; modeled as modern leveling, so the "LOK" reflects the loss of the original datum.



The Sanctuary *(Adytum)*:

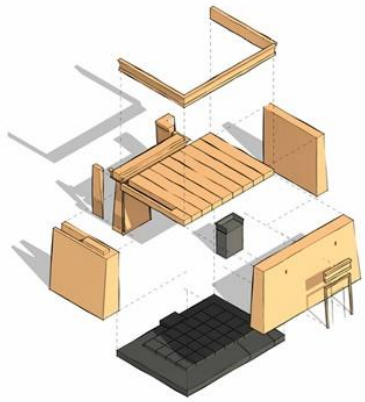
Roof system and HBIM parametric values





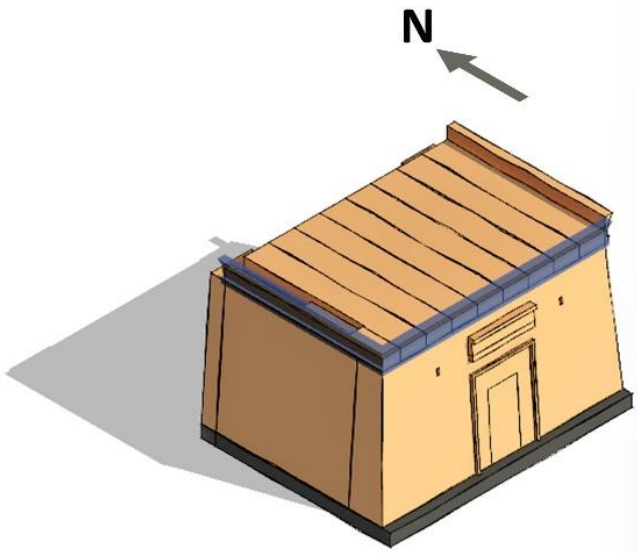
1. HBIM_Associated_Void_01: Upper Staircase Open Ceiling Zone.
2. HBIM_Chronological_Phase: Phase 1: Meroitic Core (Ergamenes). Note: Easternmost longitudinal beam represents original in-situ placement[cite: 2].
3. HBIM_Conservation_Status: Fragmentary / Partially Non-Extant. The sanctuary roof was originally constructed from massive sandstone beams laid in a North-South orientation. Only the easternmost beam of this roofing system remains in its original, in situ position; the others were lost or collapsed prior to the modern conservation efforts.
4. HBIM_Epigraphy_Relief_ID: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 46 (§ 94); S. 63 (§ 131); S. 358 (§ 783). Also references specific ceiling plates recorded under Taf. 148.
5. HBIM_Iconographic_Notes: The underside of the roof slabs feature deep, weathered remnants of the traditional sky-canopy relief, consisting of repetitive rows of flying vultures interspersed with specialized hieroglyphic bands containing text fragments of the royal cartouche.
6. HBIM_Internal_Spacial_Anomalies: Set clear ceiling room dimension height to exactly 4.75 m. Only the easternmost longitudinal roof beam was discovered *in situ* during architectural documentation.
7. HBIM_Intervention_History: 1908–1909 Barsanti Reconstruction. Following the site clearance, Alessandro Barsanti performed a structural reconstruction of the roof plane. While the surviving original eastern beam was stabilized, the majority of the roof surface you see in current site documentation—including the infill between the remaining ancient beam and the wall headers—is a modern cement-supported reconstruction meant to seal the Sanctuary from light and moisture.
8. HBIM_Logic/Roeder_notes: Left unmapped by modern cement pours during initial conservation, leaving its true ancient top height plane clear for architectural demarkation. Unlike the surrounding rooms where roof elements were totally shattered or missing, the Sanctuary area retains an active chronological marker. Only the easternmost roof block was found *in situ* (in its original ancient position) during early architectural surveys, providing the exact boundary key for the room's clear height.
9. HBIM_Material_Composition: Six massive stone roof logs spanning over 6.00 m in length, running on a North-South alignment axis.
10. HBIM_Lok: LOK 1.

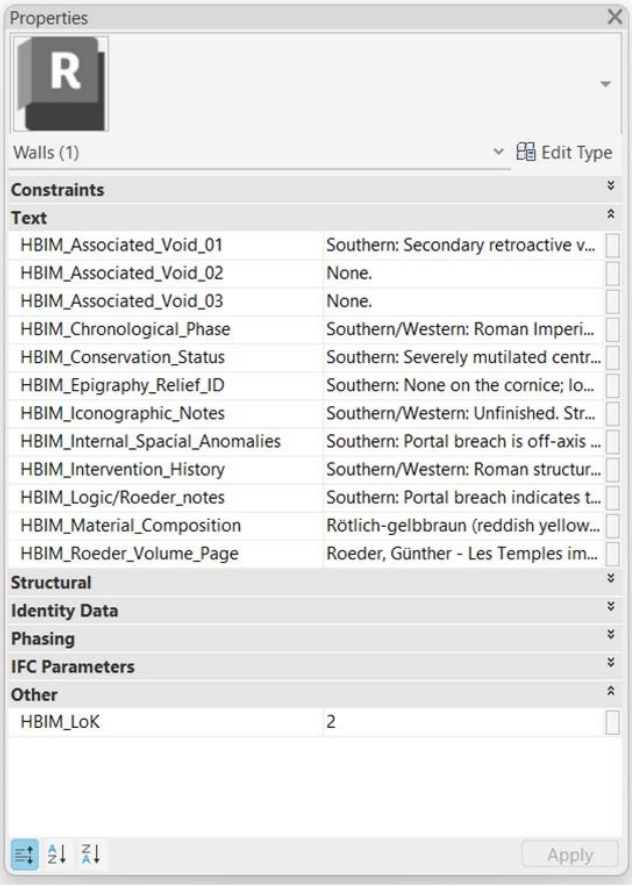
The structural configuration and the placement of the surviving stone beams (Deckenbalken) were physically verified and documented by Roeder during his recording sessions, providing a high-confidence, evidence-based geometric datum.



The Sanctuary *(Adytum)*:

South-West Cavetto Cornice and Torus Molding including HBIM parametric values





1. HBIM_Associated_Void_01: Southern: Secondary retroactive void, 2.23 m high by 1.08 m wide, created by the ancient portal breach.

Western: Primary internal sloped void for the staircase, 1.08 m down to 64 cm wide.

2. HBIM_Chronological_Phase: Southern/Western: Roman Imperial Phase (Augustan initial build, later modified).
3. HBIM_Conservation_Status: Southern: Severely mutilated central cornice loop due to the secondary portal breach.

Western: Missing upper extremities (48 cm layer) and significantly weathered due to exposure to the elements.

4. HBIM_Epigraphy_Relief_ID: Southern: None on the cornice; lower relief zone recorded under Roeder § 740–758.

Western: None; surface is completely smooth/uninflected (glatt).

5. HBIM_Iconographic_Notes: Southern/Western: Unfinished. Structural block profiles prepared for the uraeus-frieze, but final iconographic detailing never executed (roh behauen).
6. HBIM_Internal_Spacial_Anomalies: Southern: Portal breach is off-axis (2.71 m from SW corner, 3.98 m from SE corner).

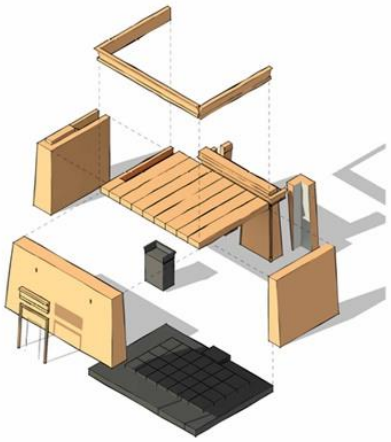
Western: Structural step-back at the 16th stair step reducing wall thickness/corridor width by 55 cm.

7. HBIM_Intervention_History: Southern/Western: Roman structural modification; 1908–1909 Barsanti consolidation (cement mortar injection and leveling patches).
8. HBIM_Logic/Roeder_notes: Southern: Portal breach indicates traffic pattern reorientation from the exterior courtyard.

Western: Plain, uncarved profiles signify that while Augustan construction was volumetrically completed, aesthetic detailing was abandoned.

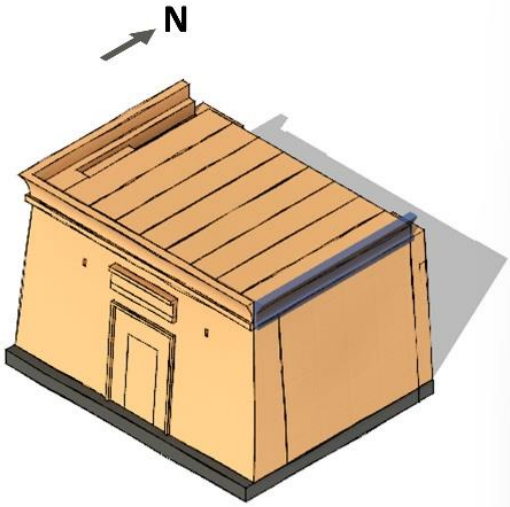
9. HBIM_Material_Composition: Rötlich-gelbbraun (reddish yellow-brown) sandstone, stabilized with 20th-century grey cement mortar.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Pages 41, 60, § 82, § 124.
11. HBIM_Lok: LOK 2

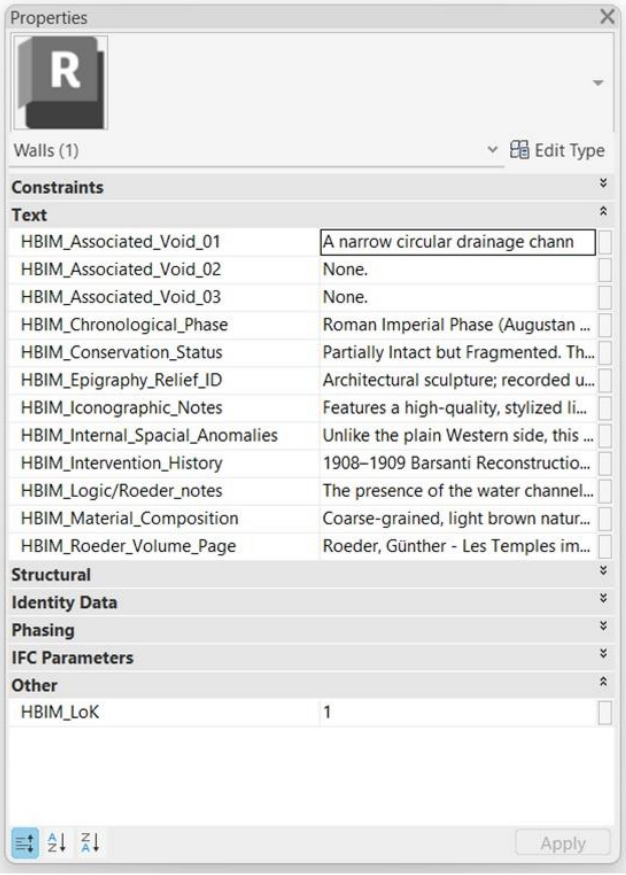
Geometric profile is known, but fabric is a 1908-1909 modern reconstruction.



The Sanctuary *(Adytum)*:

Eastern Cavetto Cornice and Torus Molding including HBIM parametric values





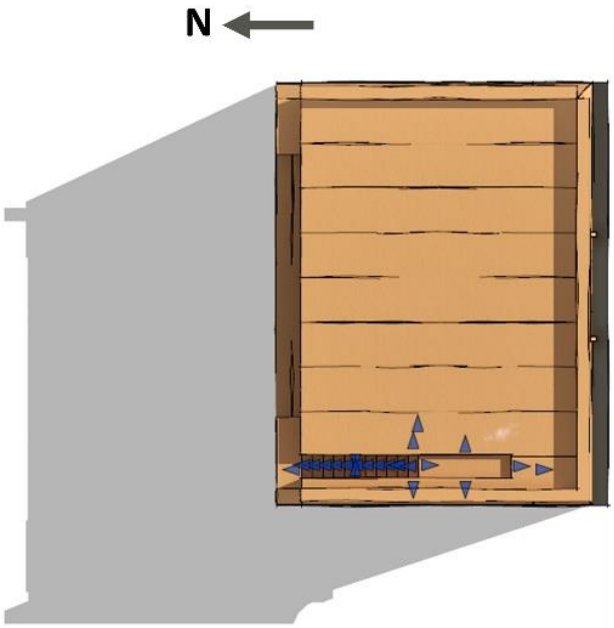


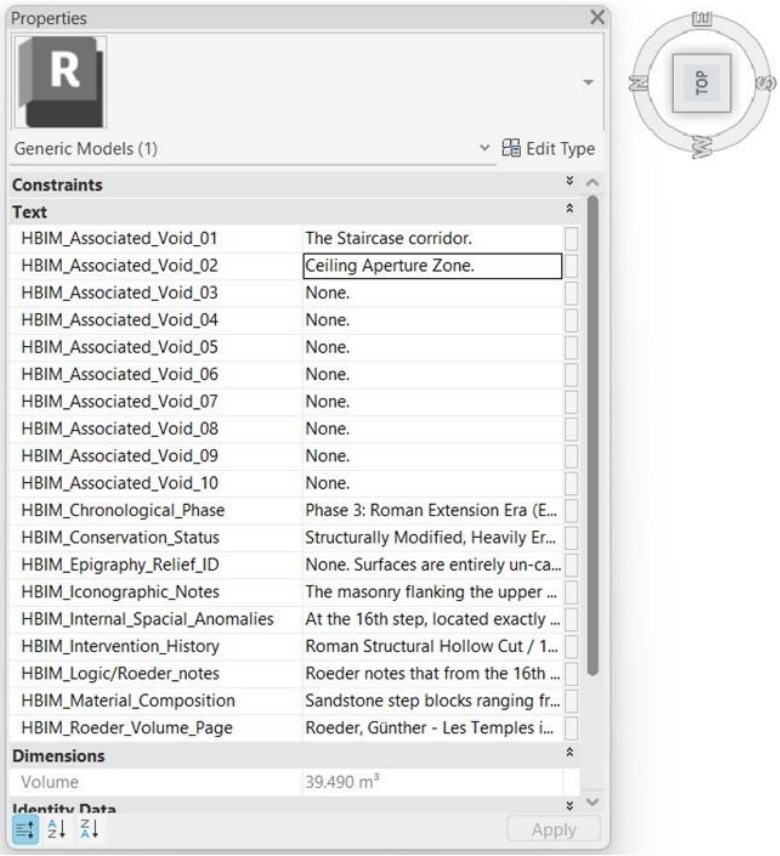
1. HBIM_Associated_Void: A narrow circular drainage channel (6 to 10 cm irregular diameter) drilled completely through the lower block layer of the cornice to serve as a high-level water outlet.
2. HBIM_Chronological_Phase: Roman Imperial Phase (Augustan Construction).
3. HBIM_Conservation_Status: Partially Intact but Fragmented. The horizontal profiles are preserved in their original alignment, but the lower half of the specific block containing the drainage tunnel has completely broken away.
4. HBIM_Epigraphy_Relief_ID: Architectural sculpture; recorded under Roeder § 79 and § 128.
5. HBIM_Iconographic_Notes: Features a high-quality, stylized lion-head waterspout (Löwenkopf) carved directly onto the upper projecting section of the block face (measuring 41 cm high by 75 cm wide). The relief is executed in a mixed Greco-Egyptian style, displaying large, multi-lined framed eyes, a wide snout, and heavy mane locks falling down the forehead and cheeks.
6. HBIM_Internal_Spacial_Anomalies: Unlike the plain Western side, this section of the cornice had to bridge over the top of the adjacent Roman side-chapel walls, where two specially cut stone blocks were positioned to form an architectural bridge directly above the entry portal.
7. HBIM_Intervention_History: 1908–1909 Barsanti Reconstruction. The entire northern expanse of this wall had collapsed and was rebuilt piece-by-piece by Barsanti, who filled the shattered void of the lower water channel with modern cement.
8. HBIM_Logic/Roeder_notes: The presence of the water channel is an anomaly: its intake sits 15 cm above the actual flat roof plane of the inner Ergamenes Kapelle, rendering it ineffective for baseline drainage. This indicates that it was a retrofitted correction to channel runoff after the Roman Sanctuary walls enclosed the older chapel on all sides.
9. HBIM_Material_Composition: Coarse-grained, light brown natural sandstone core.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Pages 39–40 and 60, § 79–80 and § 123.
11. HBIM_LoK: LOK 1

Extant in-situ Roman Augustan masonry as per Roeder's onsite recordings.

The Sanctuary *(Adytum)*:

Ceiling aperture zone of the Hidden staircase including HBIM parametric values

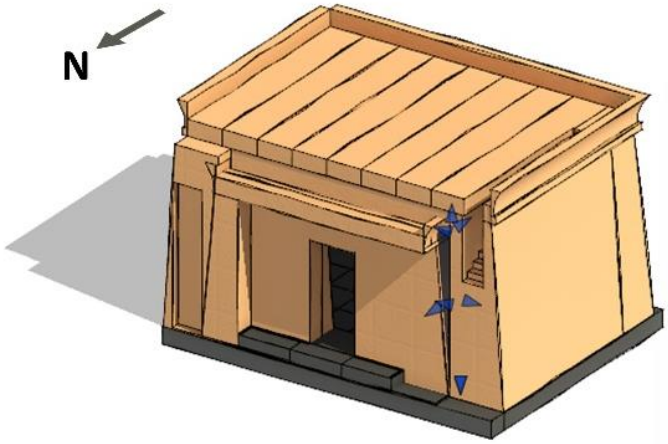


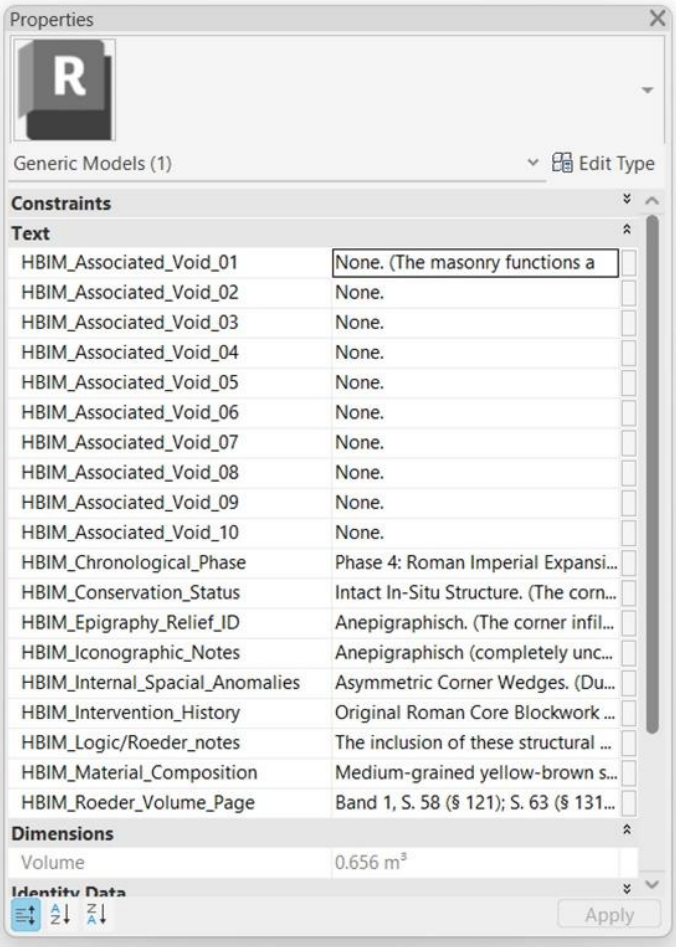


1. HBIM_Associated_Void_01: Ceiling Aperture Zone
2. HBIM_Chronological_Phase: Phase 3: Roman Extension Era (Enclosure and integration with Phase 1 Meroitic Core)
3. HBIM_Epigraphy_Relief_ID: Surfaces are entirely un-carved text fields.
4. HBIM_Iconographic_Notes: The masonry flanking the upper open stairs features zero relief registers; however, the older western wall face of the Ergamenes core directly underneath is decorated with ancient white lime-wash coatings hosting three large, distinct hand-painted Coptic crosses measuring 64 cm, 58 cm, and 45 cm in height respectively.
5. HBIM_Internal_Spacial_Anomalies: At the 16th step, located exactly 32 cm south of the northernmost terminating edge of the older Ergamenes wall alignment, the staircase width pinches down sharply from 1.08 m to a narrow width of 64 cm. From this coordinate upward, the physical stone slab ceiling terminates completely, exposing the remaining steps (up to step 27) to open air.
6. HBIM_Intervention_History: Roman Structural Hollow Cut / 1908–1909 Barsanti Cement Consolidation. During the Roman Imperial extension campaign, the wall thickness was purposefully constructed to a massive 1.08 m width to encapsulate the continuous ascending flight of steps. With the building's expansion, the wall plane became a shared partition line, with its wider western side bounding the staircase while its eastern face was stepped back by 55 cm to form the vertical structural enclosure of the inner Sanctuary chamber. During the early 20th-century preservation work, Alessandro Barsanti stabilized the dangerously worn stone steps and structural masonry joints by executing extensive surface injections and leveling patches with modern cement mortar.
7. HBIM_Logic/Roeder_notes: Roeder notes that from the 16th step onward, the eastern boundary wall of the staircase is no longer formed by the sloped exterior face of the Ergamenes chapel, but transforms directly into the vertical, 55 cm thick set-in western core wall of the upper Sanctuary structure. This structural step-in was executed to provide clear foot passage onto the top Sanctuary roof plane while keeping the overall external wall thickness symmetrical.
8. HBIM_Material_Composition: Sandstone step blocks ranging from 15 cm to 18 cm in riser height. Wall surfaces facing the upper open run are characterized by rough, unfinished building surfaces showing heavy quarrying bosses.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 50 (§ 104); S. 60 (§ 124). Cross-reference with standard architectural section cutting layout under Taf. 148.

The Sanctuary *(Adytum)*:

The Roman filling masonry and HBIM parametric values

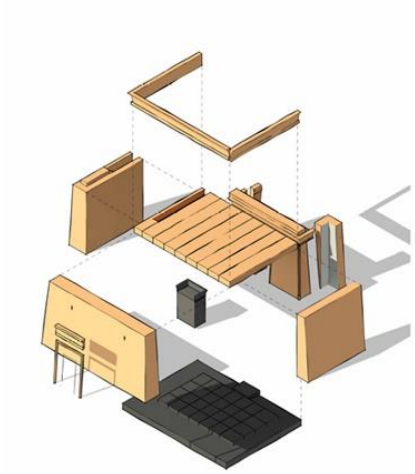


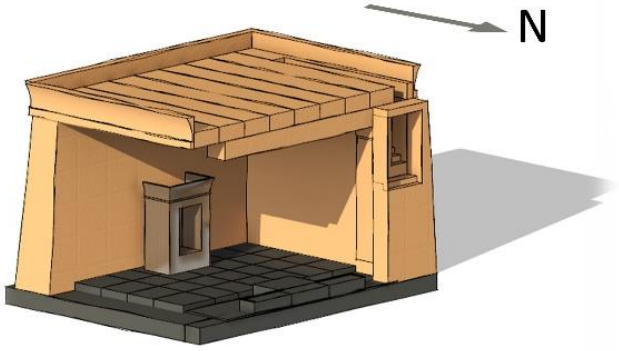




1. HBIM_Associated_Void_01: None. (The masonry functions as a solid, triangular volumetric wedge filling the void between the vertical plane of the Sanctuary and the sloped exterior profile of the Ergamenes Chapel).
2. HBIM_Chronological_Phase: Phase 4: Roman Imperial Expansion (Reign of Augustus)
3. HBIM_Conservation_Status: Intact In-Situ Structure. (The corner modification survived securely embedded within the broader masonry layout of the later extension block).
4. HBIM_Epigraphy_Relief_ID: Anepigraphisch. (The corner infill pieces themselves contain no relief panels or localized text inscriptions; however, the adjacent narrow, sloped eastern fragment of the original wall carries a specific relief layout featuring a serpent standing on a papyrus stalk, documented in § 131 and § 705).
5. HBIM_Iconographic_Notes: Anepigraphisch (completely uncarved and undecorated). The face of this specific Roman triangular infill masonry was left as plain, dressed sandstone to purely serve as a flat, vertical architectural transition layer. this infill block sits immediately flush against the original, sloped Ptolemaic exterior wall of the Ergamenes Chapel, which *is* heavily decorated. Specifically, directly next to the eastern infill wedge, the narrow exposed band of the older chapel wall features a meticulously rendered standing serpent coiled around a papyrus stalk (*Schlange auf Papyrus*). By leaving the Roman infill blocks completely plain, the ancient builders created a stark visual boundary between the highly detailed, sacred Ptolemaic relief style and the clean, structural spatial extensions of the Augustan era.
6. HBIM_Internal_Spacial_Anomalies: Asymmetric Corner Wedges. (Due to structural dimensional differences between the East and West flanking walls of the Sanctuary —driven by the inclusion of the internal roof staircase inside the 1.08 m thick Western Sanctuary wall—the structural geometry of the Northwestern infill block differs from the Northeastern infill block to square the room).
7. HBIM_Intervention_History: Original Roman Core Blockwork / 1908–1909 Barsanti Cement Stabilization. (The internal seams where the Roman vertical blockwork met the sloped Ptolemaic masonry were cleaned and injected with cement mortar during the early 20th-century preservation campaign).
8. HBIM_Logic/Roeder_notes: The inclusion of these structural corner wedges is a classic text-book demonstration of architectural adaptive reuse in ancient Egypt. Rather than razing or damaging the sacred, older chapel structure of the localized nubias king Ergamenes, the Roman architects choose an addition method that respected the existing geometry while enforcing contemporary Roman spatial rules (absolute verticality) inside the secondary chamber. this is a prime example of physical 'Collective Memory' preservation through structural compromise.
9. HBIM_Material_Composition: Medium-grained yellow-brown sandstone ashlar blocks
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 58 (§ 121); S. 63 (§ 131); Plans Taf. 148
11. HBIM_Lok: LOK 2

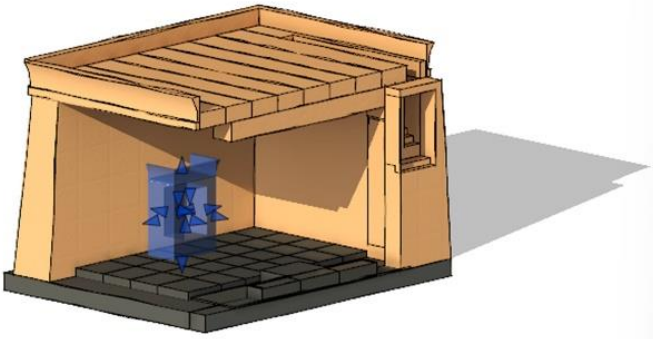
Structural intent known, but exact 1909 bonding is not visible due to cement.

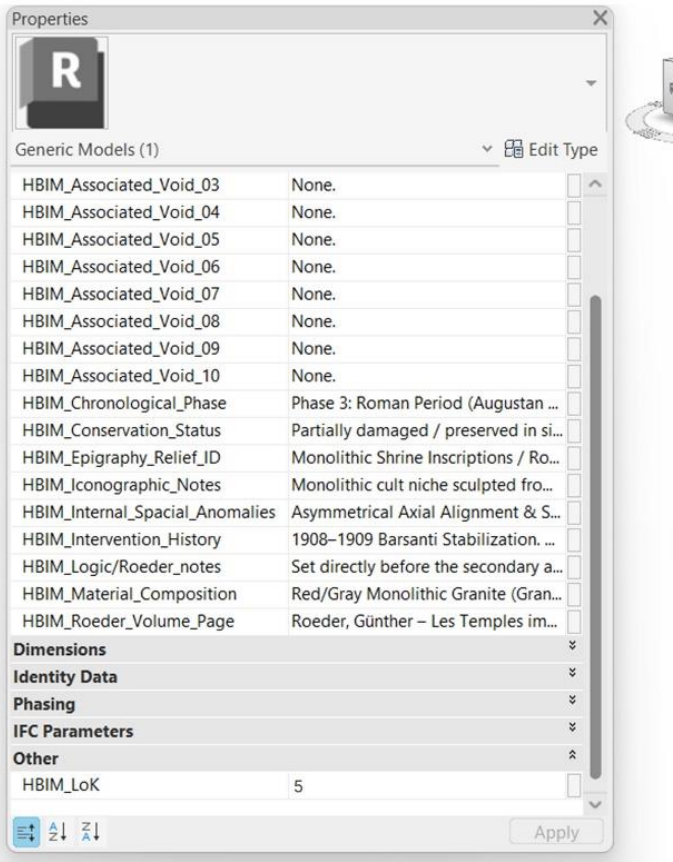




The Sanctuary *(Adytum)*:

The Granite Naos and HBIM parametric values

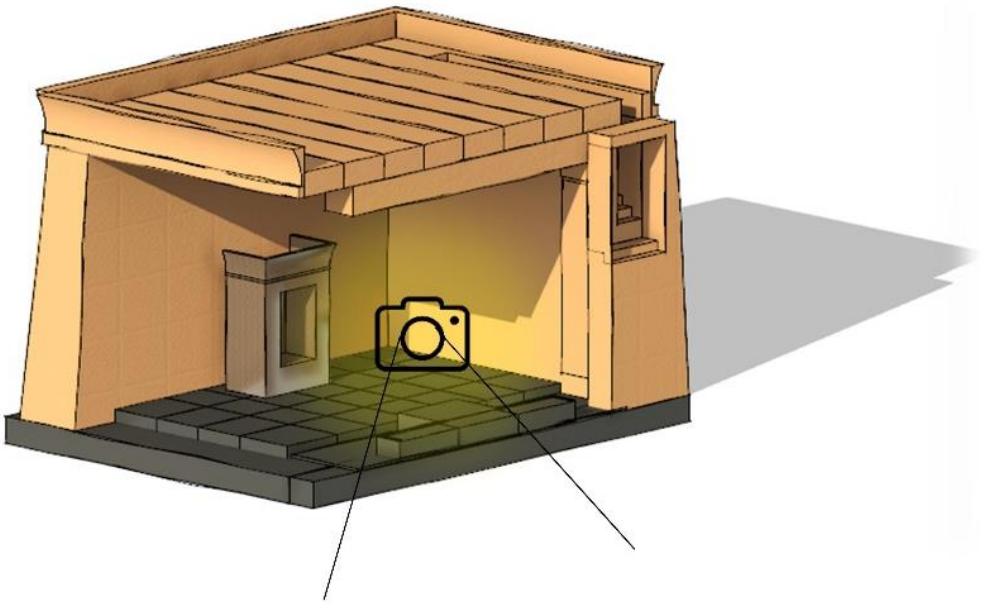


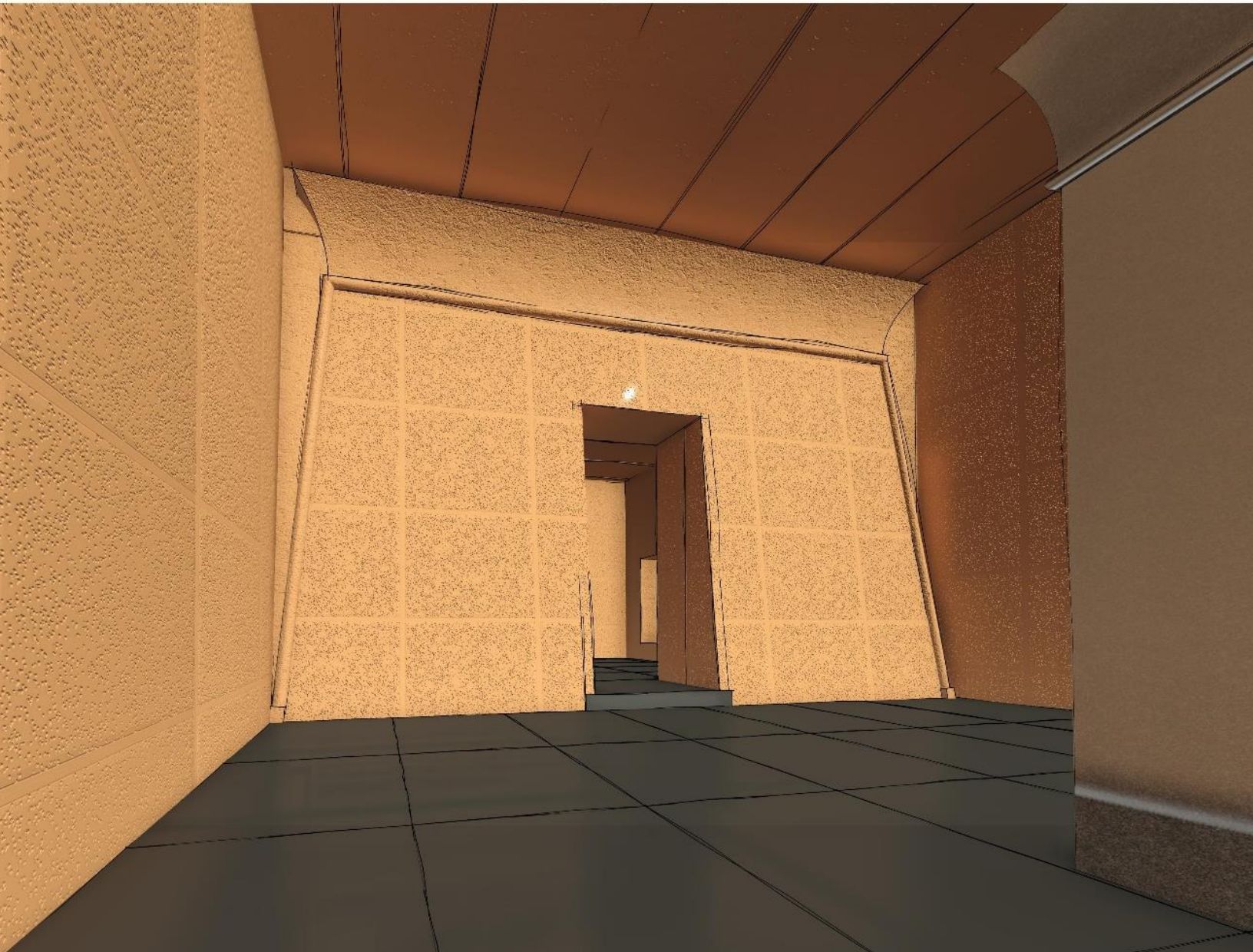


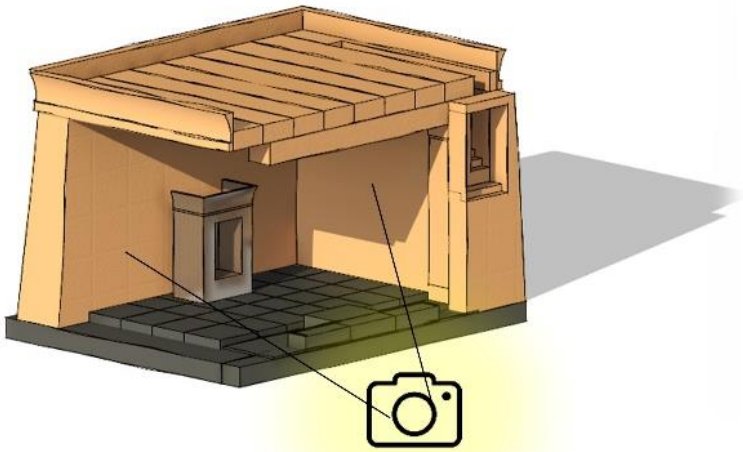


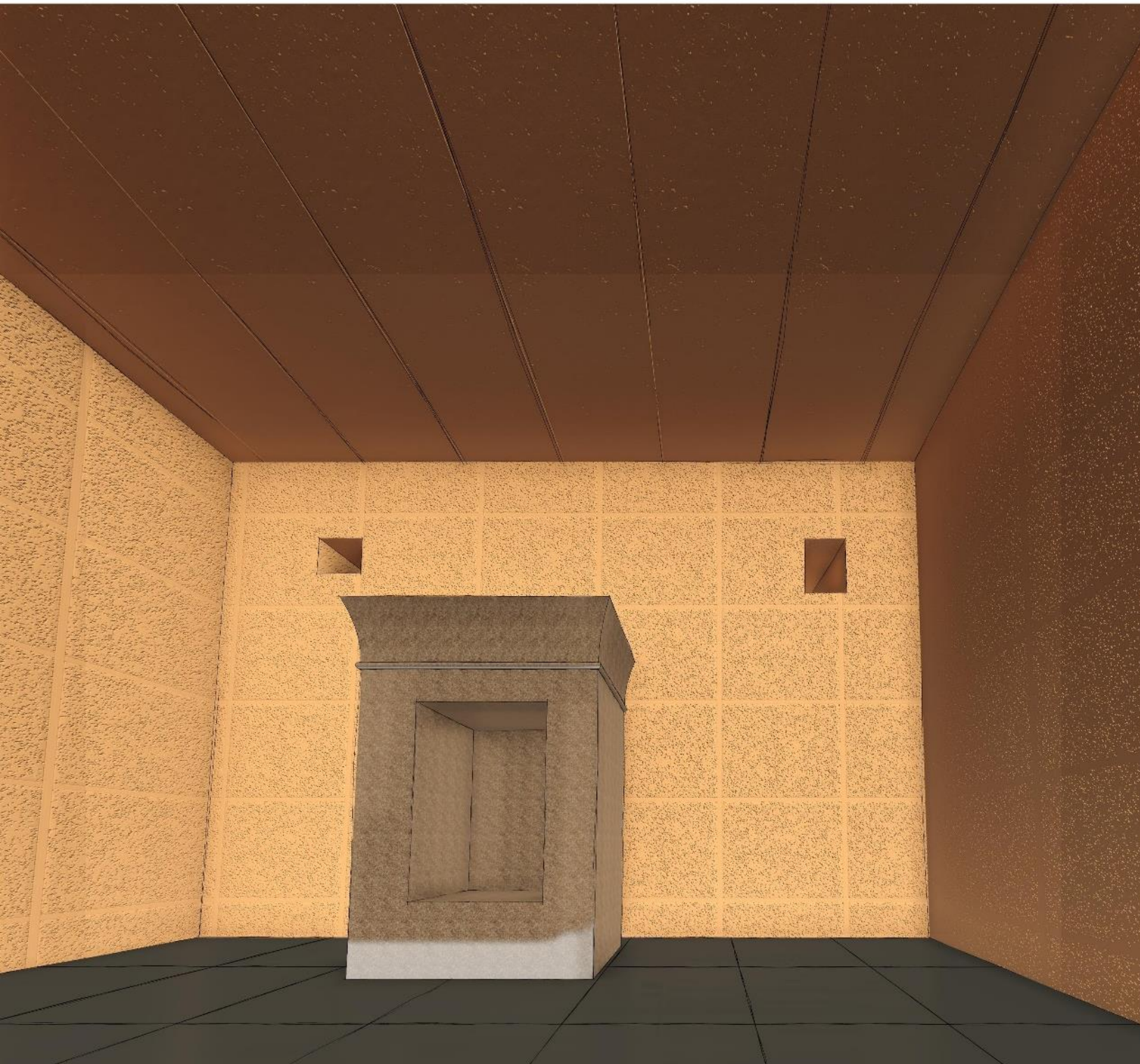
1. HBIM_Associated_Void_01: None – Freestanding Monolithic Cult Niche Structure within Sanctuary Assembly.
2. HBIM_Chronological_Phase: Roman Period (Augustan Era / early 1st century AD re-dedication/placement context).
3. HBIM_The_Conservation_Status: Partially damaged / preserved in situ. The monolithic granite naos stands set up directly in front of the secondary doorway subsequently cut through the southern sanctuary wall into the rear court.
4. HBIM_Epigraphy_Relief_ID: Monolithic Shrine Inscriptions / Royal Cult Dedication Text.
5. HBIM_Iconographic_Notes: Monolithic cult niche sculpted from pink/grey granite, featuring standard late-period architectural moldings, cavetto cornices, door-jamb alignments, and pivot/insertion slots for securing wooden shrine doors.
6. HBIM_Internal_Spacial_Anomalies: Asymmetrical Axial Alignment & Structural Modification for Transport. The monolithic naos is set directly in front of a secondary doorway later breached through the south wall, which emerges inside the sanctuary displaced 28.5cm west of the central axis due to the thicker western wall containing the roof staircase. Furthermore, placing this granite monolith inside the sanctuary required the structural widening and chiseling back of several interior doorway jambs along the procession axis, while its base threshold plane contains running door-pivot entry grooves (*Einsatzrinnen*) 6cm to 8cm deep engineered for door installation.
7. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Alessandro Barsanti reset the monolith in its present position standing directly before the breached southern doorway of the sanctuary chamber, clearing surrounding debris and consolidating the sanctuary pavement context.
8. HBIM_Logic/Roeder_notes: Set directly before the secondary axial doorway cut through the rear south wall of the sanctuary. Roeder observes that the transport and insertion of this massive monolithic granite shrine required the structural widening of several interior temple doorways (including the entrance to the Ergamenes chapel) to facilitate its passage into the innermost sanctuary space. The floor insertion features running door-pivot entry slots (*Einsatzrinnen*) along the threshold plane similar to parallel monolithic shrines cataloged at other Nubian sites.
9. HBIM_Material_Composition: Red/Gray Monolithic Granite (*Granitnaos*).
10. HBIM_Roeder_Volume_Page: Roeder, Günther – *Les Temples immergés de Nubie: Der Tempel von Dakke* Vol I (1930), Band 1, S. 38 (§ 38); S. 63 (§ 130); S. 64 (§ 132); S. 358–362 (§ 797–803).
11. HBIM_Lok: LOK 5.4.1.

This designation specifically refers to the monolithic granite Naos assembly positioned in the rear central axis of the inner Sanctuary (*Sanktuar*).









5.2.3 Roman Expansions and Structural Modifications

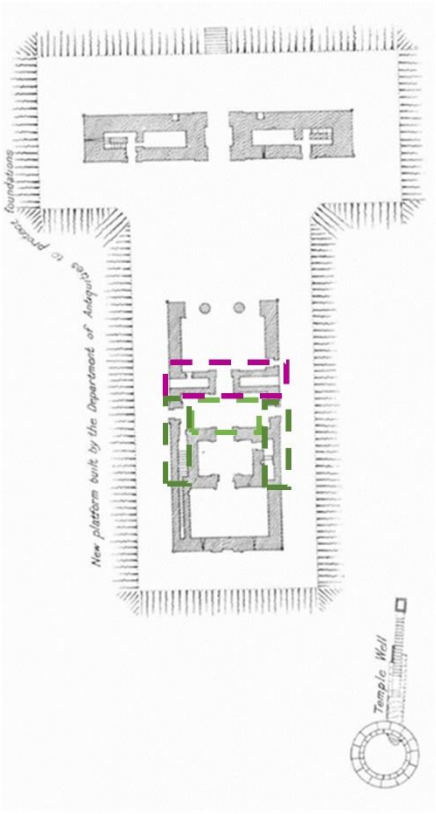
Illustrates the Augustan and Tiberian additions wrapping around the core Chapel of Ergamenes (Western wall including hidden staircase and Eastern wall including Roman Small Chapel) and Northern secondary doorways.

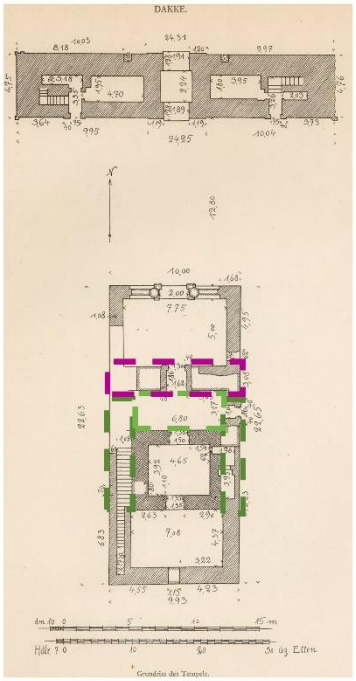
5.2.4 Transverse Room (*Querraum* Transition Gap) and Ptolemaic Monolithic Gateway

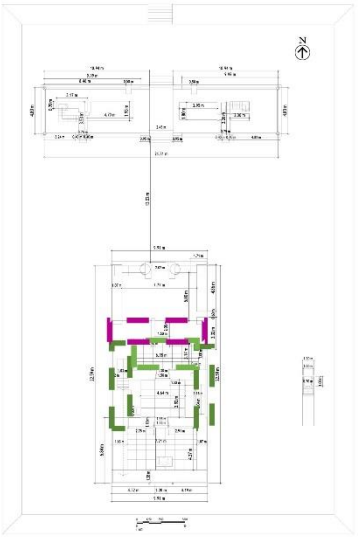
- Transverse Room (*Querraum* Transition Gap): Analyzes the intermediary spatial zone in between the Chapel of Ergamenes and Pronaos.
- Ptolemaic Monolithic Gateway: Documents the Ptolemaic monumental gateway, its structural lintels, Cavetto Cornices, and door-jamb adjustments.

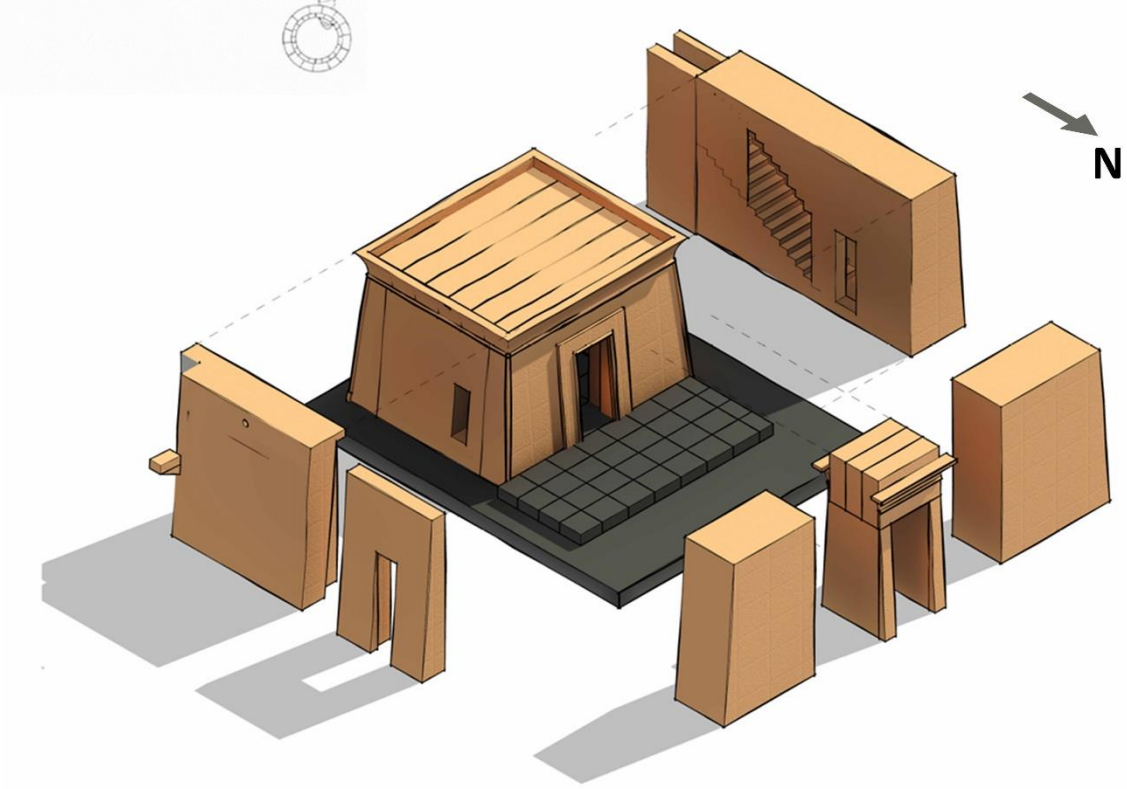
5.2.5 The Lion-Headed Waterspout *(Wasserspeier)*

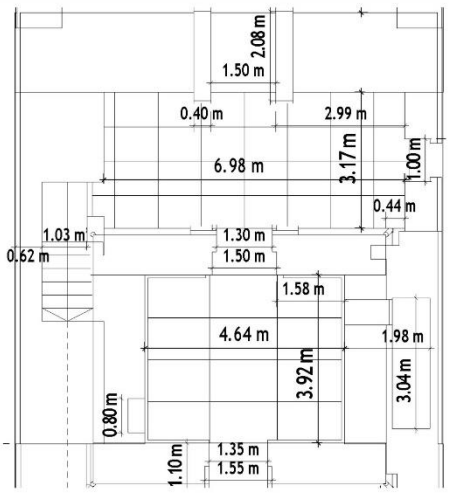
The Functional drainage element is addressed in this section: The Greco-Egyptian aesthetic installation of the lion-headed waterspout on the eastern exterior wall.


New platform built by the Department of Antiquities to protect foundations
Temple Well


DAKKE.
Grundriss des Tempels.




N


2.08 m
1.50 m
0.40 m
2.99 m
3.17 m
1.00 m
6.98 m
0.44 m
1.03 m
1.30 m
0.62 m
1.50 m
1.58 m
4.64 m
1.98 m
3.92 m
3.04 m
0.80 m
1.35 m
1.10 m
1.55 m

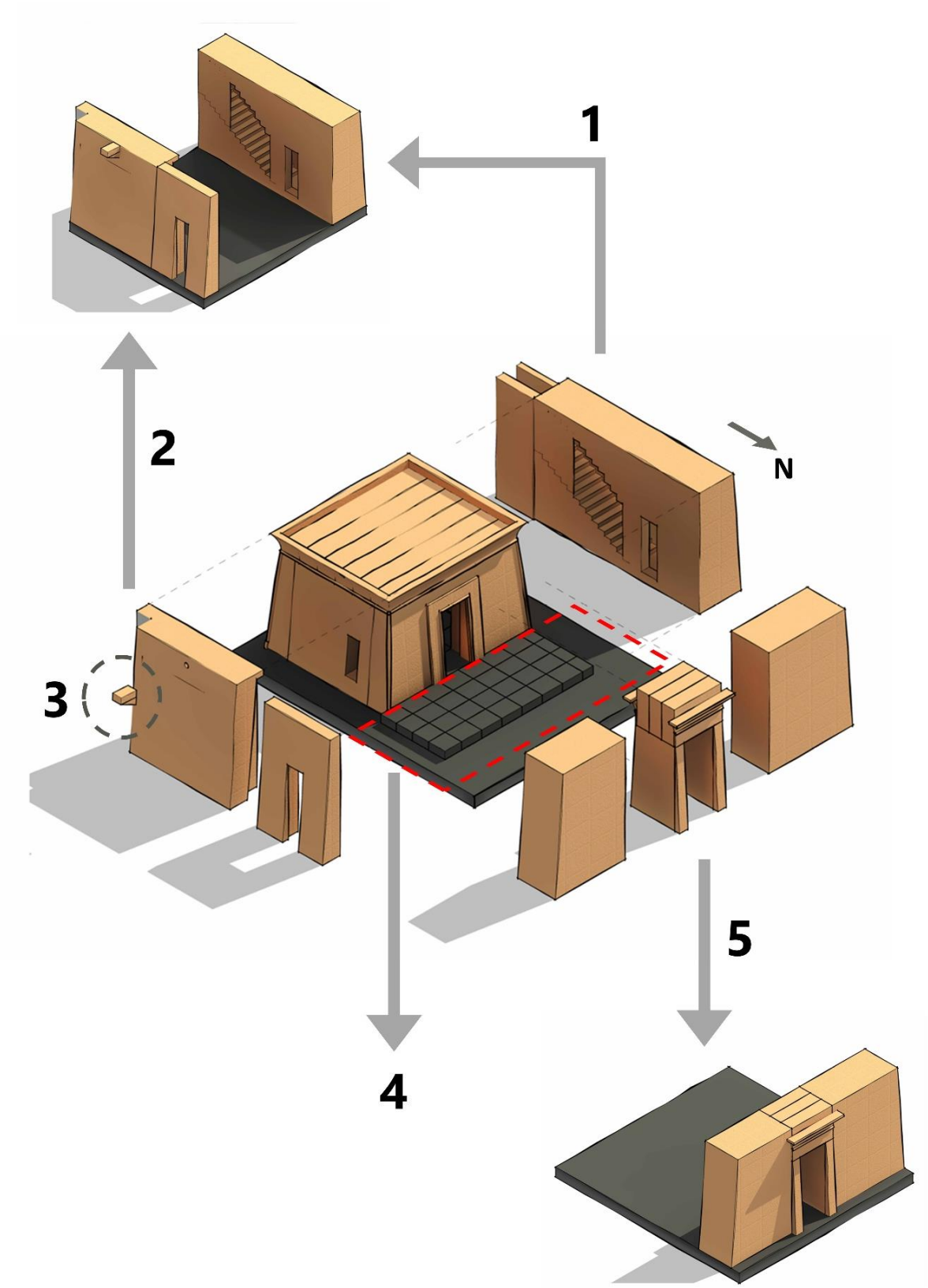


Figure 29. 1), 2)Roman Expansions around Chapel of Ergamenes- 3)The Lion-Headed Waterspout - 4)Transverse room, and 5)Ptolemaic Monolithic getaway

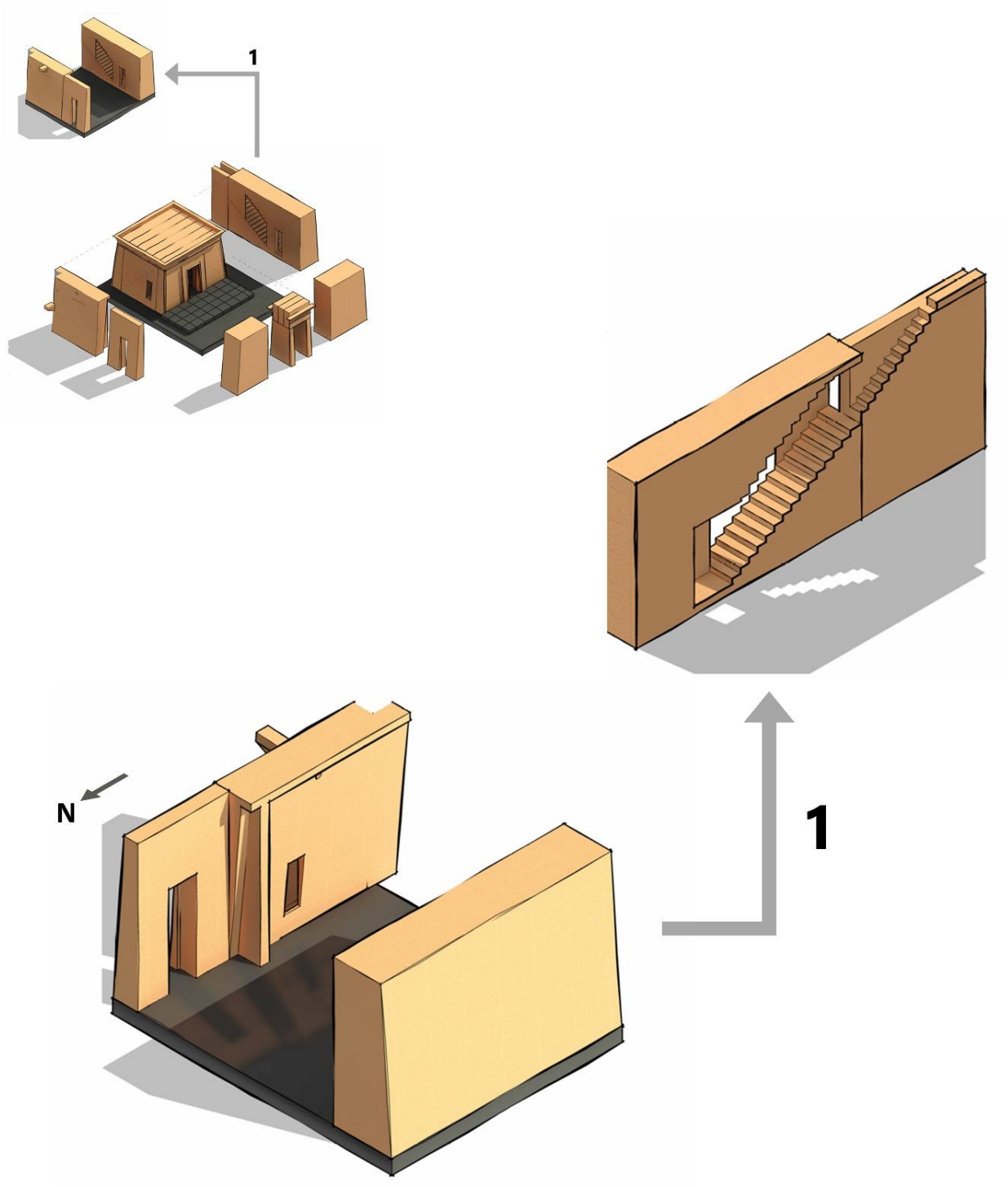
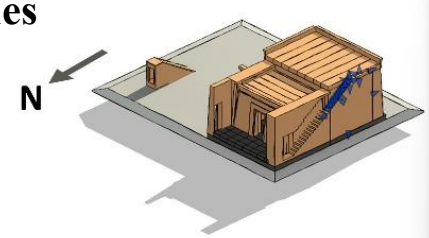
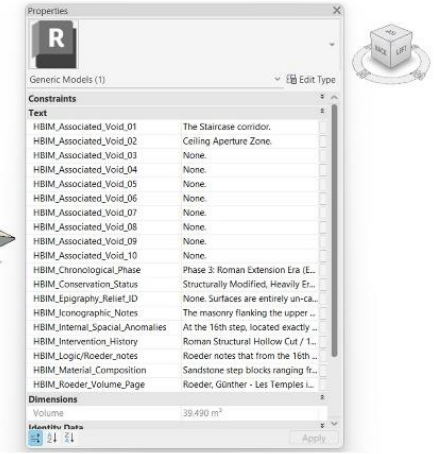


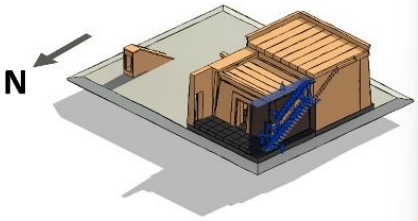
Figure 30. Roman Expansions: Western wall including Hidden Staircase.

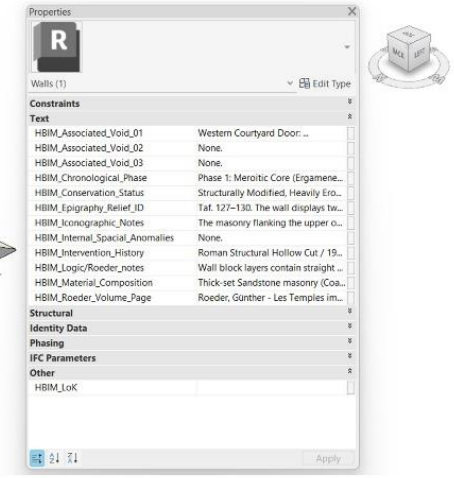
Western wall (Encapsulating the Chapel) and HBIM parametric values





1. HBIM_Associated_Void_01: Ceiling Aperture Zone
2. HBIM_Chronological_Phase: Phase 3: Roman Extension Era (Enclosure and integration with Phase 1 Meroitic Core)
3. HBIM_Epigraphy_Relief_ID: Surfaces are entirely un-carved text fields.
4. HBIM_Iconographic_Notes: The masonry flanking the upper open stairs features zero relief registers; however, the older western wall face of the Ergamenes core directly underneath is decorated with ancient white lime-wash coatings hosting three large, distinct hand-painted Coptic crosses measuring 64 cm, 58 cm, and 45 cm in height respectively.
5. HBIM_Internal_Spacial_Anomalies: At the 16th step, located exactly 32 cm south of the northernmost terminating edge of the older Ergamenes wall alignment, the staircase width pinches down sharply from 1.08 m to a narrow width of 64 cm. From this coordinate upward, the physical stone slab ceiling terminates completely, exposing the remaining steps (up to step 27) to open air.
6. HBIM_Intervention_History: Roman Structural Hollow Cut / 1908–1909 Barsanti Cement Consolidation. During the Roman Imperial extension campaign, the wall thickness was purposefully constructed to a massive 1.08 m width to encapsulate the continuous ascending flight of steps. With the building's expansion, the wall plane became a shared partition line, with its wider western side bounding the staircase while its eastern face was stepped back by 55 cm to form the vertical structural enclosure of the inner Sanctuary chamber. During the early 20th-century preservation work, Alessandro Barsanti stabilized the dangerously worn stone steps and structural masonry joints by executing extensive surface injections and leveling patches with modern cement mortar.
7. HBIM_Logic/Roeder_notes: Roeder notes that from the 16th step onward, the eastern boundary wall of the staircase is no longer formed by the sloped exterior face of the Ergamenes chapel, but transforms directly into the vertical, 55 cm thick set-in western core wall of the upper Sanctuary structure. This structural step-in was executed to provide clear foot passage onto the top Sanctuary roof plane while keeping the overall external wall thickness symmetrical.
8. HBIM_Material_Composition: Sandstone step blocks ranging from 15 cm to 18 cm in riser height. Wall surfaces facing the upper open run are characterized by rough, unfinished building surfaces showing heavy quarrying bosses.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 50 (§ 104); S. 60 (§ 124). Cross-reference with standard architectural section cutting layout under Taf. 148.

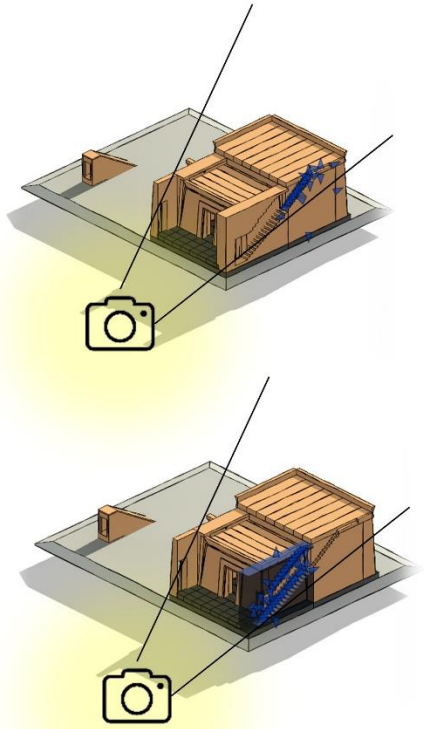


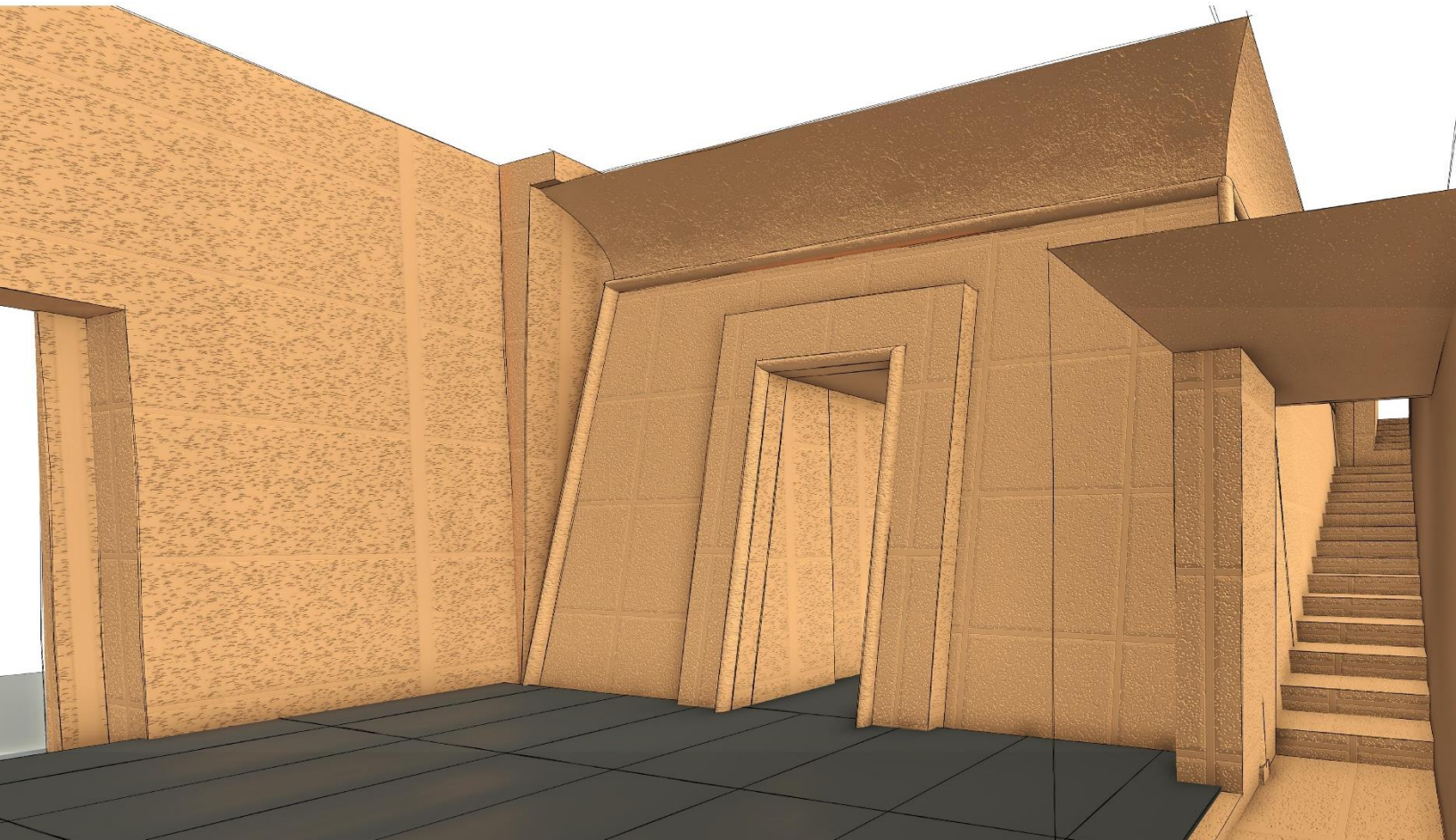


1. HBIM_Associated_Void_01: Western Courtyard Door:

[Dimensions & Descriptions]: Plain, late-period breakthrough passage puncturing horizontally through the thick masonry into the outer court space. Measures exactly 80 cm wide and 1.66 m high. This void passes entirely through the solid core wall layer and does not intersect the internal roof stairs.

2. HBIM_Chronological_Phase: Phase 1: Meroitic Core (Ergamenes) / Phase 3: Roman Extension Era (Augustan wrap-around construction): Staircase modifications completed in Phase 3 (Roman Expansion)
3. HBIM_Conservation_Status: Structurally Modified, Heavily Eroded, and Partially Intact Core Matrix. The main block mass remains upright and standing in its original alignment, but its structural core was significantly manipulated in antiquity to hollow out the internal path for the rooftop staircase (Treppe zum Dach). The lower masonry courses are mostly intact, while the upper-most stone layers are completely missing or severely weathered, leaving the topmost section of the internal staircase cavity exposed to the open sky. The interior face of the wall retains visible plaster remnants (Kalktünche).
4. HBIM_Epigraphy_Relief_ID: Taf. 127–130. The wall displays two complete rows of reliefs depicting the Pharaonic ruler making offerings to localized manifestations of Horus and the wider Osirian triad.
5. HBIM_Iconographic_Notes: The masonry flanking the upper open stairs features zero relief registers; however, the older western wall face of the Ergamenes core directly underneath is decorated with ancient white lime-wash coatings hosting three large, distinct hand-painted Coptic crosses measuring 64 cm, 58 cm, and 45 cm in height respectively.
6. HBIM_Intervention_History: Roman Structural Hollow Cut / 1908–1909 Barsanti Cement Consolidation. During the Roman Imperial extension campaign, the wall thickness was purposefully constructed to a massive 1.08 m width to encapsulate the continuous ascending flight of steps. With the building's expansion, the wall plane became a shared partition line, with its wider western side bounding the staircase while its eastern face was stepped back by 55 cm to form the vertical structural enclosure of the inner Sanctuary chamber. During the early 20th-century preservation work, Alessandro Barsanti stabilized the dangerously worn stone steps and structural masonry joints by executing extensive surface injections and leveling patches with modern cement mortar.
7. HBIM_Logic/Roeder_notes: Wall block layers contain straight vertical joins where they meet the older core, validating separate construction layers/ Roeder specifies that the low-level niche was an original structural inclusion meticulously planned by the early builders, whereas the courtyard pass-through is a raw, non-framed breach added long after the Meroitic construction window was closed
8. HBIM_Material_Composition: Thick-set Sandstone masonry (Coarse-grained Kertassi) block-bonds, significantly wider than the eastern wall with Solid wall section spans 10.10 m long from the corner to the northern ptolemaic construction joint, structurally thickened to accommodate the internal roof-access staircase stair-well.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 37 (§ 70–74); S. 63 (§ 132); S. 328 (§ 718–739).





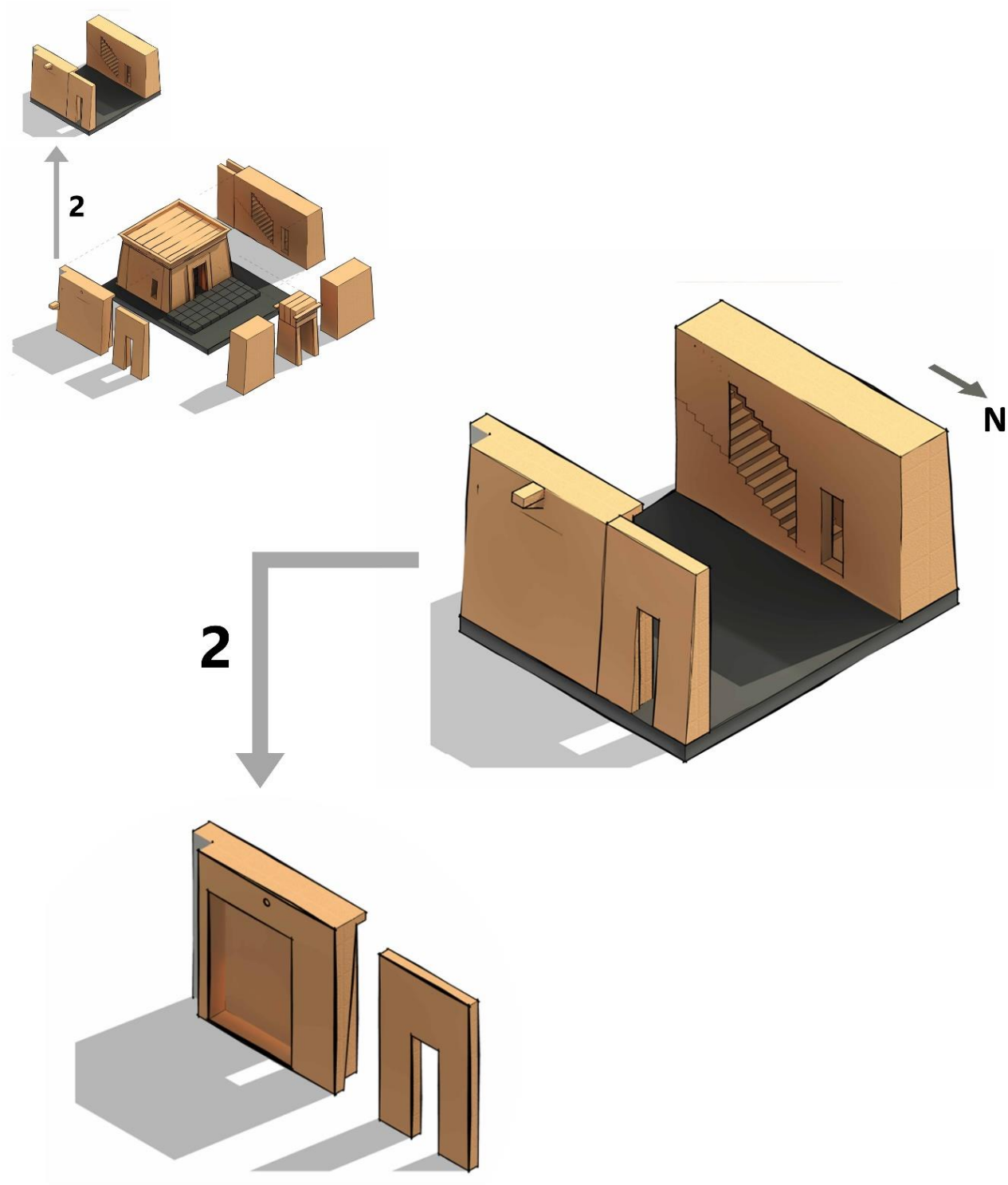
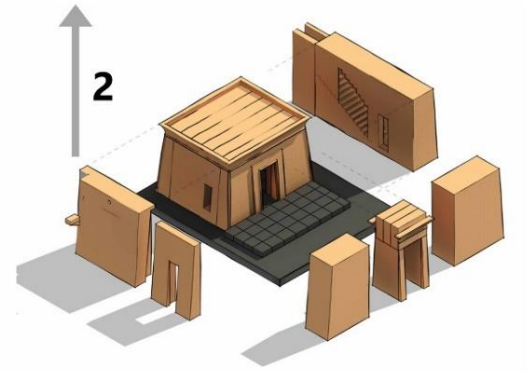


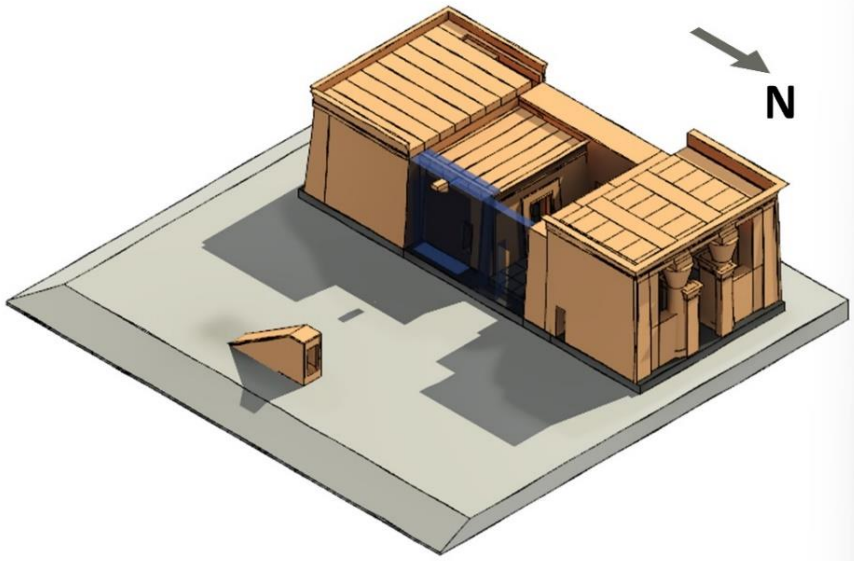
Figure 31. Roman Expansions: Eastern wall including Roman small Chapel Northern and Secondary Access Door

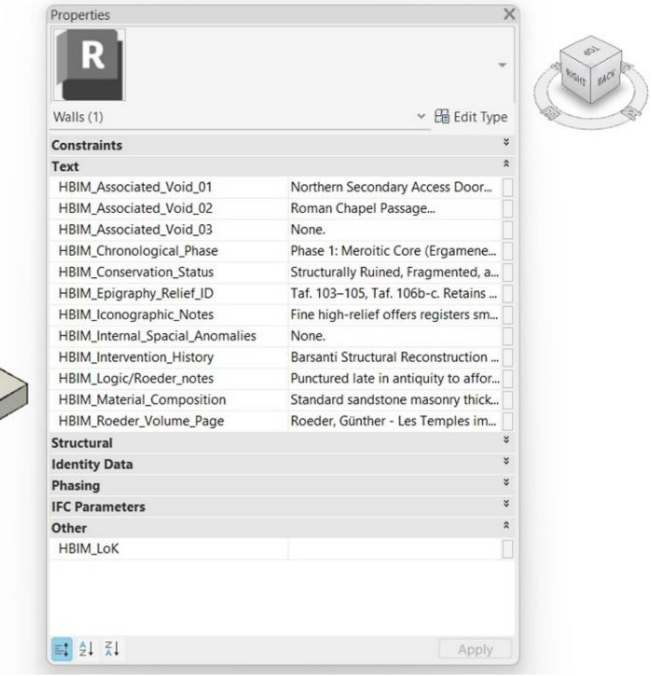




Roman Expansions:

Eastern wall (Encapsulating the Chapel) Including Roman Small Chapel and Northern Secondary Access Door and HIBIM parametric values





1. HBIM_Associated_Voids_01: Northern Secondary Access Door

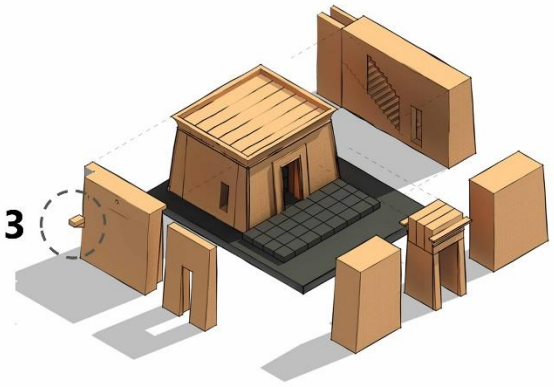
[Dimensions &_Descriptions]: Raw, completely unadorned rectangular Roman breakthrough doorway cutting through earlier hieroglyphic bands. Measures exactly 62 cm wide x 1.67 meters high. Northern jamb starts exactly 37 cm south along the internal wall face from the NW sanctuary corner junction. No lintel, cavetto cornice, or framing moldings present.

2. HBIM_Associated_Voids_02: Roman Chapel Passage

[Dimensions &_Descriptions]: Lower east wall puncture forming a 62 cm wide, 1.67 m high un-profiled opening that steps up 37 cm above the baseline floor to grant axis entry into the secondary Roman Rooms built flush against the temple exterior.

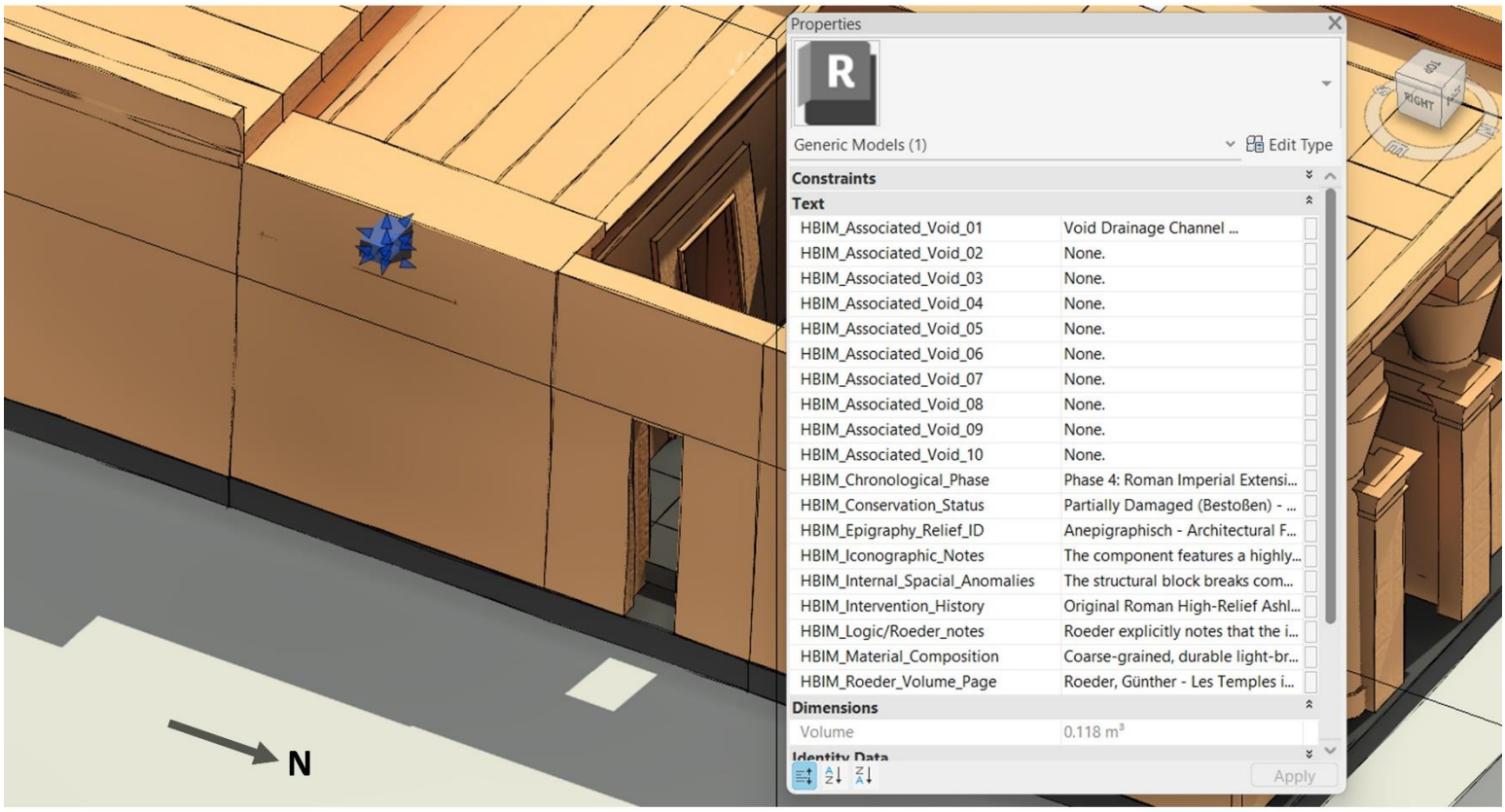
3. HBIM_Cronological_Phase: Phase 1: Meroitic Core (Ergamenes Construction) / Altered in Phase 3 (Roman Augustan Secondary Doorway Breakthrough)
4. HBIM_Conservation_Status: Structurally Ruined, Fragmented, and Reconstructed Core Matrix. The entire northern section of this wall assembly had completely collapsed prior to modern intervention. The only original pharaonic structural core piece recovered from this section was the heavily weathered door lintel block (Türsturz) of the primary side-portal. The adjacent stone surfaces flanking this portal are severely eroded with minor missing ashlar blocks.
5. HBIM_Epigraphy_Relifes_ID: Taf. 103–105, Taf. 106b-c. Retains three rows of fine high-relief scenes showing the king offering before the local pantheon, broken abruptly by the later Roman doorway cut.
6. HBIM_Iconographic_Notes: Fine high-relief offers registers smashed violently across their borders by the late Roman door cut.
7. HBIM_Intervention_History: Barsanti Structural Reconstruction (1908–1909) / Modern Material Substitution. Following the total collapse of the northern expanse of this layout, Alessandro Barsanti completely rebuilt the missing masonry parameters block-by-block using salvaged ancient fragments alongside heavy cement replication layers to stabilize the frame. Because the original structural vertical profiles of the eastern portal's side jambs (Pfosten) were entirely lost, Barsanti completely fabricated a new doorway framework (measuring exactly 86 cm wide by 3.23 m high, located 6.10 m south of the northeastern outer corner alignment) using raw, smooth cement infill to safely host and support the recovered ancient ptolemaic lintel block overhead
8. HBIM_Logic/Roeder_notes: Punctured late in antiquity to afford functional circulatory interconnectivity into the secondary Roman rooms built against the temple shell.
9. HBIM_Material_Composition: Standard sandstone masonry thickness at exactly 1.08 m. Spliced against a 1.20 m offset relative to the ancient Meroitic front wall line.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 41–42 (§ 83); S. 39 (§ 75–76); S. 57 (§ 119); S. 63 (§ 131)
11. HBIM_Lok: LOK 1

Dimensions and positions were physically recorded and surveyed by Roeder.



Roman Expansions:

Lion-Headed Water Spout *(Wasserspeier)* and HBIM parametric values

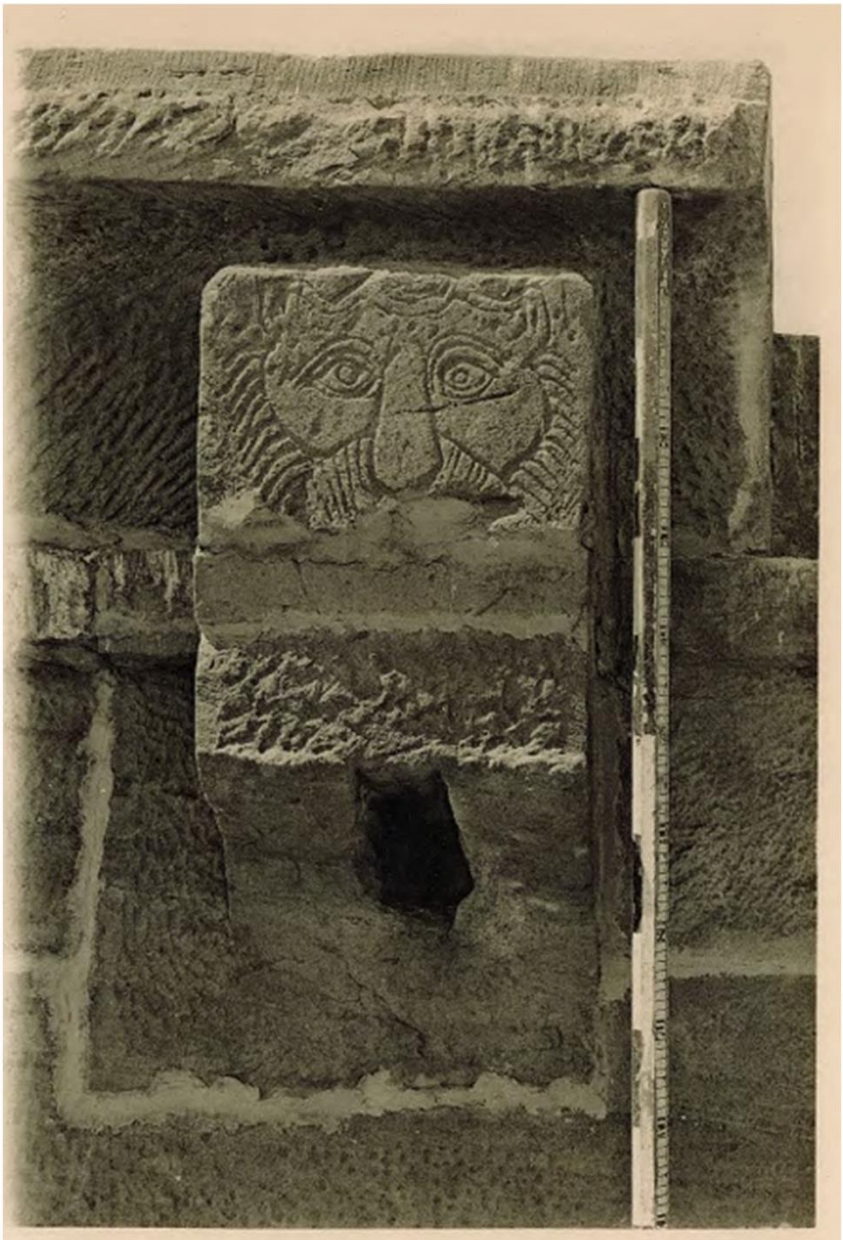


1. HBIM_Associated_Void_01: Void Drainage Channel

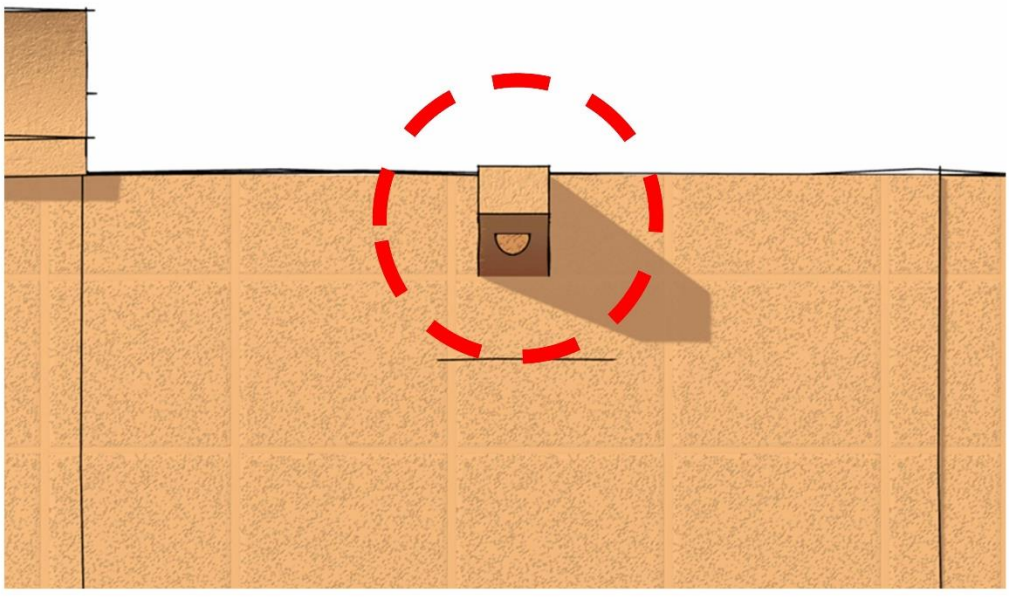
[Dimensions & Descriptions]: 6-10 cm Diameter Inclined Internal Roof Conduit

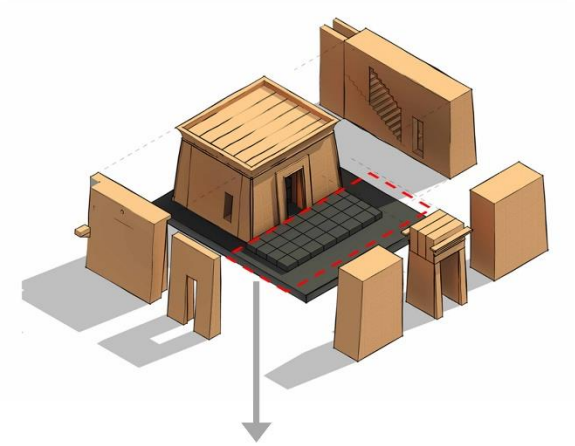
2. HBIM_Chronological_Phase: Phase 4: Roman Imperial Extension Shell (Reign of Augustus)
3. HBIM_Conservation_Status: Partially Damaged (Bestoßen) - Lower drainage projection snapped away; lion visage detailing intact.
4. HBIM_Epigraphy_Relief_ID: Anepigraphisch - Architectural Functional Sculpture
5. HBIM_Iconographic_Notes: The component features a highly detailed lion's head sculpted in front view (*Löwenkopf in Vorderansicht*) executed in a distinctive Graeco-Egyptian stylistic fusion. The stylized mane curves dramatically across the forehead block, with deep incised locks falling flanking the cheeks and streaming onto the snout. The eyes are extraordinarily large, defined by multiple concentric sculpted frames; the nasal bridge is remarkably broad and flat. This crisp, high-quality carving represents the peak of Augustan-era masonry craftsmanship at the site.
6. HBIM_Internal_Spacial_Anomalies: The structural block breaks completely through the wall mass to serve as the low-point output terminal for the complex drainage system hollowing out the enclosed roof of the earlier Ergamenes Kapelle. The drainage sequence originates exactly 15 cm above the finished floor level of the Ergamenes roof slab, runs horizontally straight East directly through the Roman Capelle interior space via two massive custom-cut stone joist blocks that span like a bridge above the sanctuary access doorway, and terminates at this lion snout output.
7. HBIM_Intervention_History: Original Roman High-Relief Ashlar Block / Intact In-Situ Preservation Core
8. HBIM_Logic/Roeder_notes: The waterspout on the Eastern exterior wall is an archaeological anomaly and a vital piece of the temple's structural evolution. Roeder explicitly notes that the internal drainage channel (6–10 cm diameter) sits 15 cm above the actual roof plane of the Ergamenes Kapelle, making it functionally impossible for the spout to drain that roof. This proves the spout was a retrofitted structural intervention—likely added after the Roman Sanctuary walls enclosed the older chapel, necessitating a new path for water runoff that the original Ergamenes design never anticipated. It is a prime example of "reconstructed functionality" where the Roman builders prioritized structural water management over the original, aesthetic, and functional logic of the Ergamenes structure.
9. HBIM_Material_Composition: Coarse-grained, durable light-brown sandstone (resembling Kertassi quarry fabrics)
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 39–40 (§ 79–80); S. 60 (§ 123); Plates Vol 2, Taf. 10, 100
11. HBIM_LoK_Level: LoK 4

Fully documented, measured, and structurally drafted by Roeder.



b. Wasserspeier an der östlichen Aussenwand.

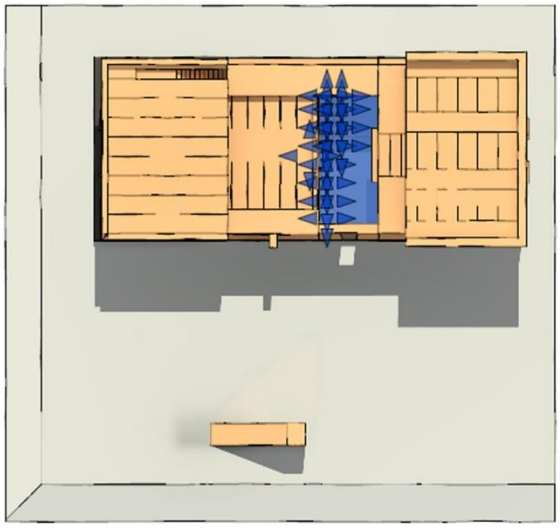




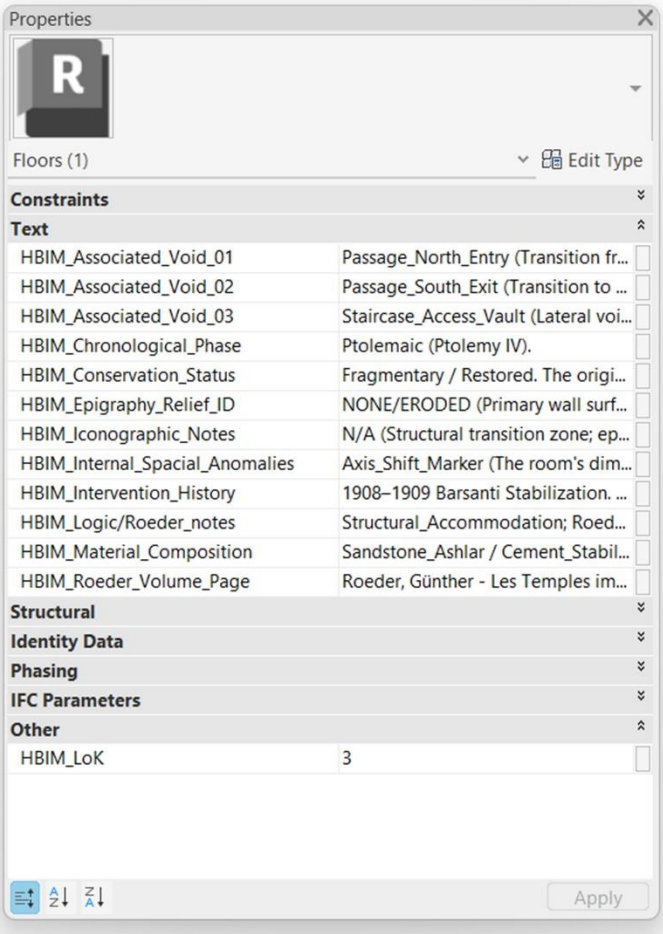
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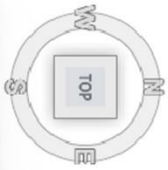
Roman Expansions:

The Transverse Room (*Querraum Transition Gap)* and HBIM parametric values

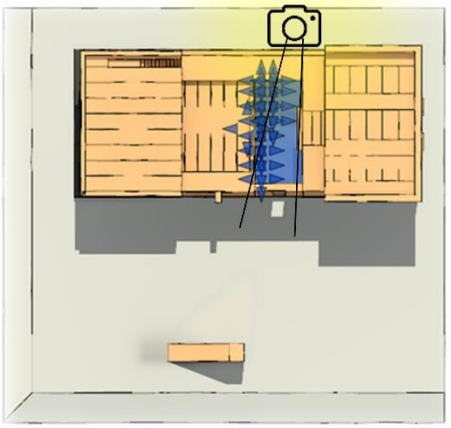


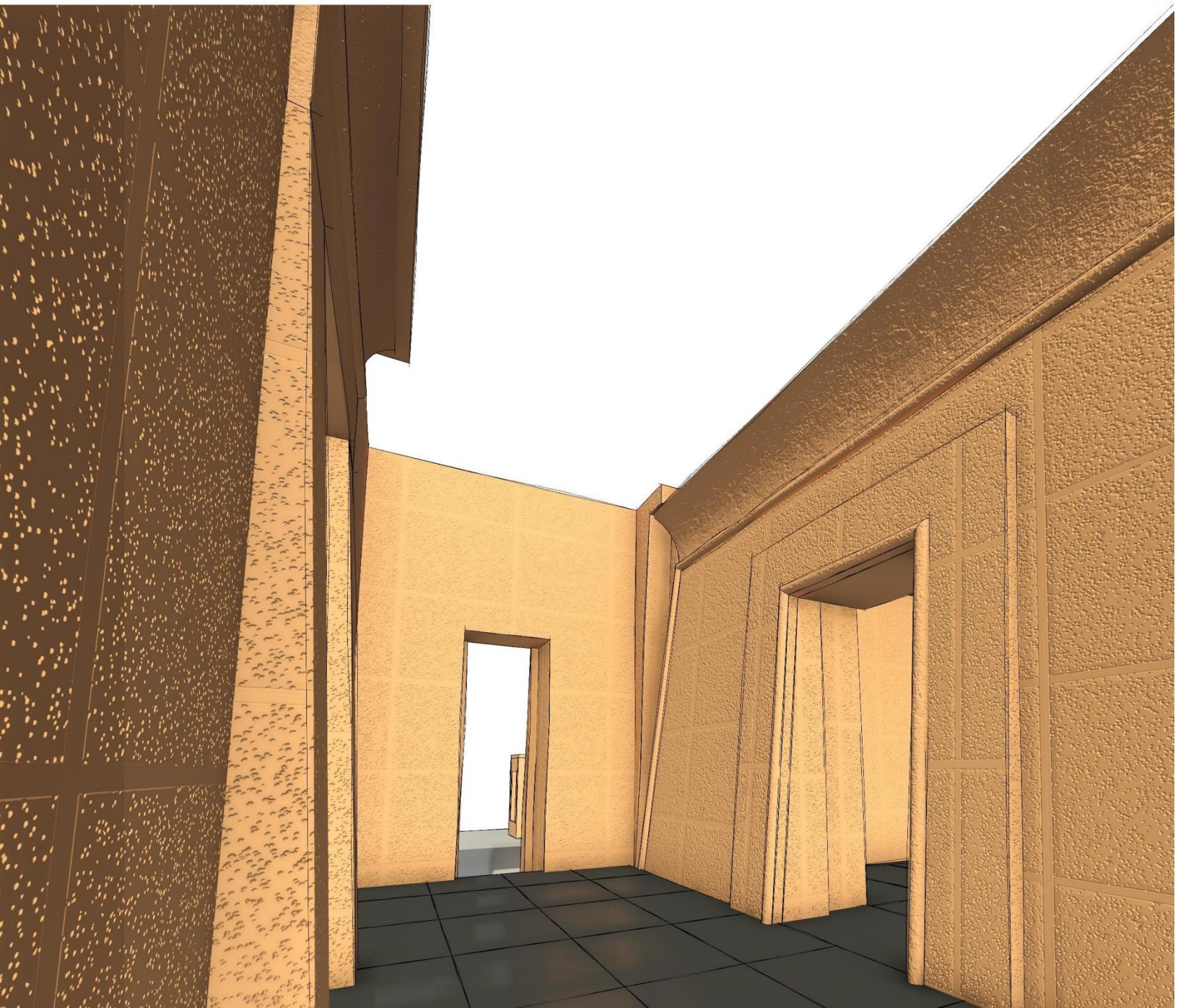
N

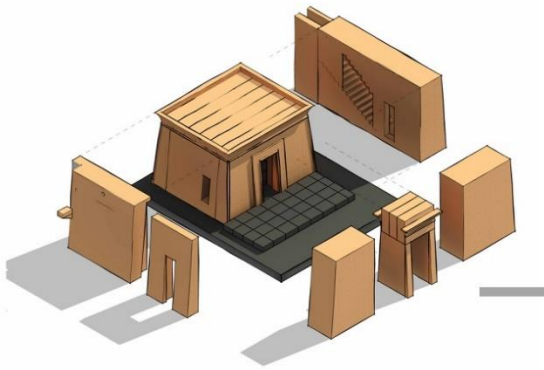




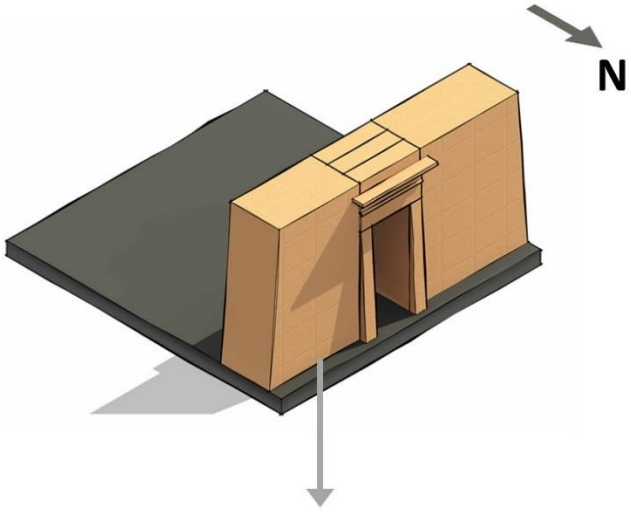
1. HBIM_Associated_Void_01: Passage_North_Entry (Transition from Pylon axis to Querraum).
2. HBIM_Associated_Void_02: Passage_South_Exit (Transition to Ergamenes Chapel entrance).
3. HBIM_Associated_Void_03: Staircase_Access_Vault (Lateral void housing the ascent to the temple roof)
4. HBIM_Chronological_Phase: Ptolemaic (Ptolemy IV).
5. HBIM_Conservation_Status: Fragmentary / Restored. The original flooring within this gap was largely lost due to the collapse of the forward temple structures and subsequent flooding. During the stabilization efforts led by Barsanti, the floor level was reconstructed using cement-based screeds to provide a level transition between the chapel threshold and the gateway passage.
6. HBIM_Epigraphy_Relief_ID: NONE/ERODED (Primary wall surfaces were compromised; remaining registers are limited to jamb fragments).
7. HBIM_Iconographic_Notes: N/A (Structural transition zone; epigraphic decorative program lost due to stone surface degradation).
8. HBIM_Internal_Spacial_Anomalies: Axis_Shift_Marker (The room's dimensions and placement deviate slightly from the central axis to accommodate the pre-existing chapel walls).
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The primary intervention involved the removal of debris and the installation of a non-original, leveled surface to facilitate site access, which effectively obscured any remaining diagnostic features of the original floor system.
10. HBIM_Logic/Roeder_notes: Structural_Accommodation; Roeder notes this space was specifically generated to link the Ergamenes core with the newer ptolemaic pylon.
11. HBIM_Material_Composition: Sandstone_Ashlar / Cement_Stabilization_Infill.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), pp. 49–50; Plans_19.pdf (Plate Plan).
13. HBIM_Lok: LOK 3 (Contextually linked to the passage between the Chapel and Gateway).







5



Roman Expansions:

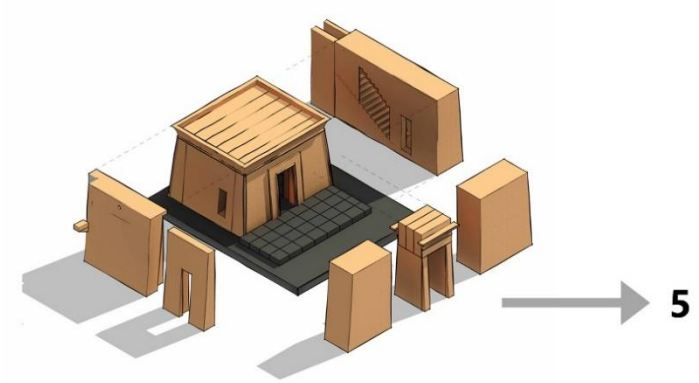
Ptolemaic Monolithically gateway and HBIM parametric values

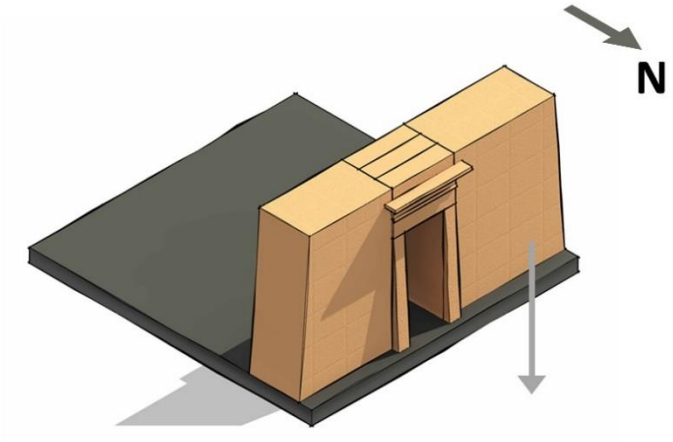
Eastern Side Wall



1. HBIM_Associated_Void_01: None.
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 2: Early Ptolemaic Expansion (Ptolemy IV Philopator I)
5. HBIM_Conservation_Status: Stabilized / Reconstructed. The eastern jamb core was subject to significant masonry displacement during the collapse of the forward temple structures. The current state reflects a stable reassembly where original sandstone blocks were reset and voids were filled with standardized, non-original masonry material to ensure vertical load transfer.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 155–158 (§ 354–363)
7. HBIM_Iconographic_Notes: The North face displays an upper register of the King presenting myrrh to Re-Harachte, a middle register offering food to Chnum-Re of Bige, and a lower register offering wine to Hathor. The inner pass-through rebate contains subsequent Roman registers tracking an offering Emperor added under the authority of Augustus.
8. HBIM_Internal_Spacial_Anomalies: The inner doorjamb width shows an irregular, forced hack-away line where an inner strip measuring between 15 and 25 cm wide was systematically chiseled off to expand the clear entry passage to 1.62 m. A deep latch bolt slot sits recessed into this eastern inner face
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti's team performed a critical structural stabilization of this eastern jamb, involving the pinning of displaced ashlar blocks and the systematic injection of cement grout to consolidate the rubble-fill core, which had lost its original bonding material due to environmental degradation and structural shift.
10. HBIM_Logic/Roeder_notes: The post-construction widening project completely destroyed the inner border framing lines and clipped the edge text fields of the primary Ptolemy IV reliefs, illustrating a direct spatial clash between logistics and preservation in antiquity.
11. HBIM_Material_Composition: Reddish light-brown sandstone masonry. The gateway wall cap projects an aggressive 93 cm clear of the main interior Query Room wall plaster line.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 34 (§ 64); S. 47–48 (§ 99–101).
13. HBIM_Lok: LOK 3.

The Western wall core of the gateway functions as the structural counterpart to the Eastern wall, defining the western limit of the ptolemaic entrance axis. Its spatial relationship is defined by the central temple axis established in the Ptolemaic structural survey documented in the records of Günther Roeder.

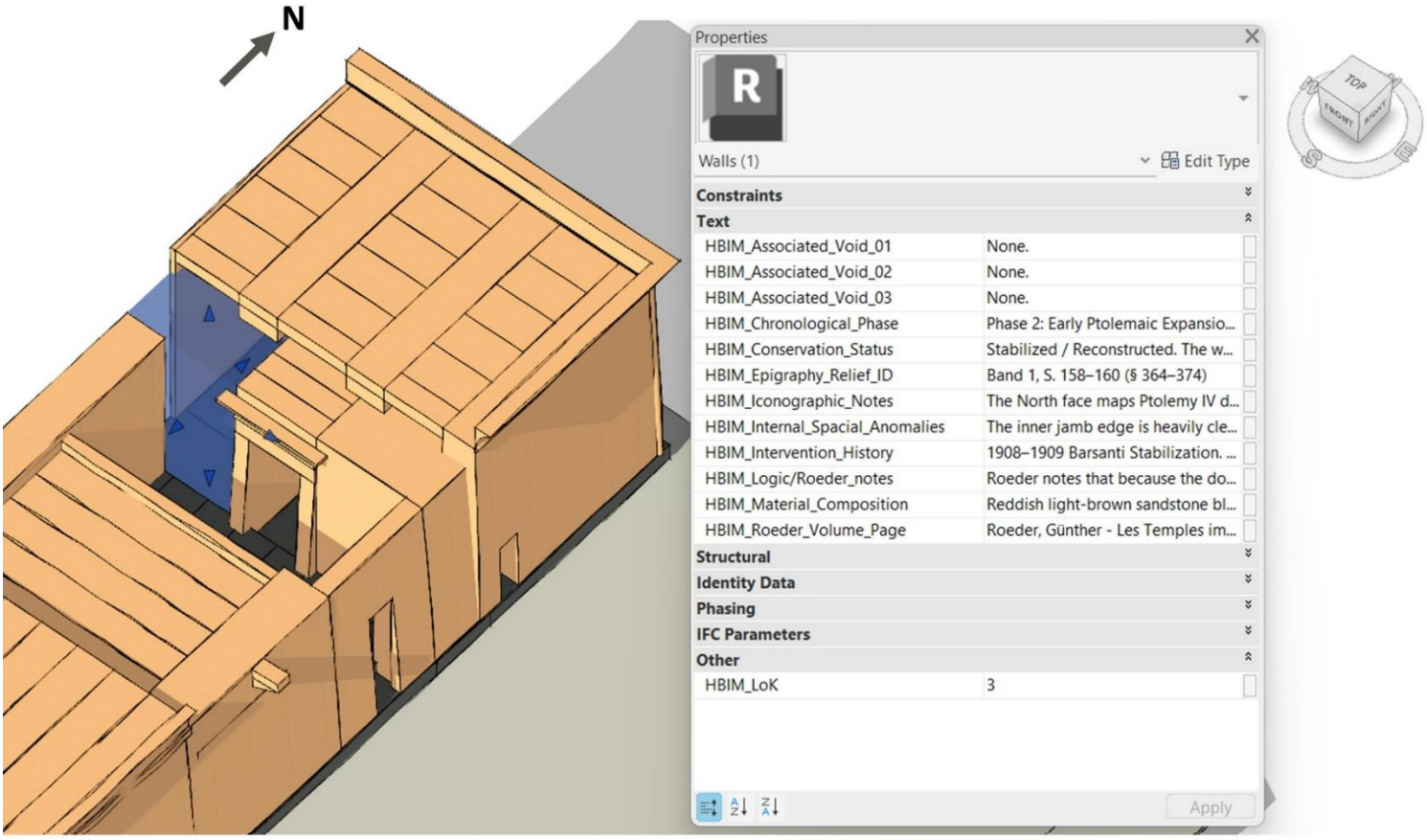




Roman Expansions:

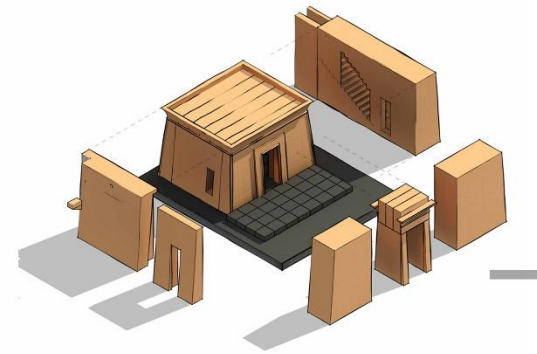
Ptolemaic Monolithically gateway and HBIM parametric values

Western Side Wall

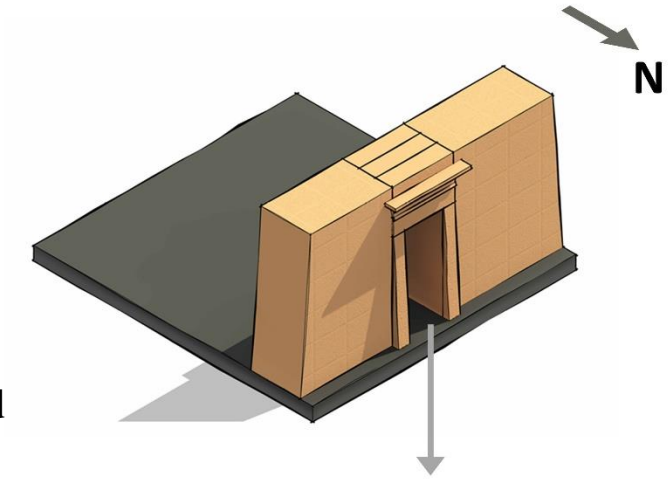


1. HBIM_Associated_Void_01: None.
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 2: Early Ptolemaic Expansion (Ptolemy IV Philopator I)
5. HBIM_Conservation_Status: Stabilized / Reconstructed. The western jamb core sustained significant structural displacement due to the collapse of the forward temple structures. It currently reflects a stable state following the re-setting of original sandstone ashlar blocks, which were secured with modern mortars during early 20th-century preservation efforts.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 158–160 (§ 364–374)
7. HBIM_Iconographic_Notes: The North face maps Ptolemy IV dedicating fields to Isis. The base register preserves an unfinished, finely incised Nile-god offering figure carrying papyrus and lily details.
8. HBIM_Internal_Spacial_Anomalies: The inner jamb edge is heavily cleared out to facilitate a dual-leaf timber door hanging. The upper western corner interface retains a clear, round socket cup designed to seat the rotating pivot axis of the ancient door leaf.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Alessandro Barsanti's intervention focused on the structural consolidation of the western jamb, involving the mechanical pinning of displaced blocks and the injection of cement grout into the core of the masonry to restore vertical structural continuity.
10. HBIM_Logic/Roeder_notes: Roeder notes that because the door hinge sockets and the chopped jamb clearances override the initial Ptolemaic reliefs, the gateway originally possessed no functional door valves under Ptolemy IV; the double door leaves were forced into the layout during the Roman expansion era.
11. HBIM_Material_Composition: Reddish light-brown sandstone blocks.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 48 (§ 101); S. 49 (§ 103).
13. HBIM_Lok: LOK 3.

This component constitutes the western structural jamb and adjoining lateral wall core of the Ptolemaic portal, mirroring the structural load-bearing function of the eastern assembly along the temple's north-south central axis.



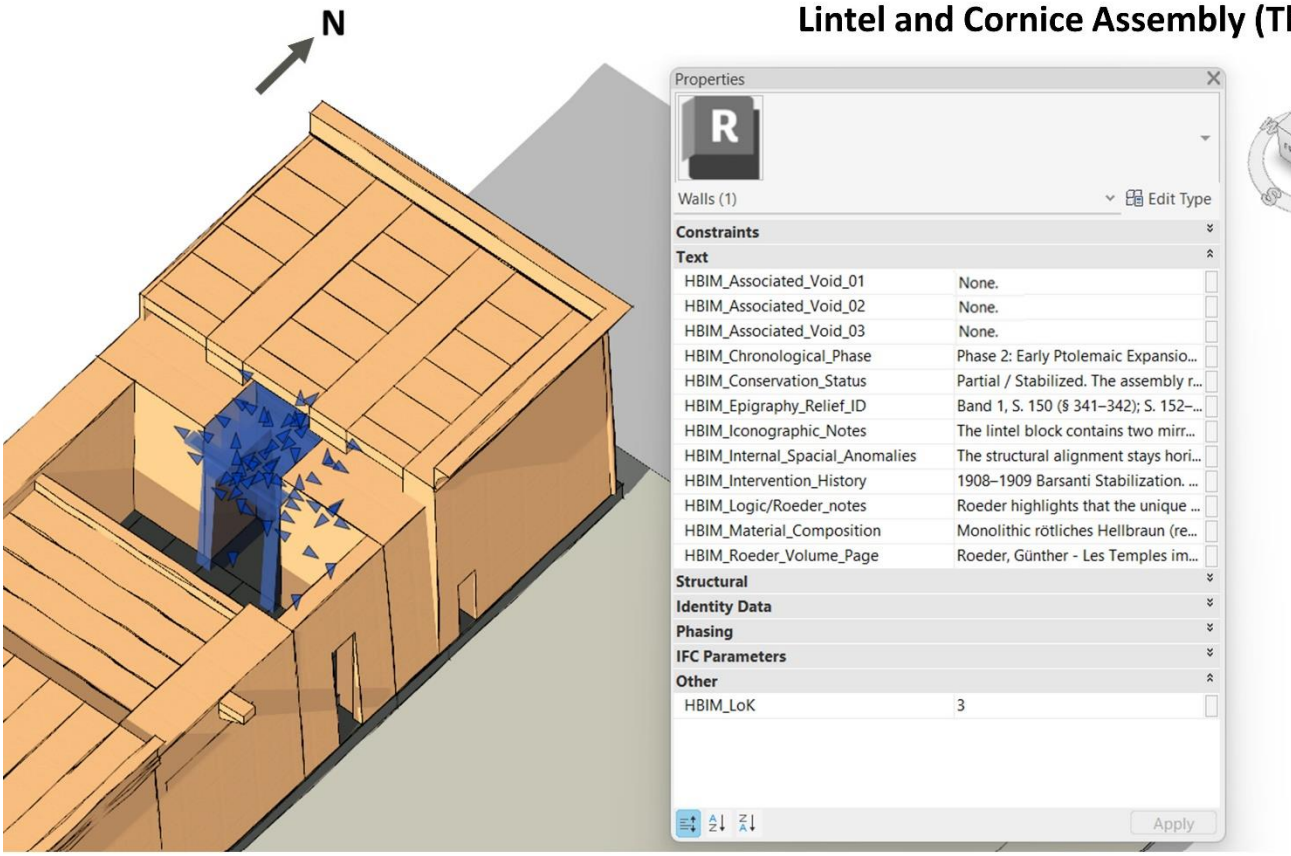
5



Roman Expansions:

Ptolemaic Monolithically gateway and HBIM parametric values

Lintel and Cornice Assembly (The Header)



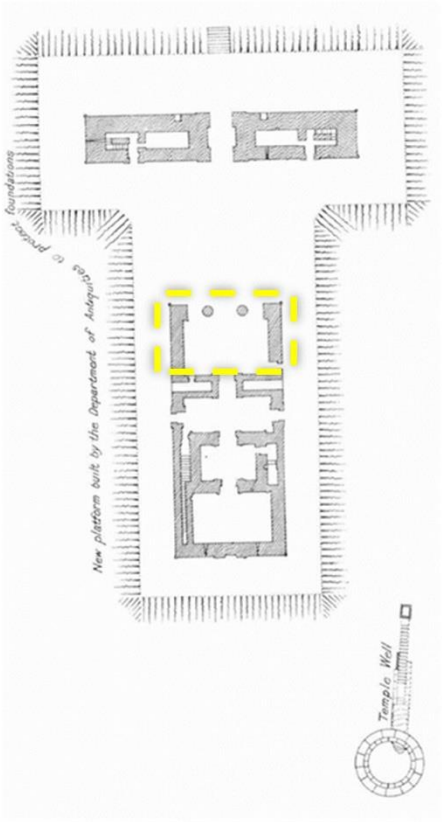
1. HBIM_Associated_Void_01: None.
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 2: Early Ptolemaic Expansion (Ptolemy IV Philopator I)
5. HBIM_Conservation_Status: Partial / Stabilized. The assembly retains its core Ptolemaic structural blocks, but the decorative iconography (specifically the sun disk and associated relief registers) exhibits significant surface weathering and localized losses due to historical exposure.
6. HBIM_Epigraphy_Relief_ID: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 150 (§ 341–342); S. 152–153 (§ 344–353)
7. HBIM_Iconographic_Notes: The lintel block contains two mirror-image symmetrical reliefs facing back-to-back, separated by a central vertical text line. The Left (West) scene displays Ptolemy IV and Queen Arsinoë II presenting Maat/Truth before Thot of Pnubs and Upset.The Right (East) scene displays the royal couple offering before Osiris and Isis. The crowning cavetto cornice carries an extraordinarily detailed winged sun disc flanked by standard protective cobras devoid of crowns, with its central inner wings beautifully rendered as wavy, undulating patterns.
8. HBIM_Internal_Spacial_Anomalies: The structural alignment stays horizontally true, but the entire header mass leans slightly backward to match the diagnostic batter slope (Böschung) of the flanking gate walls.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. During the restoration by Alessandro Barsanti, the lintel blocks were secured using cement mortar injections to rectify displacement caused by seismic activity and structural fatigue. The upper cornice assembly was consolidated to prevent the detachment of the cavetto profile.
10. HBIM_Logic/Roeder_notes: Roeder highlights that the unique iconographic treatment of the inner wings on this cornice is structurally identical to the sun disc found on the southern face of the great Pylon, providing a secure stylistic and chronological anchor across the outer temple transformations. Also he notes The header features the iconic *flügel-Sonne* (winged sun disk) and ensures the wing articulation matches the "three-part" configuration (inner section, mid-section, and long wing-tips), which is a diagnostic feature of the Ptolemaic architectural style used in Dakka.
11. HBIM_Material_Composition: Monolithic rötliches Hellbraun (reddish light-brown) fine sandstone block.The blocks are meticulously smoothed and squared, displaying variable course packing heights between 40 and 70 cm.
12. HBIM_Roeder_Volume_Page: Band 1, S. 34 (§ 64); S. 47–49 (§ 99–103).
13. HBIM_Lok: LOK 3.

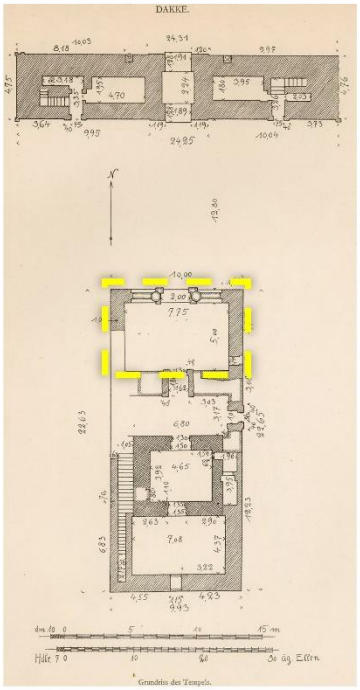
In the formal HBIM structure for the Temple of Dakka, the Gateway (Ptolemaic Portal) is designated as LOK 3, representing the primary structural intervention and access point between the Pylon and the Temple house.

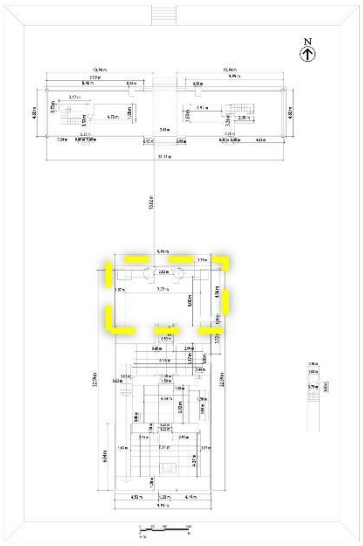
5.2.6 The Pronaos *(Vorhalle)*:

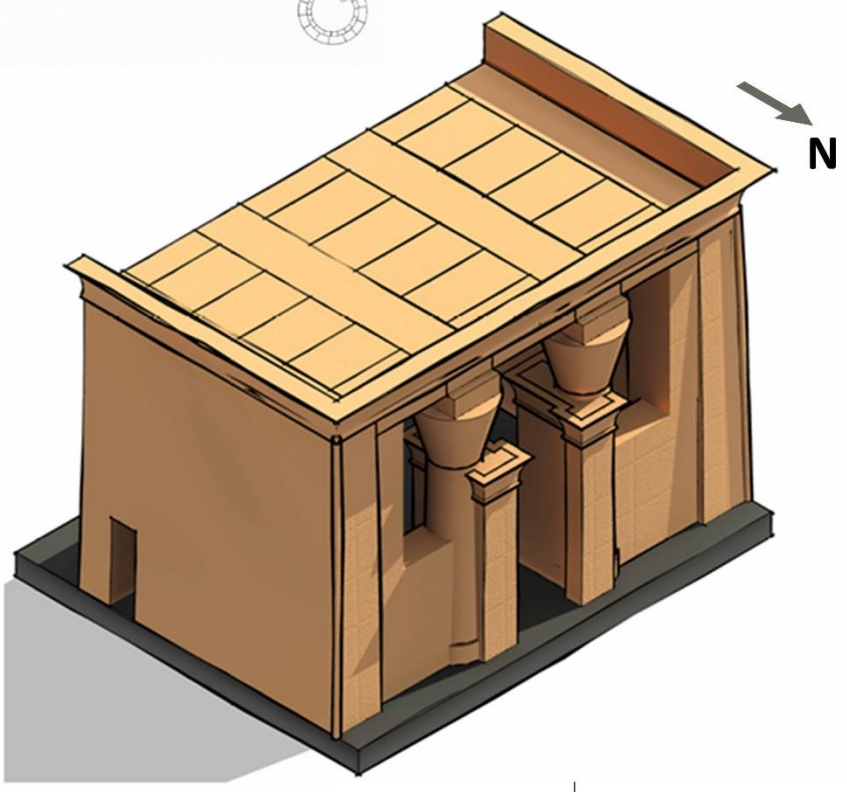
Intercolumnar Screen Walls, Papyrus Columns, and Roof Assembly

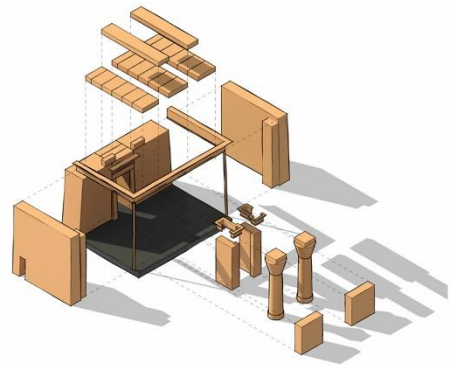
- Details the Ptolemaic facade and hypostyle hall.
- Documents the bundled papyrus columns with composite capital heads, the carved intercolumnar screen walls, the roof slab assemblies, and the historical reality of the 1896–1903 structural collapses and Barsanti restorations.

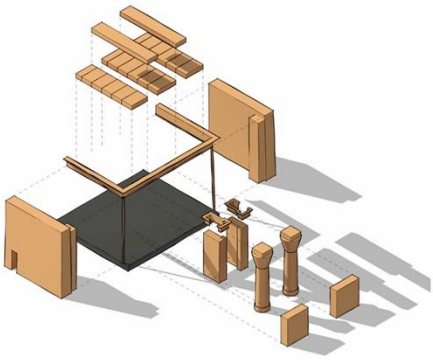

New platform built by the Department of Antiquities
Temple Wall

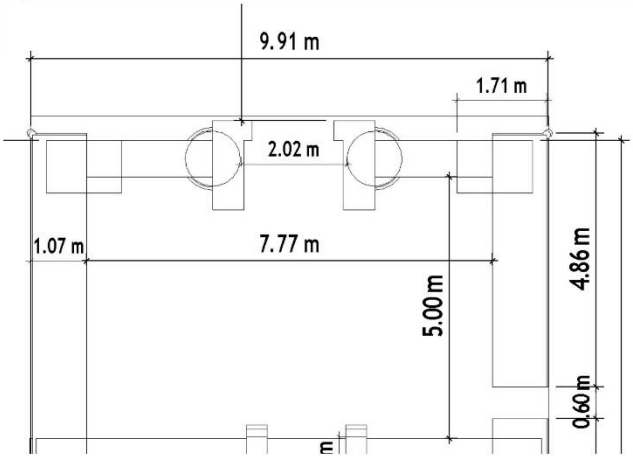

DAKKE.
Grundriss des Tempels.




N






9.91 m
1.71 m
2.02 m
1.07 m
7.77 m
4.86 m
5.00 m
0.60 m



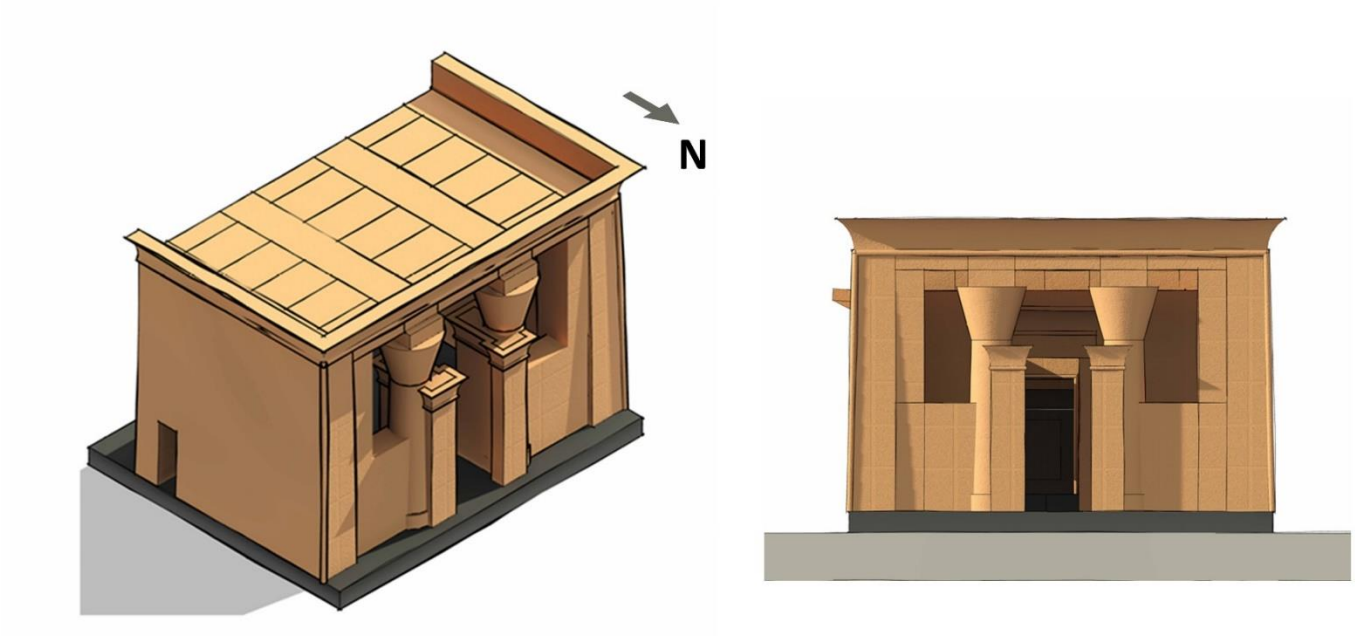


Figure 32. The generated North Facade of the Pronaos in Revit vs. Roeder's photos

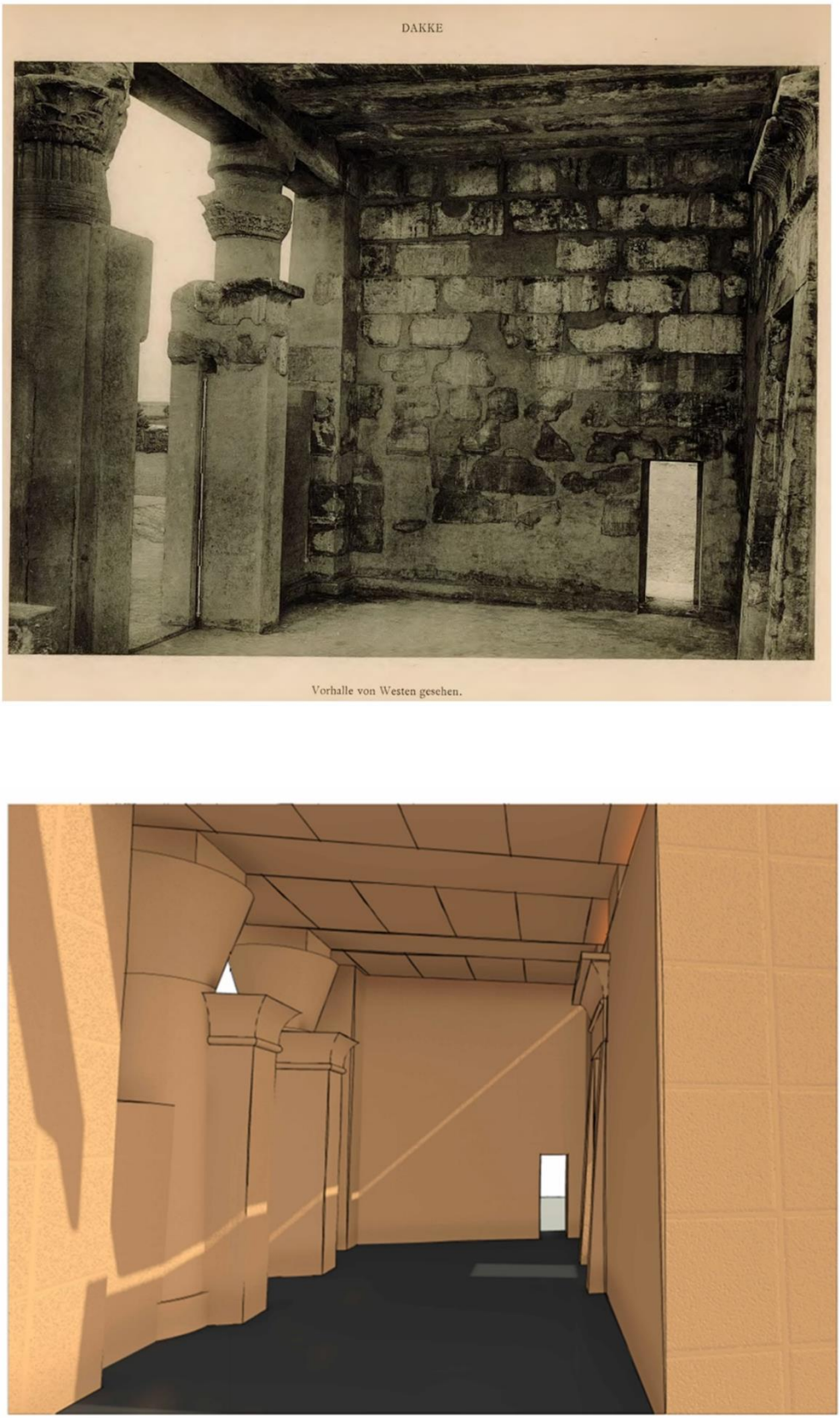
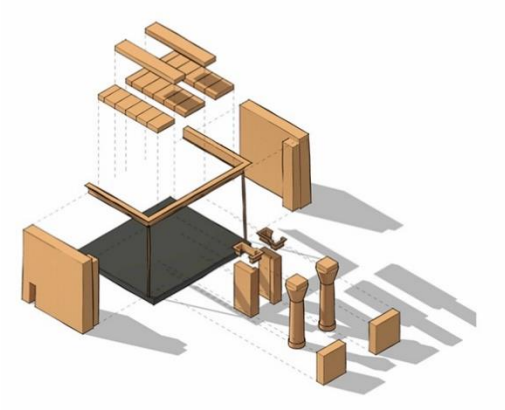
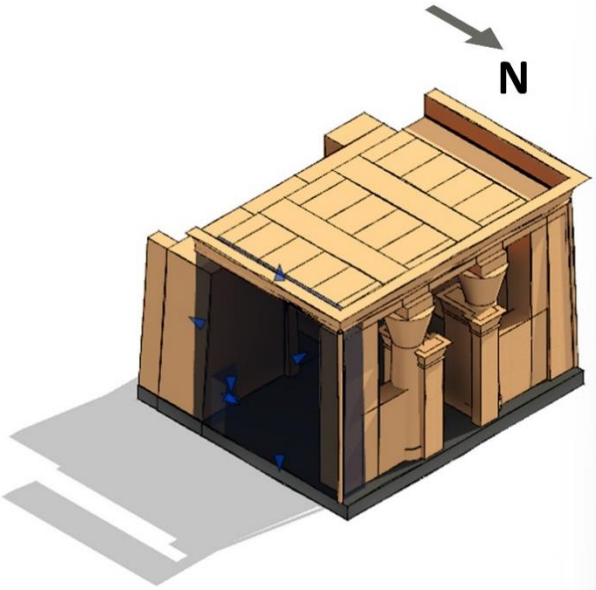


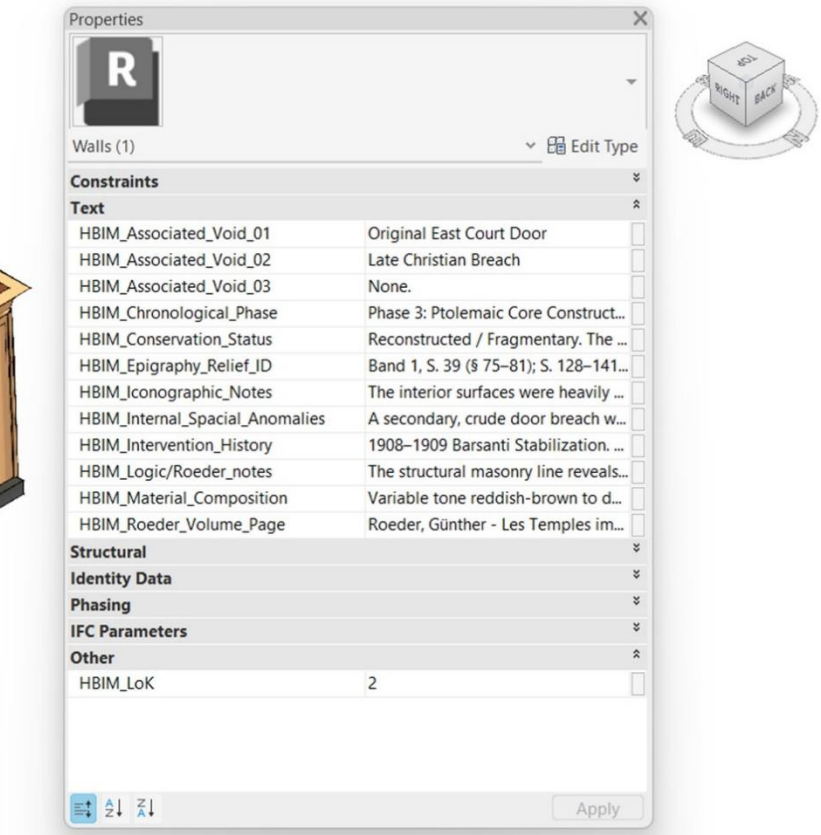
Figure 33. The Internal space of Pronaos (the hypostyle hall) in Roeder photos vs.3D model in Revit



The Pronaos *(Vorhalle):*

Eastern wall and HBIM parametric values



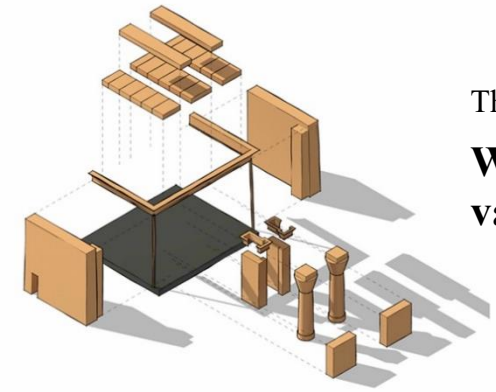


1. HBIM_Associated_Void_01: Original East Court Door
2. HBIM_Associated_Void_02: V02: Late Christian Breach
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Core Construction (Ptolemy IX Euergetes II)
5. HBIM_Conservation_Status: Reconstructed / Fragmentary. The eastern wall was severely compromised by the Pronaos collapse in 1903. While the core structural integrity has been restored, the original sandstone masonry was heavily supplemented with modern cementitious bedding during the 1908–1909 stabilization phase.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 39 (§ 75–81); S. 128–141 (§ 284–316).
7. HBIM_Iconographic_Notes: The interior surfaces were heavily sculpted under a Roman Emperor (referred to purely as Pharao in texts). The East wall preserves three horizontal registers of high-relief offering scenes, which were coated in a thick layer of Christian plaster and overpainted with crude red-brown icons of saints and angels in Vorderansicht.
8. HBIM_Internal_Spacial_Anomalies: A secondary, crude door breach was hacked through the northern sector in antiquity but was deleted/filled flat with masonry by Barsanti.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Alessandro Barsanti reconstructed this wall using a combination of surviving original blocks and modern mortar infill to restore the eastern boundary of the Pronaos and provide a stable base for the remaining relief registers.
10. HBIM_Logic/Roeder_notes: The structural masonry line reveals a straight, running vertical joint line 1.20 m north of the older Meroitic chapel facade, confirming the chronological boundary between the expansion segments.

NOTE: Because The Vorhalle suffered a progressive catastrophic structural collapse—the western half falling in a storm in 1896, and the eastern half coming down in 1903—Barsanti had to rebuild the facade and walls from absolute scratch using cement fills. Therefore, semantic segmentation must explicitly track what was historically found in situ versus what was reconstructed.

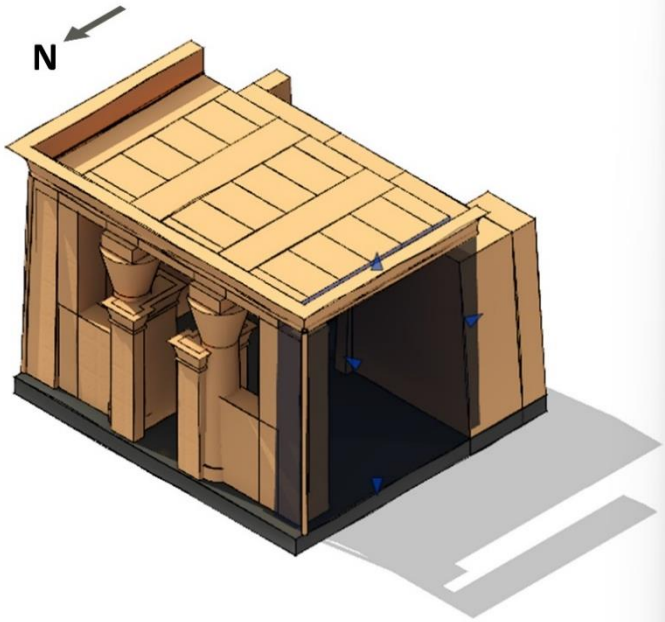
9. HBIM_Material_Composition: Variable tone reddish-brown to dark gray-yellow sandstone masonry, sitting on modern cement foundation consolidations. Block size dimensions track closely around a recurring length of 1.05 m.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 34-35 (§ 65); S. 39 (§ 75–78); S. 46–47 (§ 94–97).
11. HBIM_Lok: LOK 2.2.

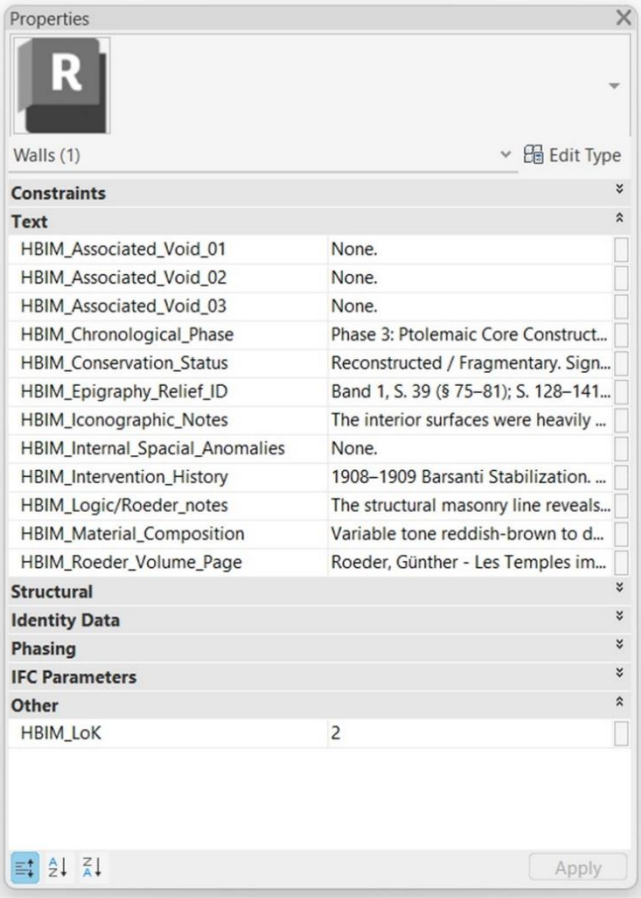
This component represents the eastern lateral wall core of the Pronaos, structural partition positioned directly opposite the western wall and serving as the primary surface for the lower, middle, and upper registers of the decorative relief program documented by Roeder.



The Pronaos *(Vorhalle):*

Western wall and HBIM parametric values





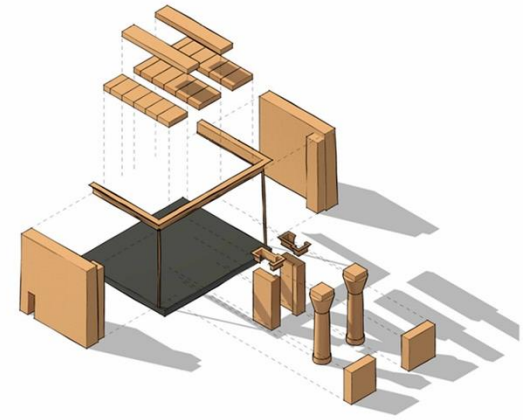


1. HBIM_Associated_Void_01: None.
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Core Construction (Ptolemy IX Euergetes II)
5. HBIM_Conservation_Status: Reconstructed / Fragmentary. Significant sections of the original wall fabric were lost during the collapse of the Pronaos; the current wall serves as a structural consolidation of the remaining masonry with modern infill.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 39 (§ 75–81); S. 128–141 (§ 284–316).
7. HBIM_Iconographic_Notes: The interior surfaces were heavily sculpted under a Roman Emperor (referred to purely as Pharao in texts). The West wall traces show Augustus previously ordered matching reliefs here before losing them to wall decay.
8. HBIM_Internal_Spacial_Anomalies: None.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Similar to the eastern wall, this structure was reinforced by Barsanti using cement mortar to secure displaced sandstone ashlar and to provide lateral stability to the Pronaos roof remnants.
10. HBIM_Logic/Roeder_notes: The structural masonry line reveals a straight, running vertical joint line 1.20 m north of the older Meroitic chapel facade, confirming the chronological boundary between the expansion segments.

NOTE: Because The Vorhalle suffered a progressive catastrophic structural collapse—the western half falling in a storm in 1896, and the eastern half coming down in 1903—Barsanti had to rebuild the facade and walls from absolute scratch using cement fills. Therefore, semantic segmentation must explicitly track what was historically found in situ versus what was reconstructed.

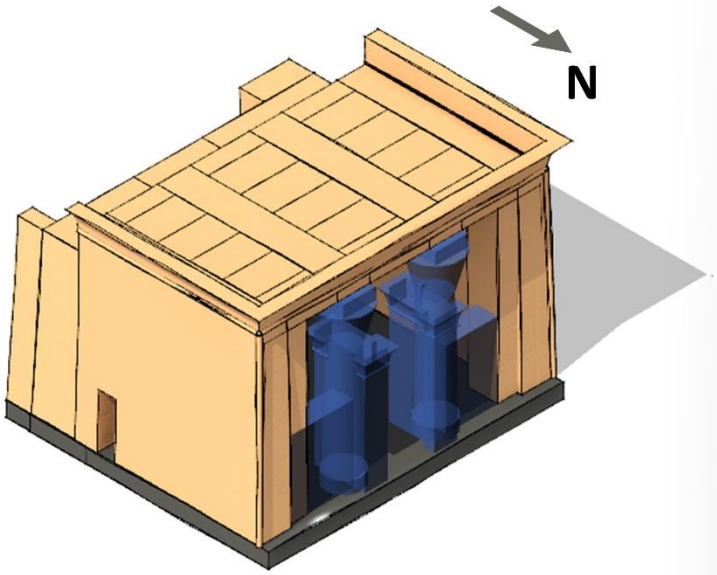
9. HBIM_Material_Composition: Variable tone reddish-brown to dark gray-yellow sandstone masonry, sitting on modern cement foundation consolidations. Block size dimensions track closely around a recurring length of 1.05 m.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 34-35 (§ 65); S. 39 (§ 75–78); S. 46–47 (§ 94–97).
11. HBIM_Lok: LOK 2.1.

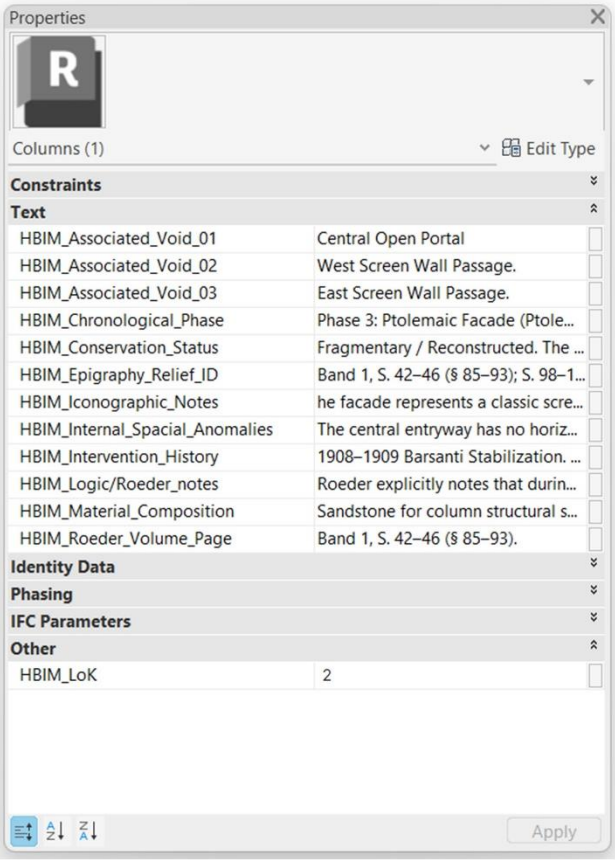
This component defines the western structural enclosure wall of the Pronaos, mirroring the Eastern wall (LOK 2.2) to complete the lateral structural sequence of this chamber.



The Pronaos *(Vorhalle):*

Northern Façade: Intercolumnar Screen Walls, Papyrus Columns, and Entrance



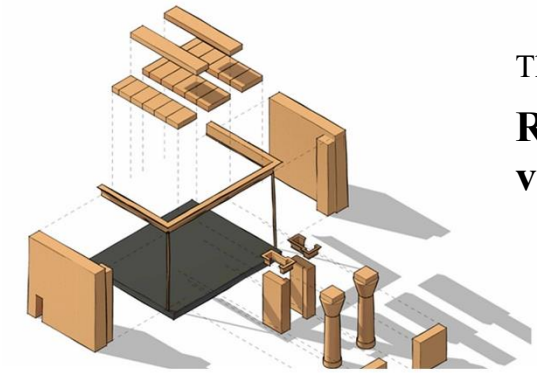


1. HBIM_Associated_Void_01: [V_01] Central Open Portal.
2. HBIM_Associated_Void_02: [V_02] West Screen Wall Passage.
3. HBIM_Associated_Void_03: [V_03] East Screen Wall Window.
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Facade (Ptolemy IX Euergetes II).
5. HBIM_Conservation_Status: Fragmentary / Reconstructed. The facade system suffered catastrophic failure during the 1903 collapse. Present architectural integrity relies on the re-erection of displaced drums and the structural consolidation of the screen walls, which were stabilized with non-original infill and metal reinforcement pins.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 42–46 (§ 85–93); S. 98–128 (§ 217–283).
7. HBIM_Iconographic_Notes: The facade represents a classic screen-wall kiosk structure. Flanking corner wall pillars (1.57 m wide) carry four vertical registers of painted high-reliefs of Ptolemy IX before the local pantheon. The columns are bundled papyrus variants featuring composite capital heads built of 32 elements (West) and 64 elements (East). The intermediate screen walls (36 cm thick) are completely lost but traditionally showed low-profile relief bands. Inside column shafts feature facing reliefs of a dancing, harp-playing Bes demon and an upright baboon playing a sistrum.
8. HBIM_Internal_Spacial_Anomalies: The central entryway has no horizontal stone lintel or architrave spanning it, creating an open-sky portal. The inner wall reveals that the portal axis deviates 9.5 cm due West of the room's centerline axis. [V_02]and[V_03] represent late Christian alterations sliced through the screen walls.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti performed an extensive structural reassembly of the facade, involving the re-positioning of fallen column drums and the systematic re-anchoring of the screen wall panels to the main temple mass to ensure structural stability.
10. HBIM_Logic/Roeder_notes: Roeder explicitly notes that during the modern reconstruction, Barsanti accidentally swapped the two salvaged column capitals. The capital currently placed on the West column belongs structurally on the East column, and vice versa.
11. HBIM_Material_Composition: Sandstone for column structural sections and wall plates. The main entryway column height from base line up to the underside of the architrav tracks at 5.26 m.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 42–46 (§ 85–93).
13. HBIM_Lok: LOK 2.3.

This designation encompasses the columned facade (intercolumnar screens and monolithic shafts) and the portal opening of the Pronaos, representing the structural frontispiece of the Ptolemaic addition.

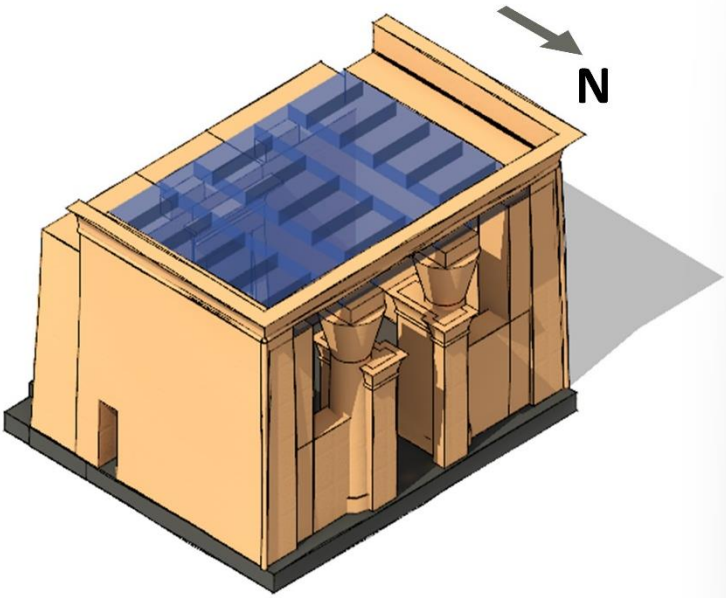


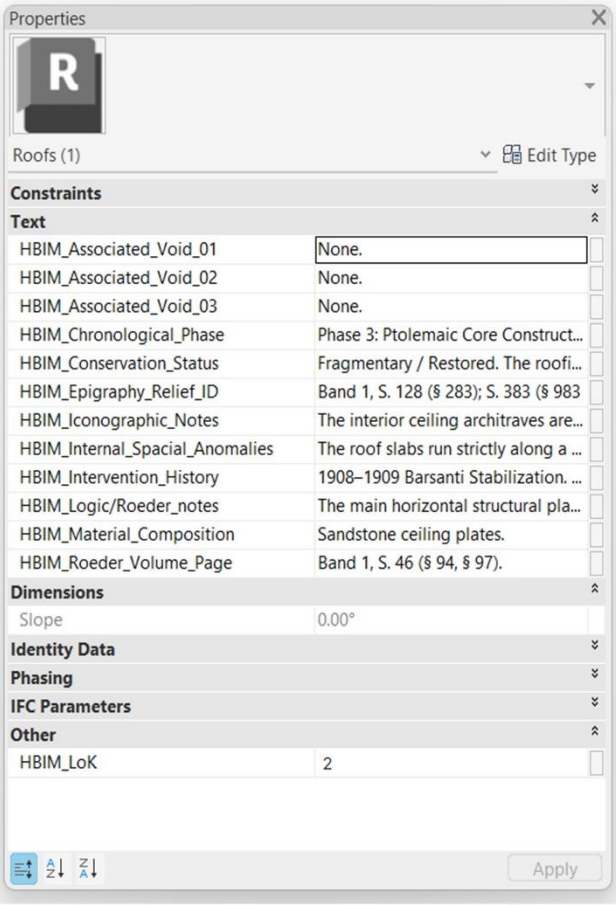
Figure 34. The generated column in Revit vs. The photo of the column of Dakka temple taken by Roeder



The Pronaos *(Vorhalle):*

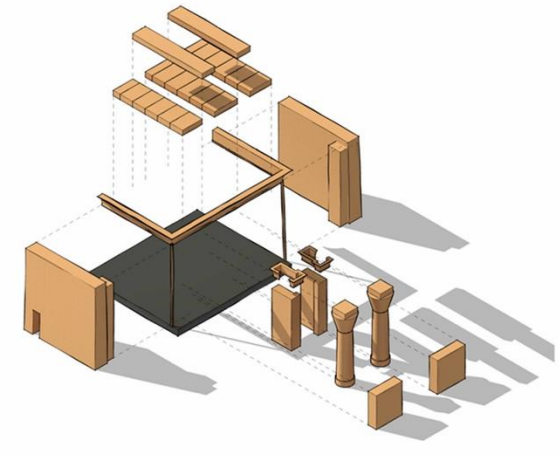
Roof system and HBIM parametric values





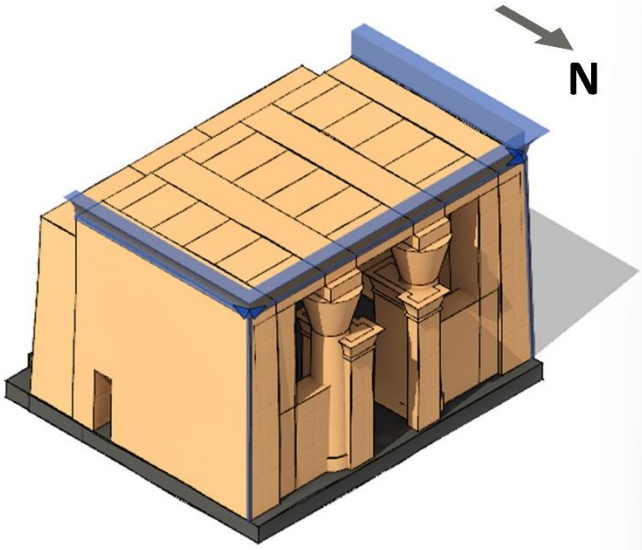
1. HBIM_Associated_Void_01: None.
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Core Construction (Ptolemy IX Euergetes II).
5. HBIM_Conservation_Status: Fragmentary / Restored. The roofing system underwent significant structural loss following the collapse of the Pronaos; existing elements are largely re-assembled fragments or structural replacements integrated during the 1908–1909 stabilization.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 128 (§ 283); S. 383 (§ 983).
7. HBIM_Iconographic_Notes: The interior ceiling architraves are richly decorated with high-relief scenes of flying vultures sweeping due South. The figures alternate between wearing the Red Crown of Lower Egypt and the White Crown of Upper Egypt, clutching Shen rings in their talons against a star field backdrop.
8. HBIM_Internal_Spacial_Anomalies: The roof slabs run strictly along a North-South track spanning a clear reach of over 6.00 m. A massive rectangular stone waterspout (Wasserspeier) passes through the central axis of the roof line to shed water away from the western wall.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti's team focused on stabilizing the remaining roof slabs, utilizing mechanical shoring and reinforcing structural gaps to prevent further collapse of the remaining Pronaos ceiling structure.
10. HBIM_Logic/Roeder_notes: The main horizontal structural plane is capped at an absolute height line tracking 5.67 m above the finished floor datum.
11. HBIM_Material_Composition: Sandstone ceiling plates.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 46 (§ 94, § 97).
13. HBIM_LoK: LOK 2.4.

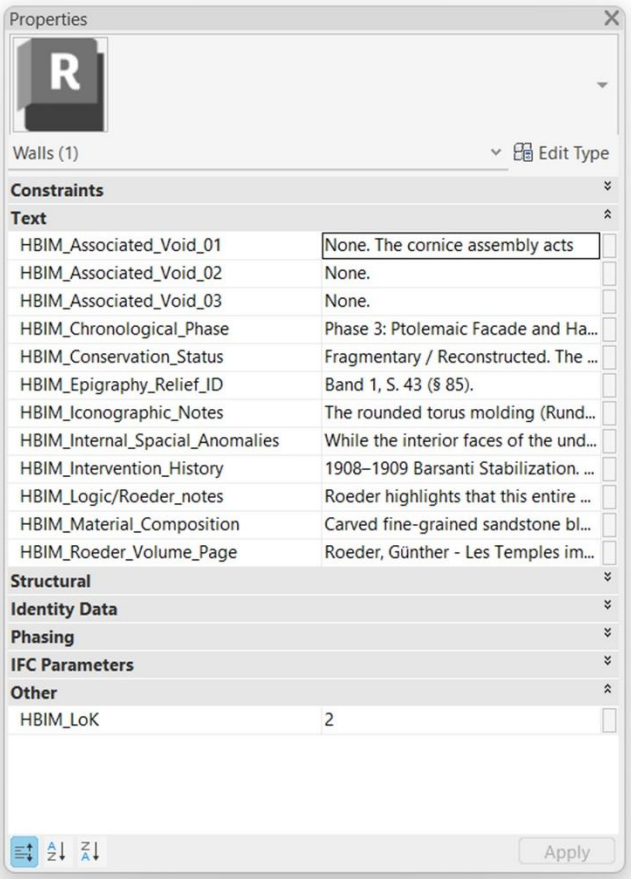
This component defines the roof slabs and support girders of the Pronaos chamber, positioned above the column and screen wall system.



The Pronaos *(Vorhalle):*

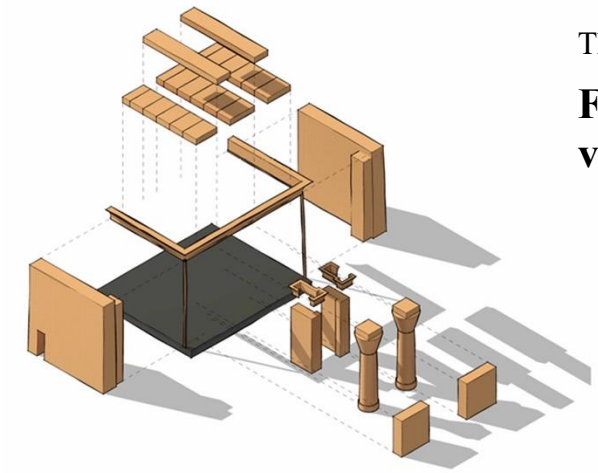
The Cavetto Cornice and Torus molding including HBIM parametric values





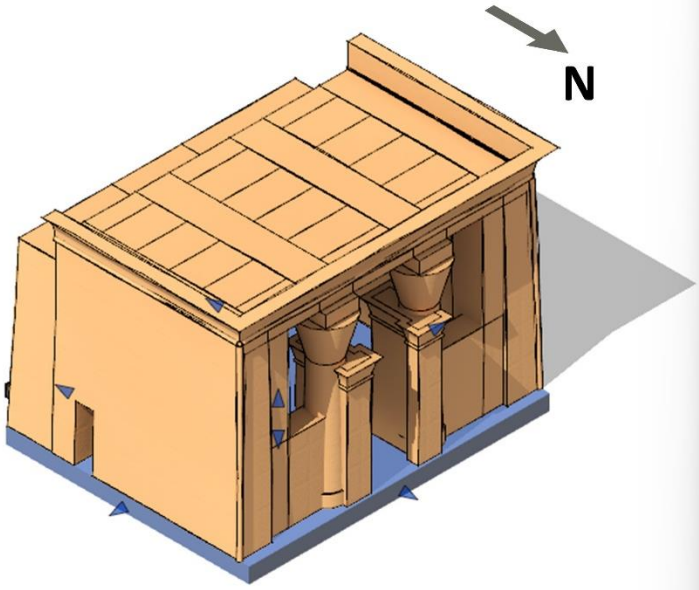
1. HBIM_Associated_Void_01: None. The cornice assembly acts as a solid capping structure running continuously along the top perimeter of the hall walls.
2. HBIM_Associated_Void_02: None (None).
3. HBIM_Associated_Void_03: None (None).
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Facade and Hall Construction (Ptolemy IX Euergetes II).
5. HBIM_Conservation_Status: Fragmentary / Reconstructed. The original Egyptian-style cornice was largely decimated during the Pronaos collapse; the current assembly consists of re-positioned original blocks recovered from the site debris, augmented with reconstruction material.
6. HBIM_Epigraphy_Relief_ID: Band 1, S. 43 (§ 85).
7. HBIM_Iconographic_Notes: The rounded torus molding (Rundstab) features an incised wrapped-band design (Bandmuster) following the exact layout style documented in Detail-Tafel 166g. Traces of ancient green paint pigment (Grüne Farbspuren) are chemically verified within the incised channels of this band. The overarching cavetto cornice (Hohlkehle) features a standard vertical feather pattern design (Federmuster).
8. HBIM_Internal_Spacial_Anomalies: While the interior faces of the underlying walls are perfectly plumb, the exterior face of this crowning cornice is sharply battered/sloped outward, matching the dramatic incline of the facade. The only preserved ancient section of the torus band pattern survived exclusively on the Northeast corner blocks.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The cornice was re-set by Barsanti as part of the overall Pronaos stabilization, using cement-based mortar to secure the heavy, ornamental stone elements and prevent them from destabilizing the facade below.
10. HBIM_Logic/Roeder_notes: Roeder highlights that this entire assembly was completely reconstructed block-by-block by Barsanti using cement fillings to stabilize the shattered fragments recovered from the courtyard floor after the 1903 collapse. The absolute top line of this dynamic profile establishes the maximum height boundary of the ptolemaic Pronaos house before it drops down to meet the lower roof heights of the backend Roman extensions.
11. HBIM_Material_Composition: Carved fine-grained sandstone blocks combined with modern preservation structural cement. The rounded torus molding measures exactly 14 cm in profile diameter (Ø 0.14 m), sitting immediately below the flaring cavetto edge . The total upper height line of the profile rests precisely 5.80 m above the main door threshold datum line (Oberkante 5,80 m).
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 43 (§ 85).
13. HBIM_Lok: LOK 2.5.

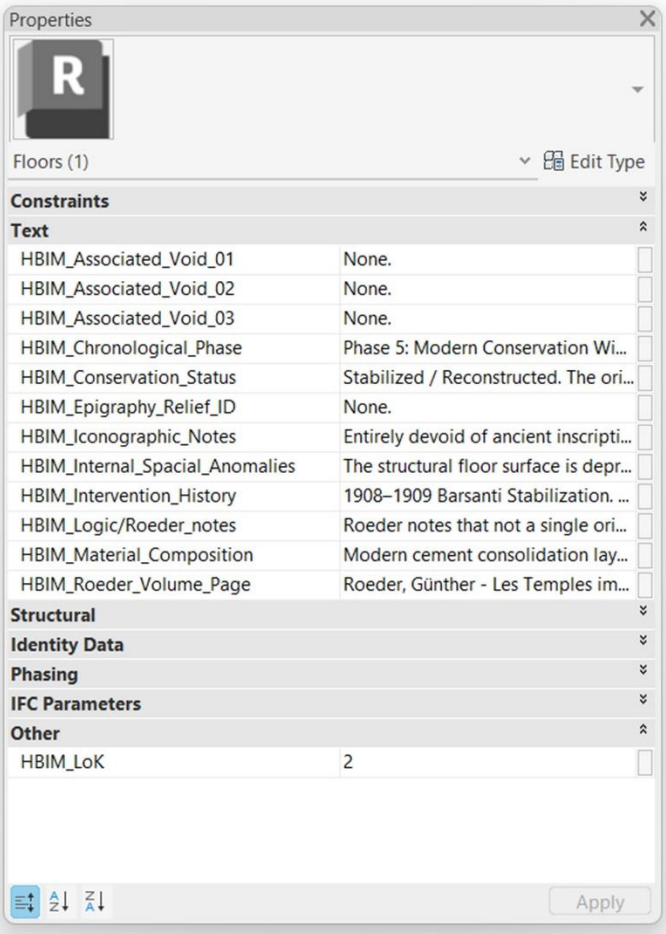
This component defines the cavetto cornice and torus molding assembly crowning the Pronaos facade, serving as the interface between the screen wall/column system and the architrave support.



The Pronaos *(Vorhalle):*

Floor system and HBIM parametric values

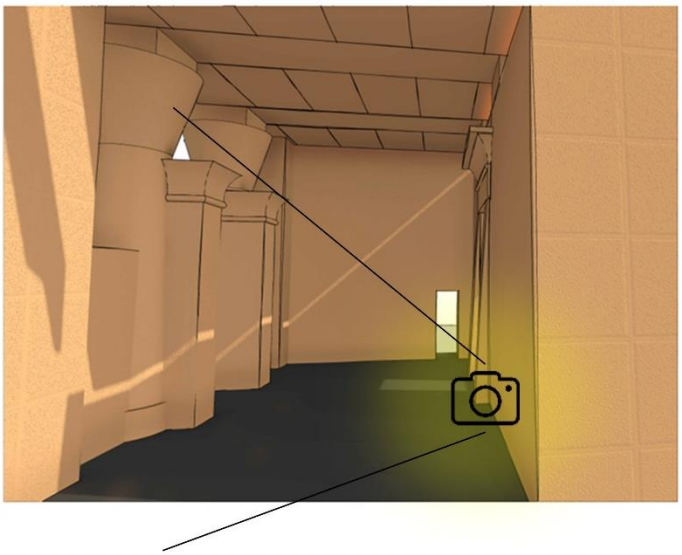






1. HBIM_Associated_Void_01: None.
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 5: Modern Conservation Window (Barsanti 1908).
5. HBIM_Epigraphy_Relief_ID: Keine (None).
6. HBIM_Iconographic_Notes: Entirely devoid of ancient inscriptions, carvings, or processional guidance marks.
7. HBIM_Internal_Spacial_Anomalies: The structural floor surface is depressed exactly 32 to 35 cm below the stone threshold line of the main temple house doorway.
8. HBIM_Logic/Roeder_notes: Roeder notes that not a single original ancient sandstone floor slab was discovered in situ during excavation; the current floor plane is a completely modern protective cement bed poured to arrest foundation shifting.
9. HBIM_Material_Composition: Modern cement consolidation layer.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 31 (§ 59); S. 46 (§ 94).
11. HBIM_The Conservation_Status: Stabilized / Reconstructed. The original sandstone pavement was severely disturbed by the Pronaos collapse and subsequent environmental erosion; the existing floor is a composite of preserved original slab fragments and extensive modern cementitious infill applied during the 1908–1909 stabilization efforts.
12. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Alessandro Barsanti's intervention included the clearing of collapse debris and the systematic re-leveling of the floor surface, which involved the injection of cement grout and the application of new mortar screeds to provide a structural walking surface over the unstable, original archaeological strata.
13. HBIM_Lok: LOK 2.4.

This component constitutes the paved floor assembly of the Pronaos, serving as the circulation surface between the Pylon portal and the Querraum transition.

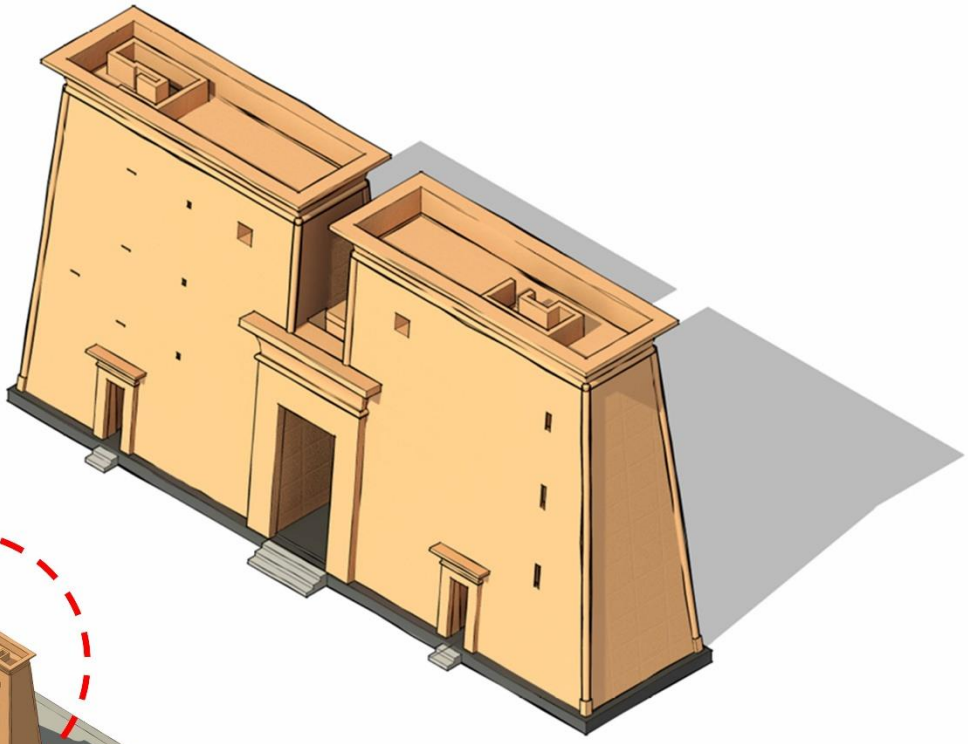


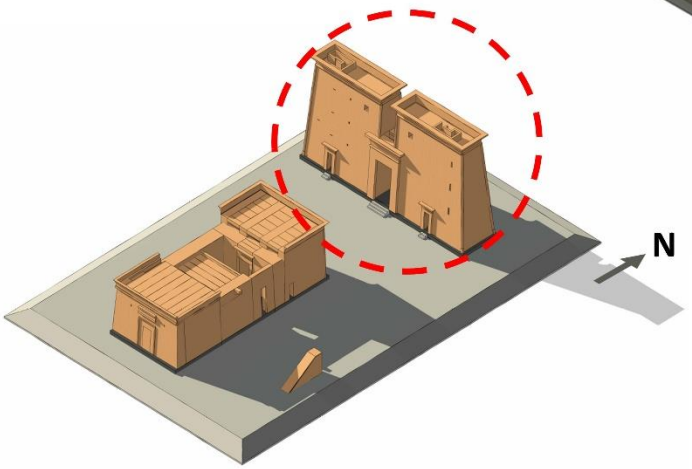


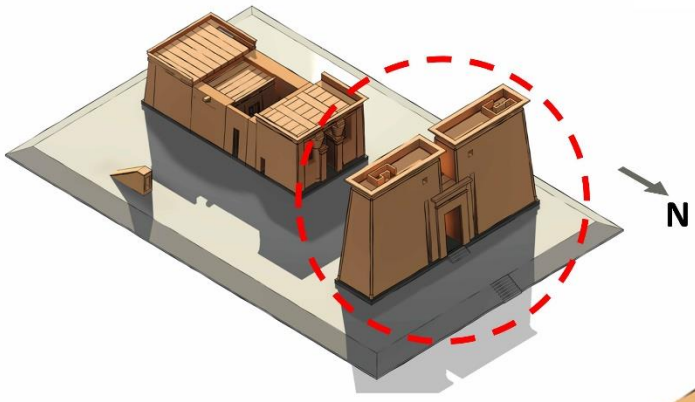
5.2.7 The Pylons (Eastern and Western Towers):

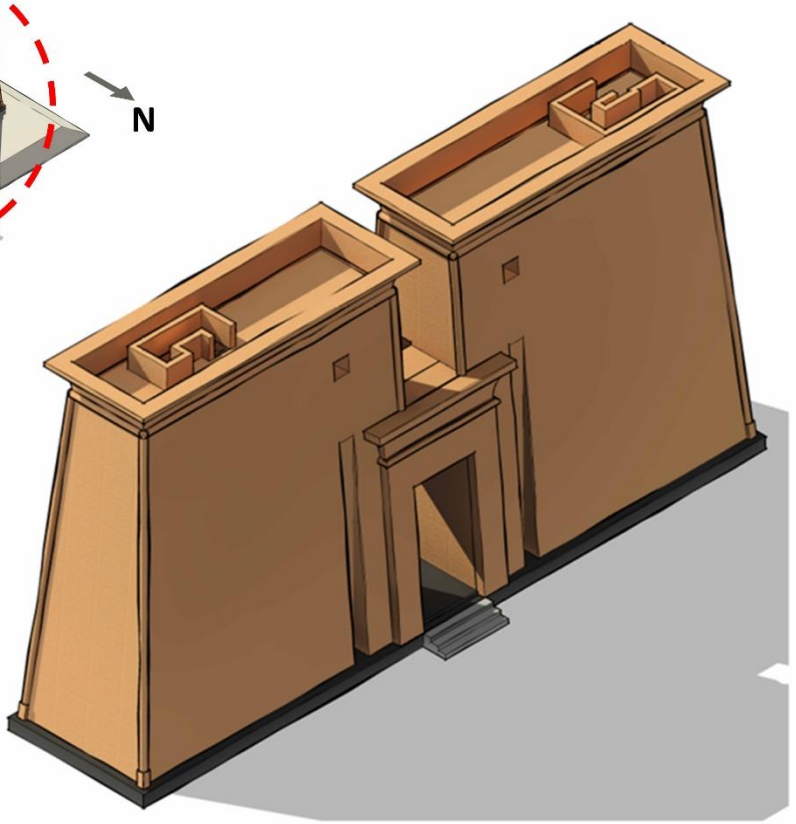
Staircase Networks, Light Slits, and Flagstaff Voids in addition to the Central Entrance gateway in between the Pylons.

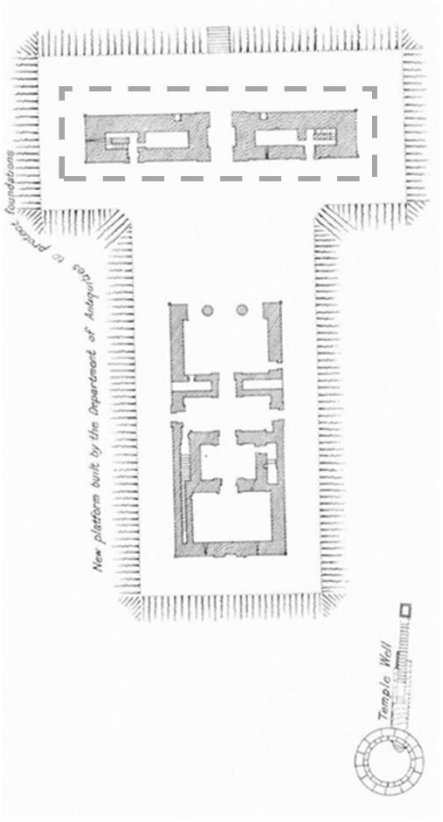
- Details the macro and micro-scale geometry of the Eastern and Western Pylon towers and the main entrance gateway in between them.
- Highlights the 75-step switchback staircases, internal chambers (Chambers 1–4), tapered light slits, inter-bridge passages, the Cavetto Cornices (functioning as the roof parapet) and Toruses of Pylons and gateway, and the vertical facade notches for the ceremonial flagstaff systems.

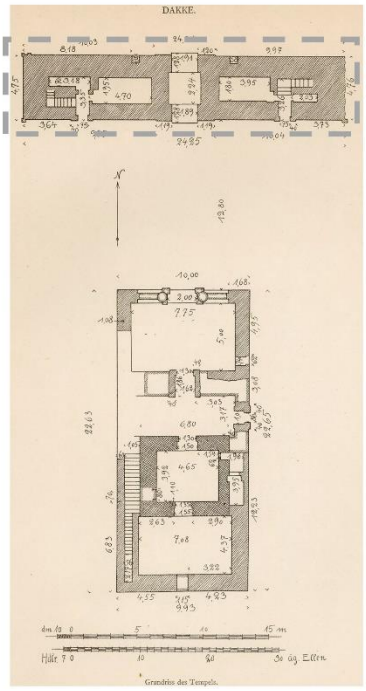


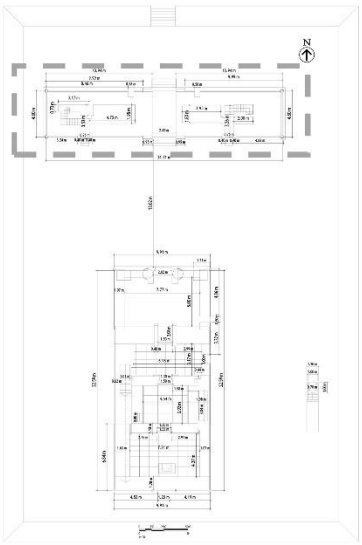

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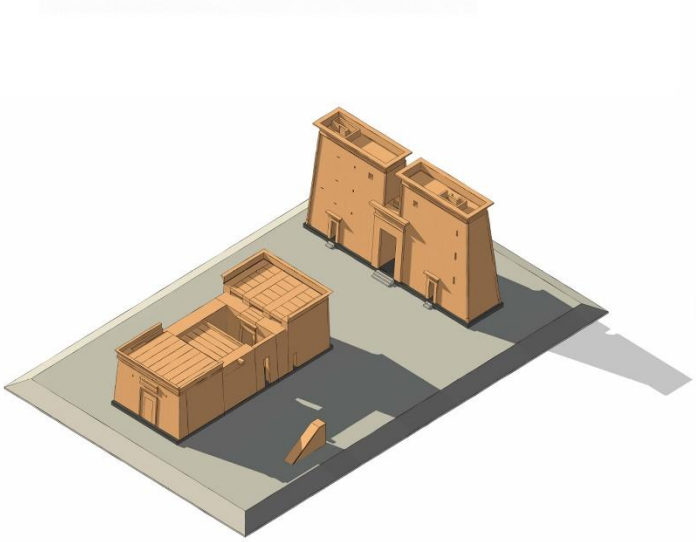

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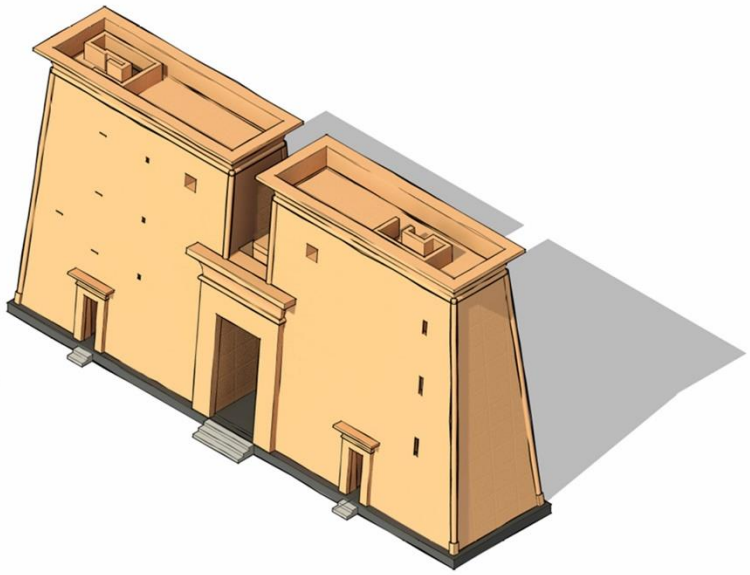


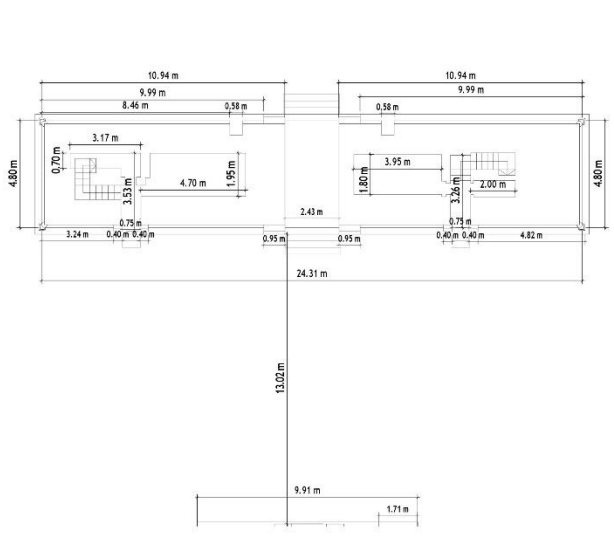

New platform built by the Department of Antiquities to protect foundations
Temple Well


DAKKE.
Grundriss des Tempels.








N
10.94 m
9.99 m
8.46 m
0.58 m
0.58 m
10.94 m
9.99 m
3.17 m
0.70 m
3.53 m
4.70 m
1.95 m
3.95 m
1.80 m
3.26 m
2.00 m
4.80 m
4.80 m
0.75 m
0.75 m
2.43 m
3.24 m
0.40 m
0.40 m
0.95 m
0.95 m
0.40 m
0.40 m
4.82 m
24.31 m
13.02 m
9.91 m
1.71 m

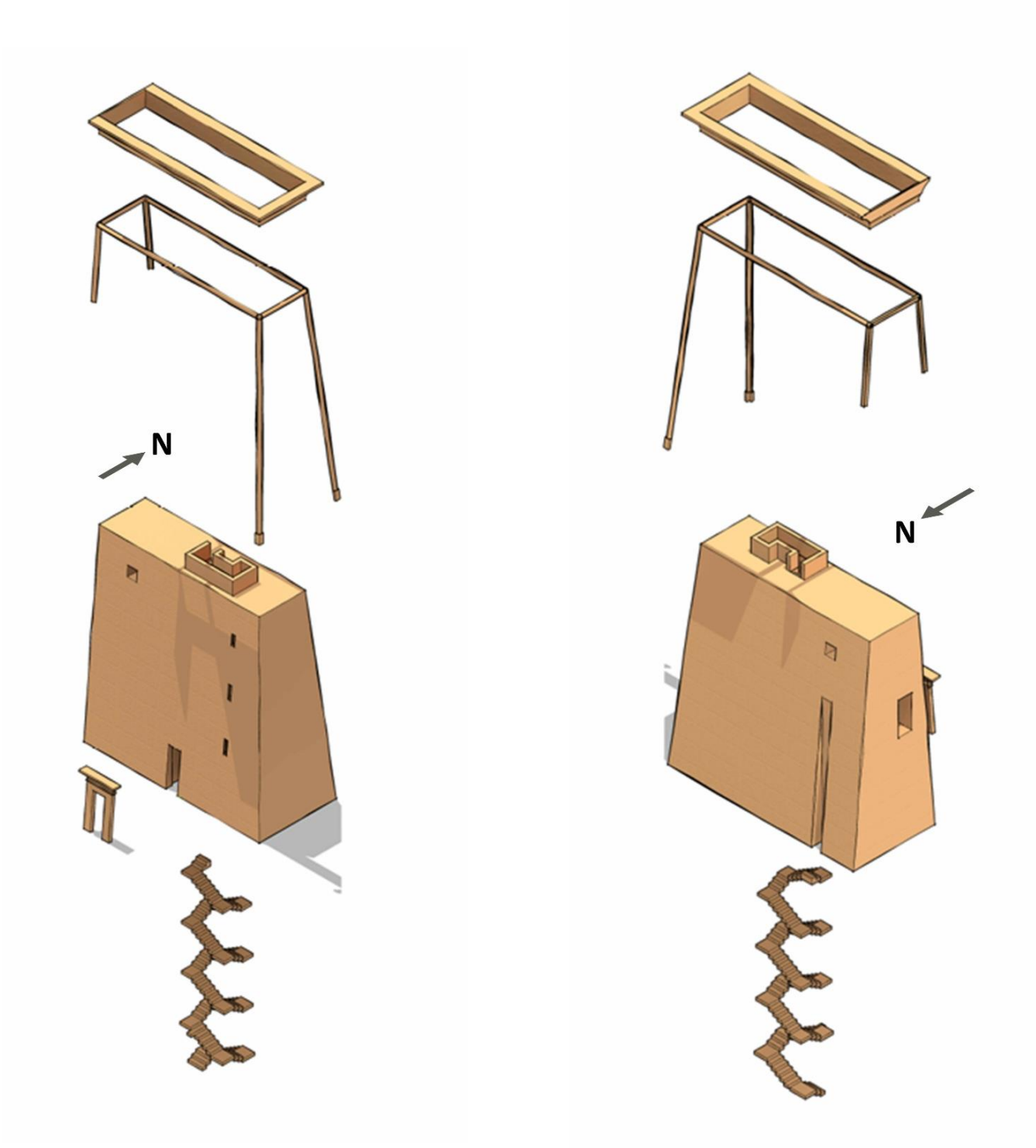
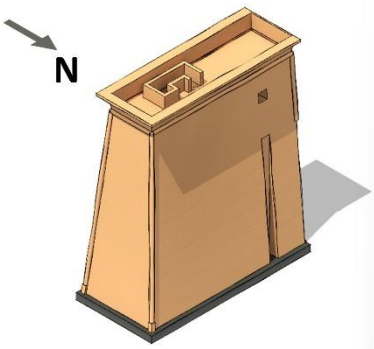


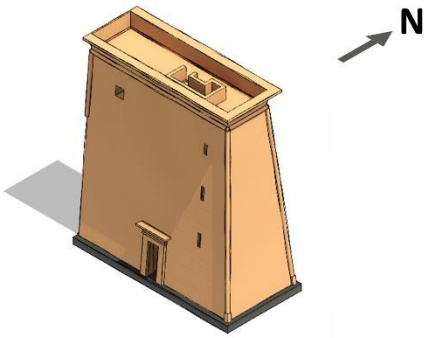
Figure 35. The Pylon: Eastern Pylon

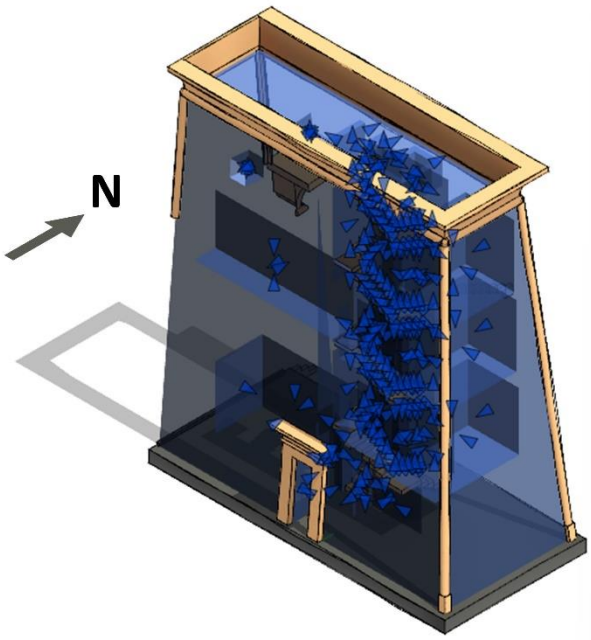


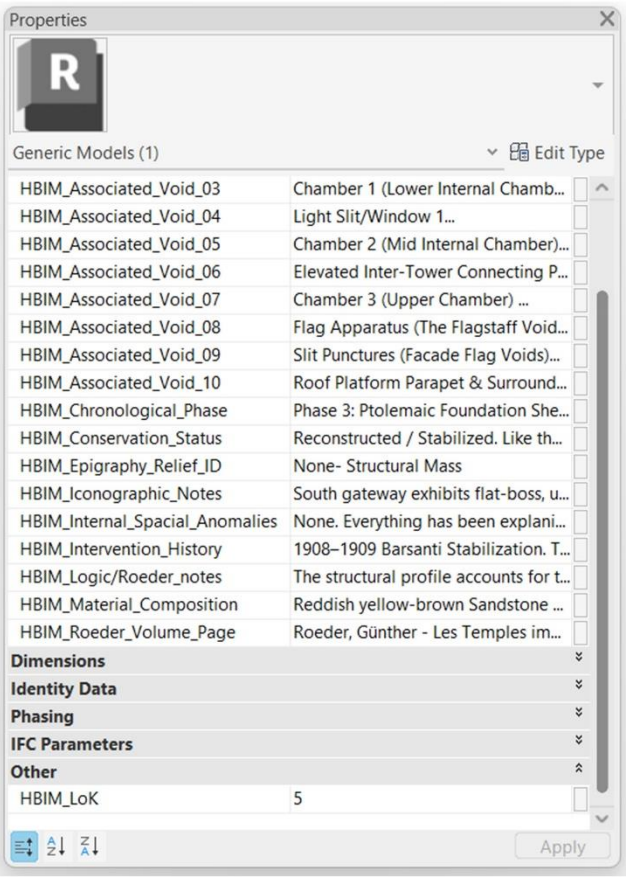
The Pylons:

Eastern Pylon and HBIM parametric values











1. HBIM_Associated_Void_01: Ground_Flur_Corridor_System (Lower Entry Flur & Under-Stair Storage)

[Dimensions and descriptions]: Entering the southern door leads into a passage 91 cm wide and 2.30 m high. The ground floor also contains a low, unadorned clearance vault (Branching right (East) before the stair ascent) with a static ceiling height of 1.69 m. It features an internal storage wall niche measuring 46 cm high x 46 cm wide x 45 cm deep, set 55 cm above the floor.

2. HBIM_Associated_Void_02: 75-Step Masonry Ascent Core (The Main Staircase Assembly (Treppe))

[Dimensions and descriptions]: Average walking width is 65 cm (tapering to just under 60 cm at the topmost unrefined stretches). Treads average 15 cm in rise height. Runs counter-clockwise through the tower core, executing sharp 90° turns at Step 3, Step 9, and Step 12 (passing Window 1), turning again at Step 18 (entering Chamber 1), and repeating at Steps 21, 27, 30, 36 (entering Chamber 2), 39, 45, 48, 54 (entering Chamber 3), 57, and 66. It breaks out into the open sky at Step 63 and terminates on the roof deck at Step 75.

3. HBIM_Associated_Void_03: Chamber 1 (Lower Internal Chamber System)

[Dimensions and descriptions]: Entrance door sits on the 18th stair step. The room measures 1.95 m wide x 4.27 m deep x 2.21 m high. Its Western masonry face houses a storage wall niche measuring 55 cm high x 55 cm wide x 55 cm deep, set 94 cm above the floor.

4. HBIM_Associated_Void_04: Light Slit/Window 1

[Dimensions and descriptions]: Positioned exactly 90 cm above the chamber floor. The internal stone embrasure spans 60 cm wide x 1.18 m high with an upward-sloping light ceiling. It funnels down directly into an external facade puncture measuring 32 cm wide x 10 cm high.

5. HBIM_Associated_Void_05: Chamber 2 (Mid Internal Chamber)

[Dimensions and descriptions]: Entrance door opens at the 36th stair step. Room expands to 1.85 m wide x 4.92 m deep x 2.38 m high.

6. HBIM_Associated_Void_06: Elevated Inter-Tower Connecting Passage (Bridge Link)

[Dimensions and descriptions]: The West wall of this chamber opens into a door slicing through the 1.00 m thick masonry dividing wall. This connects to the central bridge platform overlooking the main temple entryway. It features defensive draw-bar blocking sockets cut into the north and south jamb walls (47 cm high x 28 cm wide x 3 cm deep) set 1.43 m above the floor.

7. HBIM_Associated_Void_07: Chamber 3 (Upper Chamber)

[Dimensions and descriptions]: Entrance opens at the 54th stair step. Chamber dims are 1.80 m wide x 4.40 m deep x 2.40 m high. The interior stonework is completely unrefined, displaying rough-hewn surface textures (starken Bossen).

8. HBIM_Associated_Void_08: Flag Apparatus (The Flagstaff Void Integration)

[Dimensions and descriptions]: Piercing straight through the 70 cm thick northern wall mass is a square anchor port measuring 55 cm x 55 cm, set 51 cm above the chamber floor. This matches a mirroring anchor hole cut through the south wall mass. These apertures allow engineers to slide a horizontal wood beam through the tower to secure the massive exterior flag mast.

9. HBIM_Associated_Void_09: Slit Punctures (Facade Flag Voids)

[Dimensions and descriptions]: On the exterior, a vertical slot groove (58 cm wide x 69 cm deep at the base) parameters down the facade, aligning perfectly with the internal northern anchor hole.

10. HBIM_Associated_Void_10: Roof Platform Parapet & Surrounding Stair Enclosure (Roof Parapet and Stair Screen Wall)

[Dimensions and descriptions]: he open-air terminal stairs (Steps 63-75) open onto a recessed deck platform measuring 4.19 m long x 1.42 m wide. The walking surface is sunk exactly 60 cm below the top edge of the cavetto cornice. The doorway features an un-curtained step jamb with vertical side slot grooves designed to receive a sliding wooden screen board. Inside the northern and southern upper parapet lip blocks, specialized string loops are drilled out for tying flag rigging cords.

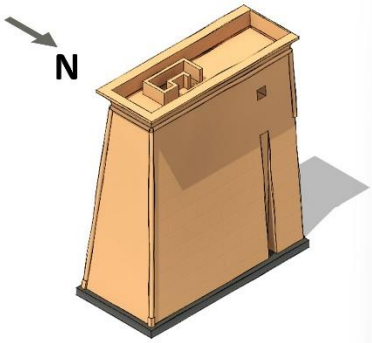
11. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell (Ptolemy IX Layout) / Finished under Roman Garrison
12. HBIM_The Conservation_Status: Reconstructed / Stabilized. Like the western counterpart, the eastern tower sustained structural distress, particularly at the cornice and upper parapet levels, necessitating significant masonry consolidation and mortar injection during early 20th-century preservation campaigns.
13. HBIM_Epigraphy_Relief_ID: Keine (None) - Structural Mass
14. HBIM_Iconographic_Notes: South gateway exhibits flat-boss, unfinished relief blocks indicating an interrupted building campaign. High-altitude stair terminus contains an incised Coptic cross (8x8 cm) matching the historical shift to Christian reuse.
15. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The eastern pylon tower was included in Barsanti's stabilization project, which involved securing the exterior sandstone ashlar, reinforcing the interior stairwell structural core, and sealing surface cracks to prevent rainwater infiltration that threatened the internal relief integrity.
16. HBIM_Logic/Roeder_notes: The structural profile accounts for the complete metric documentation compiled by Roeder in 1910 and verified during the Barsanti restoration works. Voids directly trace tactical garrison surveillance paths and liturgical flag configurations.
17. HBIM_Material_Composition: Reddish yellow-brown Sandstone block masonry.
18. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 16-27 (§ 24-48); Plans Taf. 148.
19. HBIM_Lok: LOK 5.2.

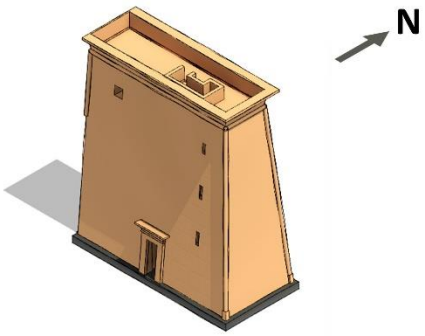
This component defines the eastern vertical structural element of the pylon, serving as the main enclosure for the internal staircase and chambers that mirror the western tower (LOK 5.1).

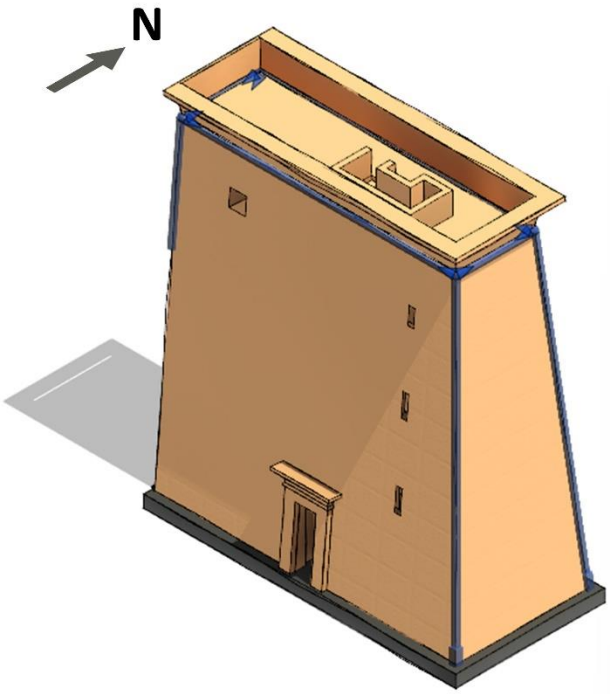


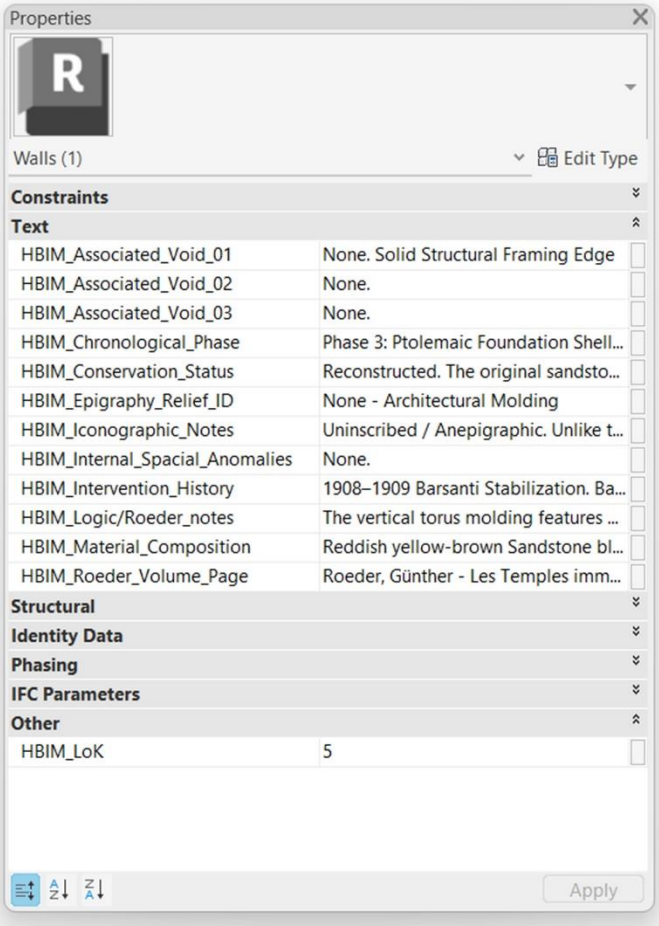
The Pylons:

Eastern Pylon's Torus Molding and HBIM parametric values





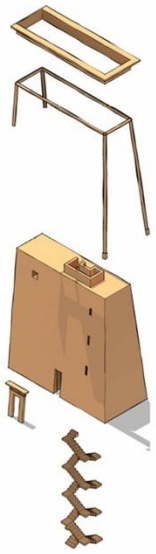






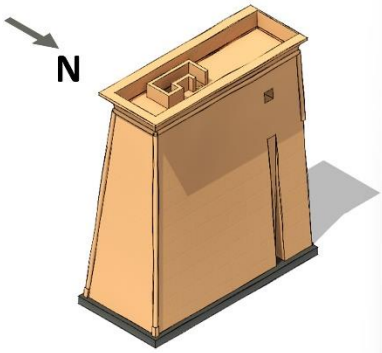
1. HBIM_Associated_Void_01: None - Solid Structural Framing Edge
2. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell (Ptolemy IX Euergetes II)
3. HBIM_The Conservation_Status: Reconstructed. The original sandstone torus drums were significantly displaced during the structural shifts of the pylon; current segments are largely reconstructed elements placed during early 20th-century consolidation, with some original stone fragments re-integrated.
4. HBIM_Epigraphy_Relief_ID: None - Architectural Molding
5. HBIM_Iconographic_Notes: Uninscribed / Anepigraphic. Unlike the fully executed interior gateways of the temple house, the exterior structural framing rolls of the Eastern Pylon show no traces of religious relief carving, ritual binding lines, or ceremonial patterns. They were left as completely raw, smooth semi-cylindrical surfaces.
6. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti's intervention included the careful cleaning and re-alignment of the surviving torus segments. Where original material was lost, he utilized cement-based mortar patches to restore the continuous vertical profile of the molding.
7. HBIM_Logic/Roeder_notes: The vertical torus molding features a diameter of 20 cm at the lower section. At the structural base plane, it terminates exactly 45 cm above the basal socket, running flush into a square-sectioned corner foundation piece measuring 36 cm high, 22 cm wide at the bottom, and 21 cm wide at the top. Unlike the western pylon corner, the northern and eastern corner toruses of this tower were completely processed to a uniform cylindrical curve but left uncarved with structural alignment bands.
8. HBIM_Material_Composition: Reddish yellow-brown Sandstone block masonry
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 17 (§ 25); S. 18 (§ 27)
10. HBIM_Lok: LOK 5.2.1.

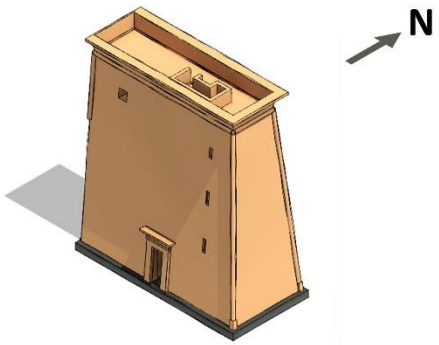
This designation specifically refers to the vertical torus molding assembly framing the outer and inner vertical edges of the Eastern Pylon tower.

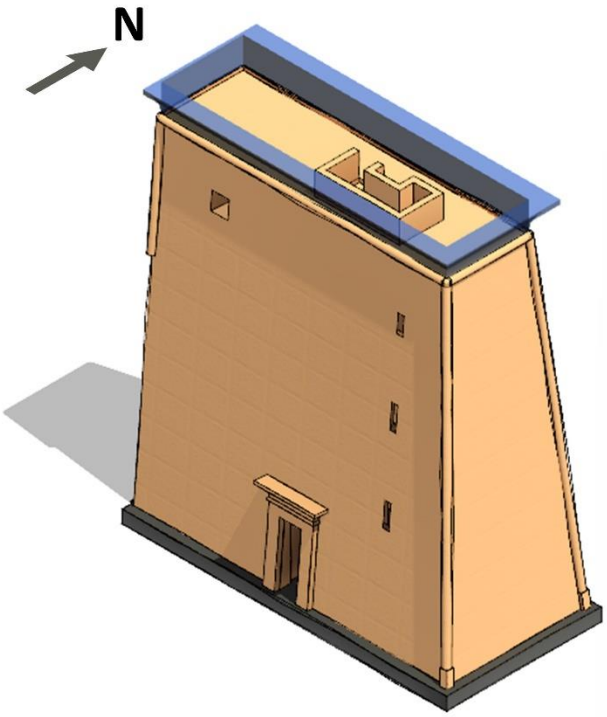


The Pylons:

Eastern Pylon's Cavetto Cornice and HBIM parametric values









Properties

Walls (1) Edit Type

Constraints	
Text	
HBIM_Associated_Void_01	None - Mass Terminal Cap
HBIM_Associated_Void_02	None.
HBIM_Associated_Void_03	None.
HBIM_Chronological_Phase	Phase 3: Ptolemaic Foundation Shell...
HBIM_Conservation_Status	Fragmentary / Restored. The cornice...
HBIM_Epigraphy_Relief_ID	None. - Architectural Molding
HBIM_Iconographic_Notes	Uninscribed / Anepigraphic. The lar...
HBIM_Internal_Spacial_Anomalies	None.
HBIM_Intervention_History	1908–1909 Barsanti Stabilization. Th...
HBIM_Logic/Roeder_notes	The classic Egyptian cavetto cornice ...
HBIM_Material_Composition	Reddish yellow-brown Sandstone bl...
HBIM_Roeder_Volume_Page	Roeder, Günther - Les Temples imm...
Structural	
Identity Data	
Phasing	
IFC Parameters	
Other	
HBIM_LoK	5

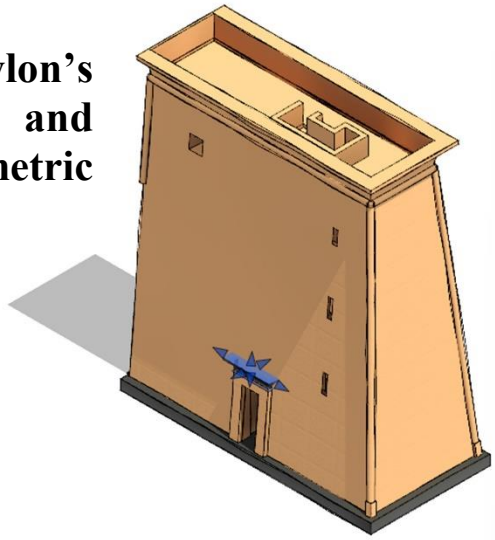
Apply

1. HBIM_Associated_Void_01: None - Mass Terminal Cap
2. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell (Ptolemy IX Euergetes II)
3. HBIM_The Conservation_Status: Fragmentary / Restored. The cornice experienced significant structural loss during the pylon's degradation. Existing elements are a combination of original recovered stone fragments and early 20th-century restorative masonry.
4. HBIM_Epigraphy_Relief_ID: None - Architectural Molding
5. HBIM_Iconographic_Notes: Uninscribed / Anepigraphic. The large cavetto cornice cappings around the perimeter of the roof platform are entirely smooth. The traditional vertical leaf or palm-frond feather patterns common to ptolemäisch-römisch cornices were never incised or painted on this section. It remains as raw, uncarved structural profile blocks.
6. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The cornice was re-assembled and secured using cement-based mortar as part of Barsanti's effort to preserve the pylon's profile and structural integrity against collapse.
7. HBIM_Logic/Roeder_notes: The classic Egyptian cavetto cornice (Hohlkehle) projects outward dynamically from all four upper faces of the tower mass. It forms a continuous protective parapet wall around the roof platform. The width of the projecting cornice lip varies between 85 cm and 100 m as it frames the recessed upper deck. The top edge lines mark the absolute peak datum of the Pylon mass at exactly 11.62 m above the gateway threshold line.
8. HBIM_Material_Composition: Reddish yellow-brown Sandstone block masonry
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 18 (§ 27); S. 24 (§ 41)
10. HBIM_Lok: LOK 5.2.2.

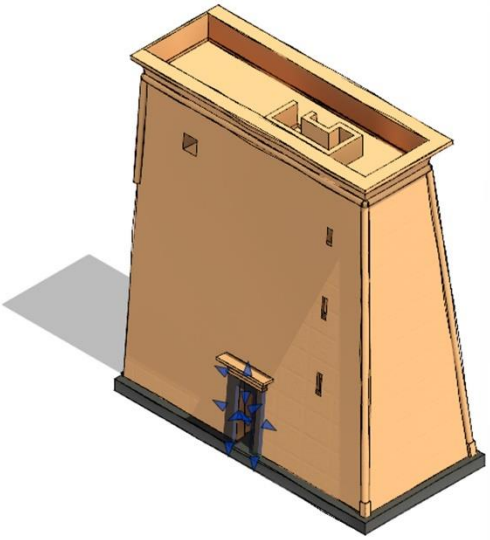
This component defines the cavetto cornice and torus assembly crowning the Eastern Pylon tower, completing the structural termination of the vertical masonry.

The Pylons:

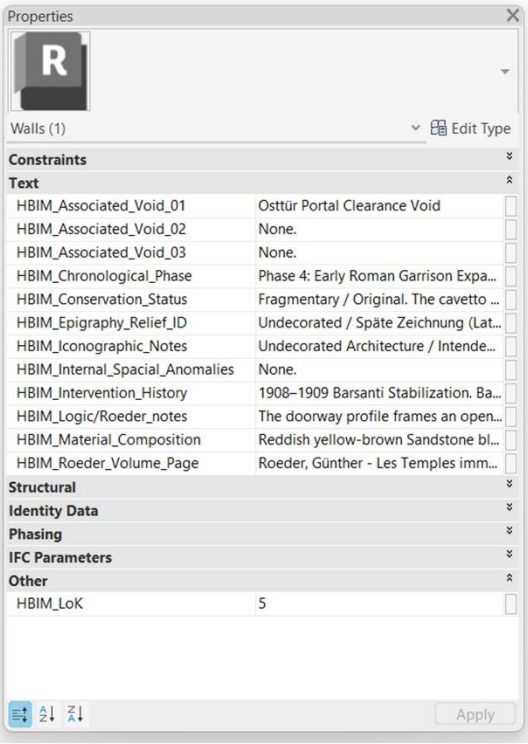
Eastern Pylon's Entrance and HBIM parametric values

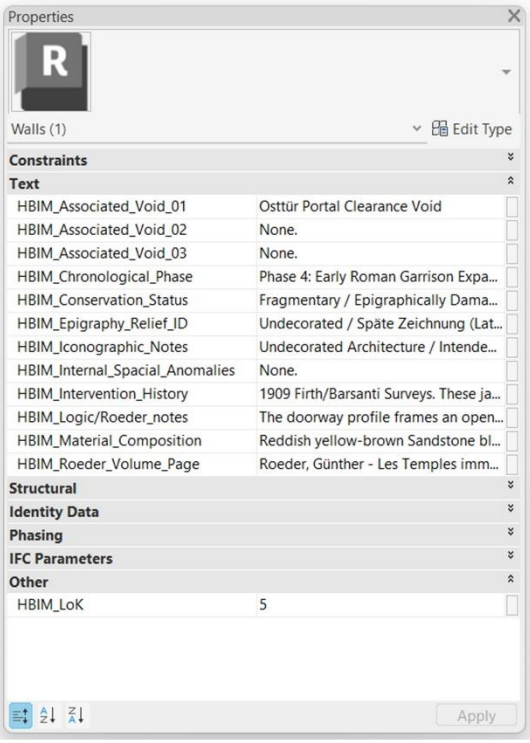




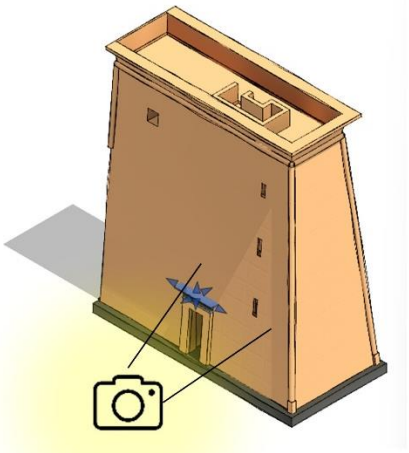


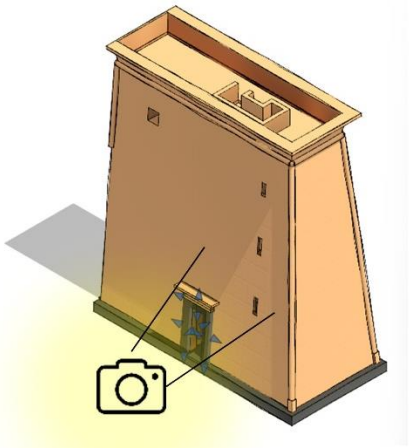






1. HBIM_Associated_Void_01: Osttür Portal Clearance Void
2. HBIM_Chronological_Phase: Phase 4: Early Roman Garrison Expansion / Late Ptolemaic Unfinished Era
3. **CORNICE:** HBIM_The Conservation_Status: Fragmentary / Original. The cavetto cornice above the southern door frame exhibits original tooling consistent with the ptolemaic-to-Roman transition, though with localized exfoliation due to wind-driven sand abrasion.
4. **JAMBS:** HBIM_The Conservation_Status: Fragmentary / Epigraphically Damaged. The door jambs display significant epigraphic loss, largely due to the secondary reuse of the Pylon and the intentional defacement of reliefs in the post-pharaonic period.
5. HBIM_Epigraphy_Relief_ID: Undecorated / Späte Zeichnung (Late non-official incised sketch)
6. HBIM_Iconographic_Notes: Undecorated Architecture / Intended Sun Disk Block. The facade jambs and lintel lack any official religious scenes or hieroglyphic dedication bands. However, an unworked rectangular stone boss block left sitting over the center of the door lintel indicates that the sculptors intended to carve a winged sun disk (Sonnenscheibe mit Uräen). For the temporary garrison security, an unofficial, crude secondary line drawing was later scratched directly into the surface of the outer eastern door jamb stone.
7. **CORNICE:** HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti stabilized the lintel and cornice assembly to prevent micro-fissures from widening, using controlled mortar pointing to consolidate the masonry joints without replacing original stone.
8. **JAMBS:** HBIM_Intervention_History: 1909 Firth/Barsanti Surveys. These jambs were documented during the clearance of the Pylon passage; subsequent stabilization involved cleaning the surfaces to clarify surviving inscriptions.
9. HBIM_Logic/Roeder_notes: The doorway profile frames an opening exactly 75 cm wide and 2.18 m high, leaning flush with the battered southern wall angle. The door jambs (Pfosten) are uniformly 40 cm wide, and the lintel (Sturz) stands 32 cm high. The overlying torus and cavetto cornice are completely plain and smooth, missing the customary winged sun disk carving. In its place sits a stark, unworked rectangular boss block measuring 44 cm wide and 21 cm high. The eastern jamb preserves an elevated insert socket for a wooden pivot stone axis block. A crude, unofficial secondary sketch from a very late period is scratched directly into the eastern door jamb stone.
10. HBIM_Material_Composition: Reddish yellow-brown Sandstone block masonry
11. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 20–22 (§ 34, 36)
12. **CORNICE:** HBIM_Lok: LOK 5.2.3.
13. **JAMBS:** HBIM_Lok: LOK 5.2.4



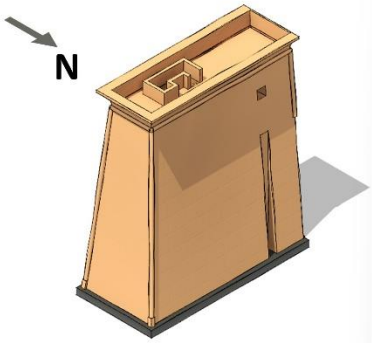


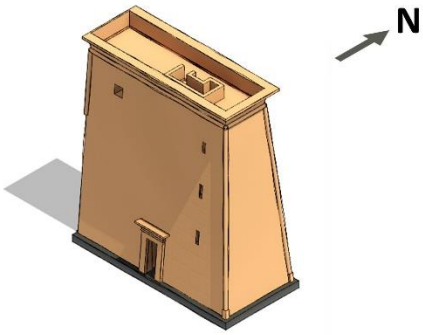


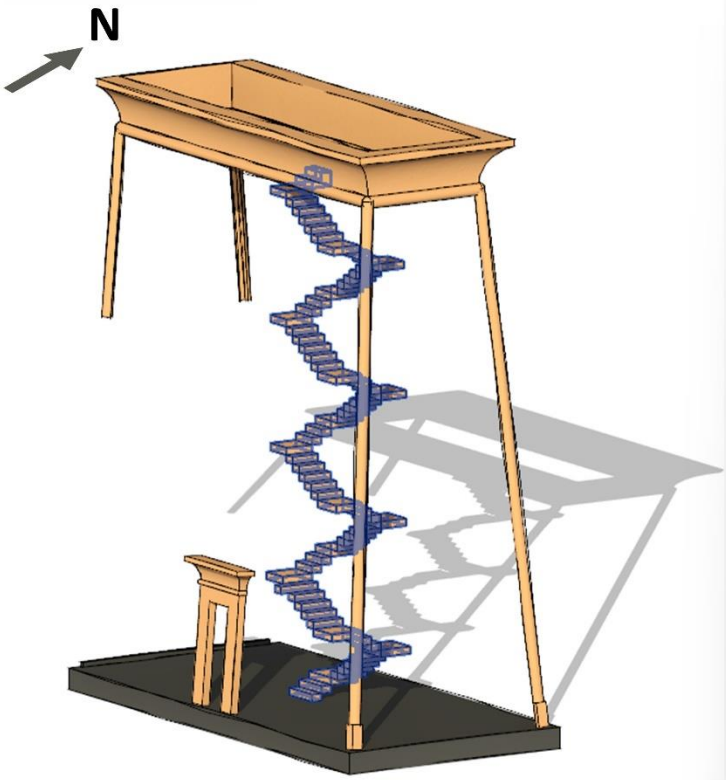


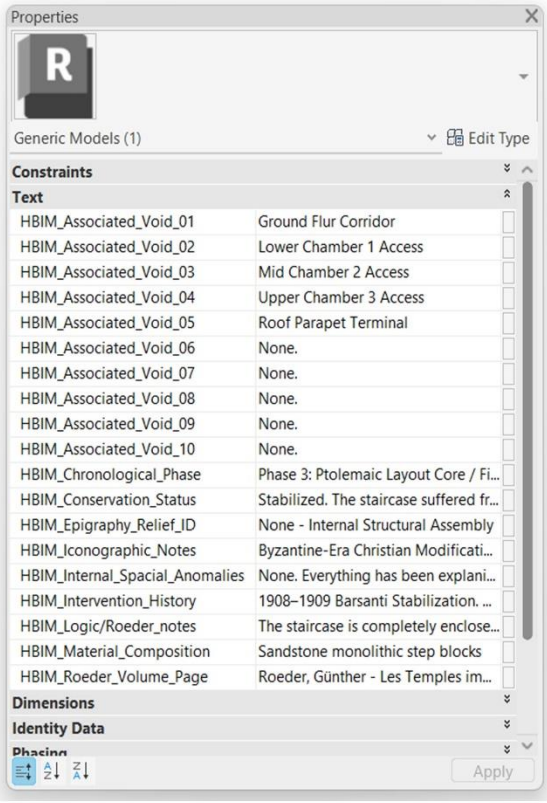
The Pylons:

Eastern Pylon's Internal Staircase system and HBIM parametric values







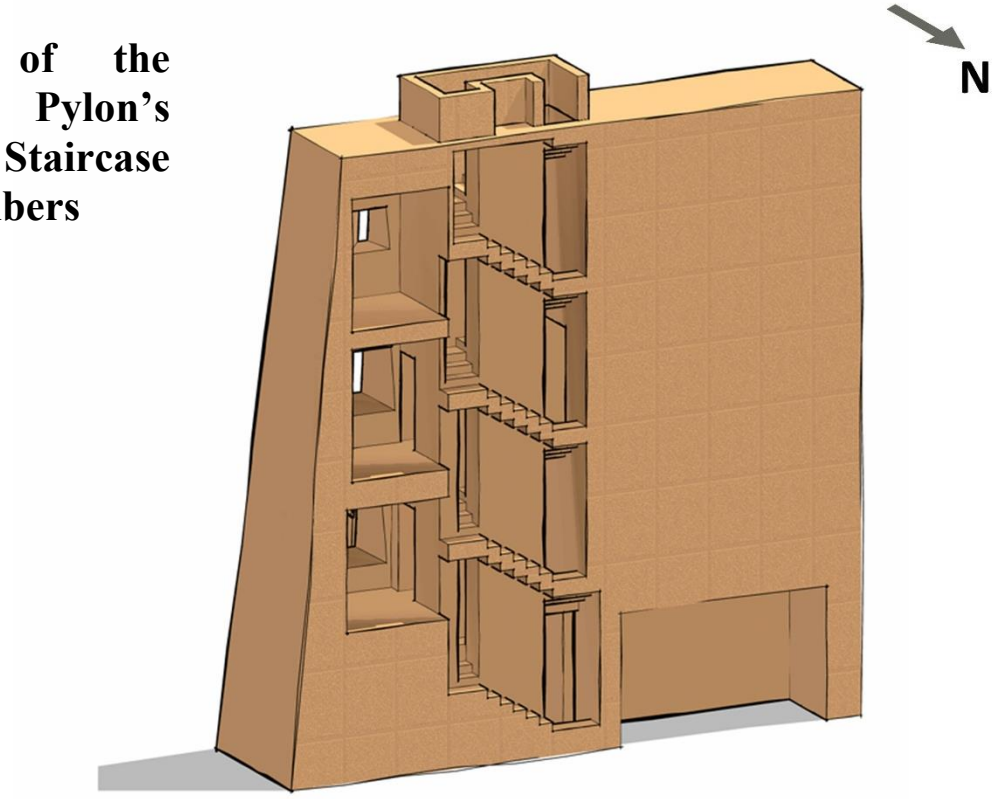


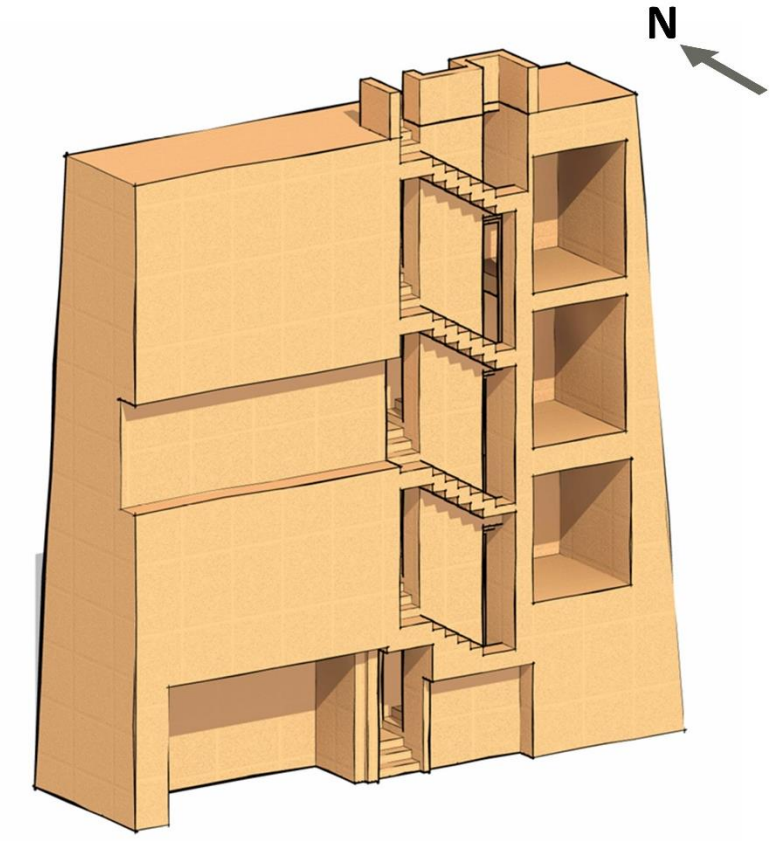
1. HBIM_Associated_Void_01: Void_01: Ground Flur Corridor
2. HBIM_Associated_Void_02: Void_02: Lower Chamber 1 Access
3. HBIM_Associated_Void_03: Void_03: Mid Chamber 2 Access
4. HBIM_Associated_Void_04: Void_04: Upper Chamber 3 Access
5. HBIM_Associated_Void_05: Void_05: Roof Parapet Terminal
6. HBIM_Chronological_Phase: Phase 3: Ptolemaic Layout Core / Finished under Roman Administration
7. HBIM_The Conservation_Status: Stabilized. The staircase suffered from significant stone displacement and potential collapse at the landing levels; the current assembly is secured, with original treads partially consolidated by Barsanti's mortar work.
8. HBIM_Epigraphy_Relief_ID: None - Internal Structural Assembly
9. HBIM_Iconographic_Notes: Byzantine-Era Christian Modifications / Coptic Graffiti. The internal walls of the staircase core are almost entirely bare of official pharaonic reliefs, maintaining heavy chisel tool markings throughout the narrow corridors. However, the circulation path documents early Christian modification: an authentic + Coptic cross measuring exactly 8 x 8 cm is deeply incised directly into the stone wall surrounding the final flight of steps as it exits onto the roof platform.
10. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti's intervention focused on the structural reinforcement of the internal staircase support walls and the re-setting of loose tread blocks to ensure safe access to the Pylon's upper levels and the roof terrace.
11. HBIM_Logic/Roeder_notes: The staircase is completely enclosed within the tight sandstone structural masonry of the tower core. The walking track has an average clear width of 65 cm, but narrows tightly down to under 60 cm in the upper levels. The stone walls lining the upper runs were left rough and unfinished, displaying prominent unworked quarry block bumps (starke Bossen). Each step features an absolute elevation rise of exactly 15 cm. The staircase climbs in a rigorous square spiral configuration. It makes tight 90-degree angular turns at Step 3, Step 9, and Step 12. At Step 12, it directly meets the sloping sill line of Window 1, which rises at an angle to allow daylight to flood down the lower run. It passes the door entries to Chamber 1 at Step 18, Chamber 2 at Step 36, and Chamber 3 at Step 54. The stone ceiling tiles terminate at Step 63, allowing the final run to rise open directly to the sky until it passes a vertical slot door frame at Step 72 and reaches the main roof parapet deck at Step 75.
12. HBIM_Material_Composition: Sandstone monolithic step blocks
13. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 25–27 (§ 43–48); Plans Taf. 148
14. HBIM_Lok: LOK 5.2.3.

This component defines the helical/straight-run internal staircase providing the vertical circulation path within the Eastern Pylon tower core.

The Pylons:

Sections of the Eastern Pylon's Internal Staircase and Chambers





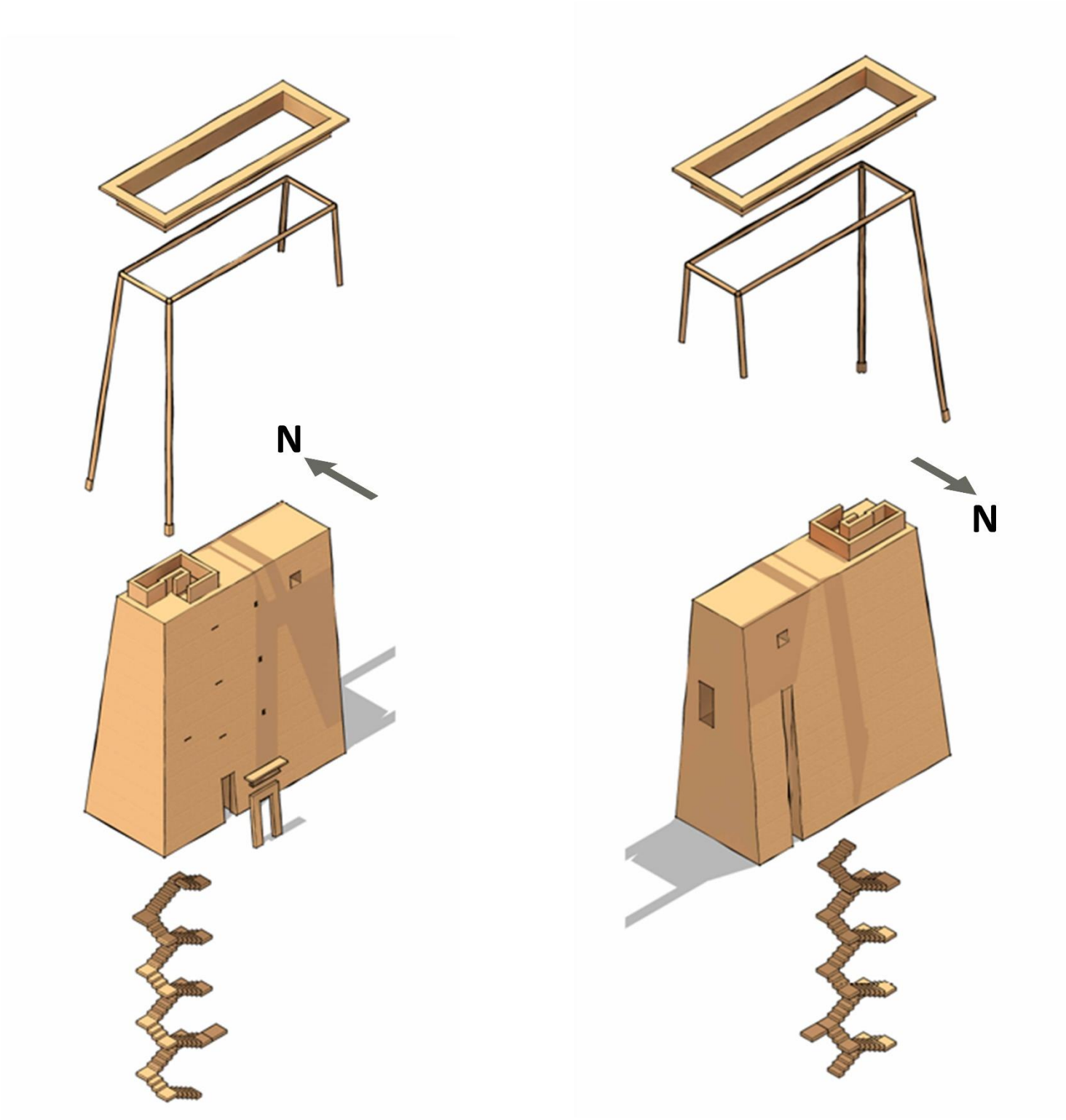
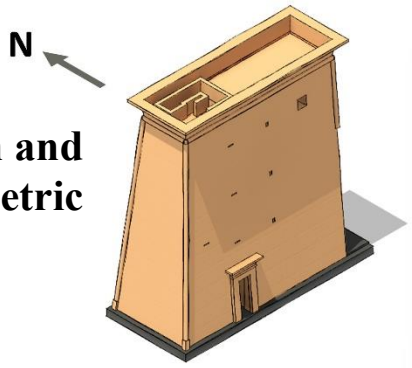


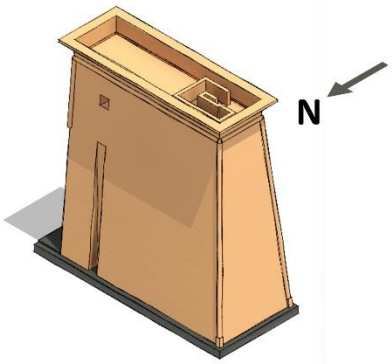
Figure 36. The Pylons: Western Pylon

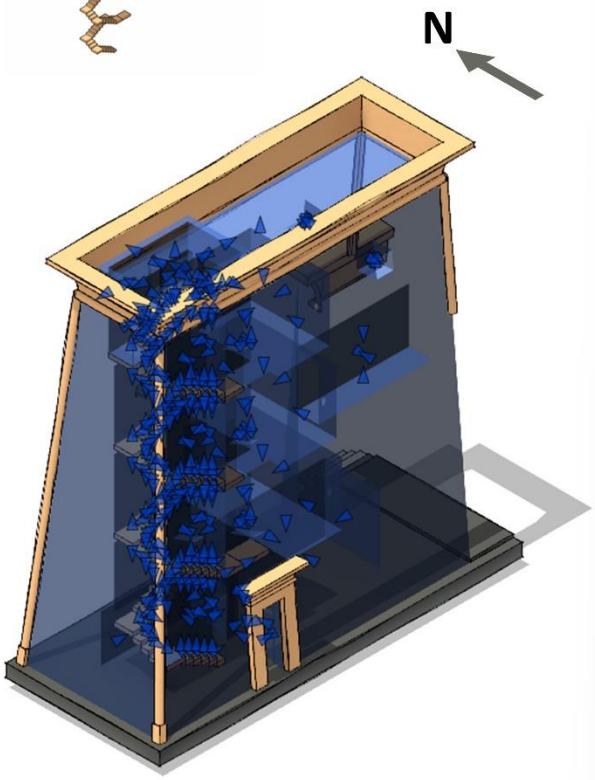


The Pylons:

Western Pylon and HBIM parametric values









Properties

Generic Models (1) | Edit Type

Constraints	
Text	
HBIM_Associated_Void_01	Ground Entry Corridor & Under-St...
HBIM_Associated_Void_02	Lower Room Assembly (Chamber ...
HBIM_Associated_Void_03	Clockwise Spiral 75-Step Staircase ...
HBIM_Associated_Void_04	Chamber 2 (Mid Internal Chamber)...
HBIM_Associated_Void_05	Chamber 3 (Upper Chamber) ...
HBIM_Associated_Void_06	Flagstaff Void System...
HBIM_Associated_Void_07	None.
HBIM_Associated_Void_08	None.
HBIM_Associated_Void_09	None.
HBIM_Associated_Void_10	None.
HBIM_Chronological_Phase	Phase 3: Ptolemaic Foundation She...
HBIM_Conservation_Status	Reconstructed. The western tower ...
HBIM_Epigraphy_Relief_ID	Reliefs 198–199 (Outer West Jamb)...
HBIM_Iconographic_Notes	The solid facade hosts several late,...
HBIM_Internal_Spacial_Anomalies	The solid facade hosts several late,...
HBIM_Intervention_History	1908–1909 Barsanti Stabilization. T...
HBIM_Logic/Roeder_notes	The high volume of interior spaces...
HBIM_Material_Composition	Fine-grained reddish yellow-brow...
HBIM_Roeder_Volume_Page	Roeder, Günther - Les Temples im...
Dimensions	
Identity Data	
Phasing	

Apply

1. HBIM_Associated_Void_01: Ground Entry Corridor & Under-Stair Low Chamber

[Dimensions and descriptions]: Ground Corridor measures 87 cm wide, 3.10 m long, and 2.40 m high. It splits into a right under-stair clearance chamber (0.70 x 3.00m, 1.95 m high) and a left doorway leading into the Under-Stair Low Chamber (1.95 x 4.70\m, 2.40 m high).

2. HBIM_Associated_Void_02: Lower Room Assembly (Chamber 1) with Wall Niche

[Dimensions and descriptions]: 1.95 x 4.70m, 2.40 m high, Chamber 1 features a unique recessed wall niche in its eastern face measuring 50 cm high, 60 cm wide, and 50 cm deep, raised 1.50 m off the floor. There's a highly tapered southern slit window (internal face: 1.15m x 55cm) in this chamber.

3. HBIM_Associated_Void_03: Clockwise Spiral 75-Step Staircase Core

[Dimensions and descriptions]: Winding Clockwise Staircase is 65 cm wide (tapering to 60 cm at the peak) with 15 cm step rises. It makes tight 90-degree turns at Steps 6, 9, and 15.

4. HBIM_Associated_Void_04: Chamber 2 (Mid Internal Chamber)

[Dimensions and descriptions]: After the continuing of the turn of stairs at Steps 24, 27, and 33, Chamber 3 opens at Step 36 (4.35 x 1.86 x, 2.37 m high). This room hosts an explicit eastern exit corridor cutting straight through a 1.00 m thick masonry wall to pass directly onto the open-air central platform bridge over the main gate portal. This bridge measures 2.87 m in length and 2.30 m in width, flanked by 1.70 m high side parapets. It contains double-sided bar-lock slots (0.47 x 0.98 x 0.13cm) set 1.43 m high to brace the bridge door with heavy timber. A clear circular floor slot (7 cm diameter) is carved with a guide channel into the threshold stone to insert the lower door axis rod.

5. HBIM_Associated_Void_05: Chamber 3 (Upper Chamber)

[Dimensions and descriptions]: Stair turns continue at Steps 36, 39, 45, and 51, leading to Chamber 4 at Step 54 (4.40 x 1.80m, 2.40 m high).

6. HBIM_Associated_Void_06: Flagstaff Void System

[Dimensions and descriptions]: (Iconographic_Notes): The system corresponds directly with the large unworked structural slot running up the north outer wall face of the tower mass. The channel has a clear width of 58 cm and starts with a baseline depth of 69 cm at the bottom mass, becoming progressively shallower as it paths upward before fading out completely right at the horizontal alignment level of the main gateway lintel piece.

(Internal Spacial Anomalies): To anchor the massive ceremonial wood mast, two matching, perfectly aligned square cubic openings measuring exactly 60x60 cm are cut straight through the 70 cm thick northern and southern masonry walls of Chamber 4, placed exactly 45 cm above the interior chamber floor.

(Logic/Roeder notes): The structural alignment of the 60x60 cm horizontal holes right behind the facade groove demonstrates the ancient construction engineering logic: the heavy wood poles were raised from the ground outside using long lines looped directly through both wall holes of Chamber 4, allowing workers inside the upper tower room to manually steady and lock the mast using interior cross-beams.

(Material Composition): Sandstone structural block cavity

(Roeder Volume Page): Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 18 (§ 27); S. 24 (§ 40)

7. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell / Finished under Roman Administration

8. HBIM_The Conservation_Status: Reconstructed. The western tower underwent extensive structural collapse in 1896. Much of the current masonry and the stability of the remaining core are the result of early 20th-century reconstruction efforts, rather than purely original pharaonic or Roman fabric.

9. HBIM_Epigraphy_Relief_ID: Reliefs 198–199 (Outer West Jamb), Reliefs 208–212 (South Facade Mass)

10. HBIM_Iconographic_Notes: The solid facade hosts several late, scratched iconographic layers. The north entryway features two crude falcon-headed deities incised straight over pre-existing block channels. The south face near the ground exhibits an isolated, non-royal incised relief of Osiris and Isis. Further west on the south facade sits a crude, highly fluid non-pharaonic drawing of a woman in front view with spread hands, positioned above a native horned cow and a profile calf.

11. HBIM_Internal_Spacial_Anomalies: The structural core of the Western Pylon contains significantly larger and architecturally more elaborate internal chambers compared to the Eastern Pylon. It is systematically carved with custom wall niches and diagnostic white lime-wash frescoes.

12. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. This was the most critical period of intervention, where the collapsed sections were re-erected, masonry joints were pointed, and the core was reinforced to halt the ongoing deterioration observed following the 1896 collapse.

13. HBIM_Logic/Roeder_notes: The high volume of interior spaces demonstrates that the Western Tower acted as the primary administrative and custodial core within the Pylon framework, rather than acting as a mere passive architectural anchor.

14. HBIM_Material_Composition: Fine-grained reddish yellow-brown Sandstone block masonry

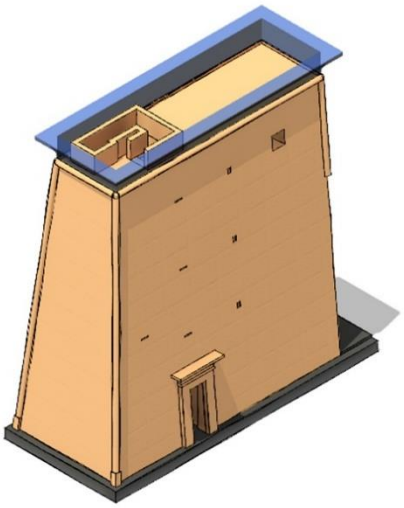
15. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 16 (§ 24); S. 18 (§ 27, 29); S. 22–25 (§ 37–42); Plans Taf. 148

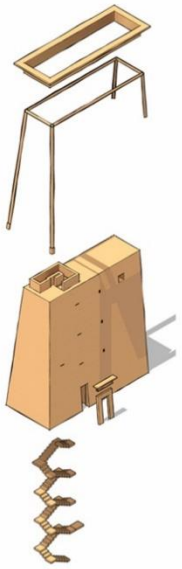
16. HBIM_Lok: LOK 5.1.

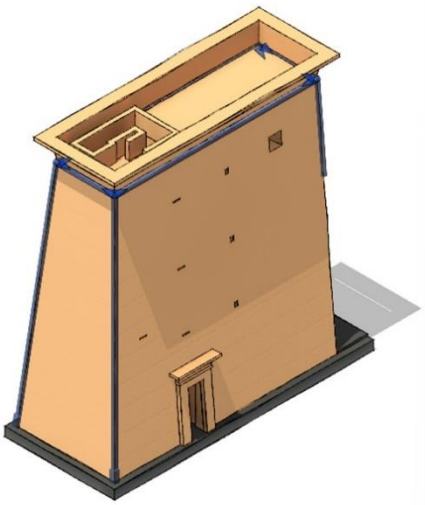
This component encompasses the western vertical structural element of the pylon, including the primary internal staircase and associated upper chambers documented in the archaeological surveys.

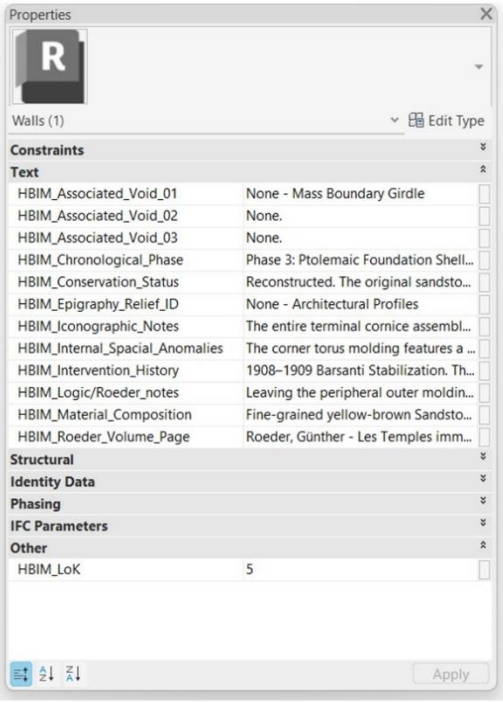
The Pylons:

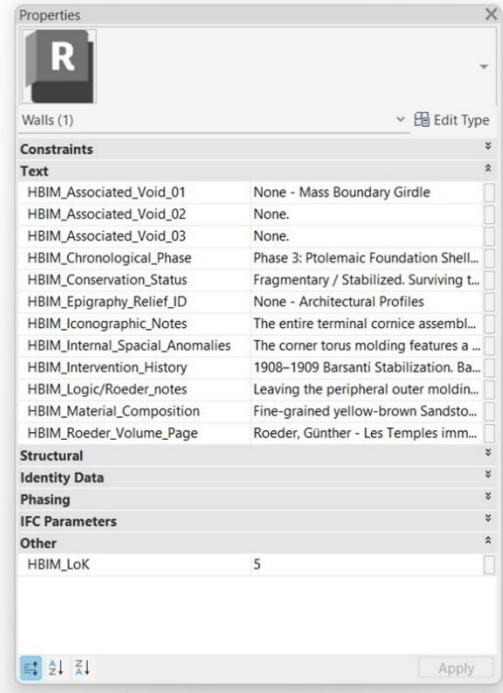
Western Pylon's Cavetto Cornice and Torus Molding including HBIM parametric values



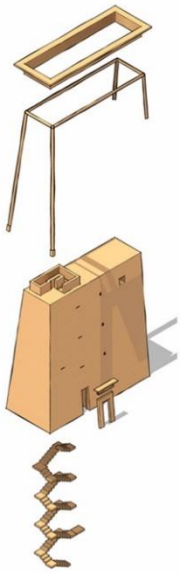






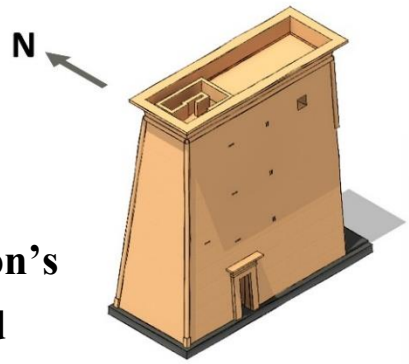


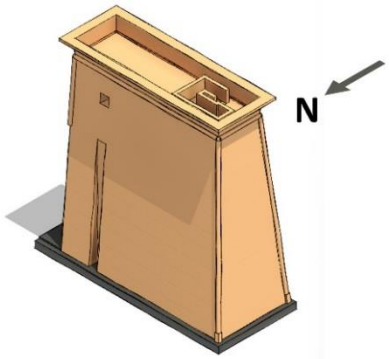
1. HBIM_Associated_Void_01: None - Mass Boundary Girdle
2. HBIM_Associated_Void_02: None - Mass Boundary Girdle
3. HBIM_Associated_Void_03: None - Mass Boundary Girdle
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell (Ptolemy IX Euergetes II)
5. **CORNICE:** HBIM_The Conservation_Status: Reconstructed. The original sandstone cornice was largely lost during the 1896 collapse; current segments represent early 20th-century restorative masonry.
6. **TORUS:** HBIM_The Conservation_Status: Fragmentary / Stabilized. Surviving torus sections are a mix of original stone and consolidation patches added to stabilize the vertical edge of the tower.
7. HBIM_Epigraphy_Relief_ID: None - Architectural Profiles
8. HBIM_Iconographic_Notes: The entire terminal cornice assembly and corner torus lines were left smooth and anepigraphic. No formal vertical leaf incisions or lotus friezes were carved on these structural bands.
9. HBIM_Internal_Spacial_Anomalies: The corner torus molding features a standard diameter of 20 cm. At the absolute southwest corner base, it terminates directly into an exposed square platform measuring 36 cm high, 22 cm wide at its base, and 21 cm wide at its top slope.
10. **CORNICE:** HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The cornice was re-assembled using cement-based mortar to restore the architectural profile of the pylon summit and prevent further structural degradation of the top course masonry.
11. **TORUS:** HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti's team cleaned and realigned these elements, using injection grouting to secure them to the pylon core.
12. HBIM_Logic/Roeder_notes: Leaving the peripheral outer moldings raw mirrors the general halt of localized royal master craftsmen before formal decoration could climb to the upper parapet levels.
13. HBIM_Material_Composition: Fine-grained yellow-brown Sandstone masonry.
14. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 17 (§ 25); S. 18 (§ 27)
15. **CORNICE:** HBIM_Lok: LOK 5.1.1.
16. **TORUS:** HBIM_Lok: LOK 5.1.2.

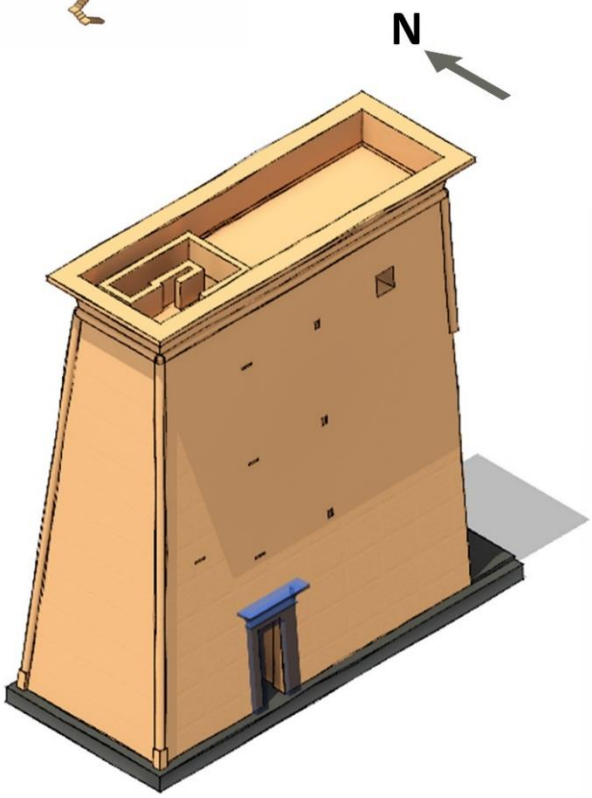


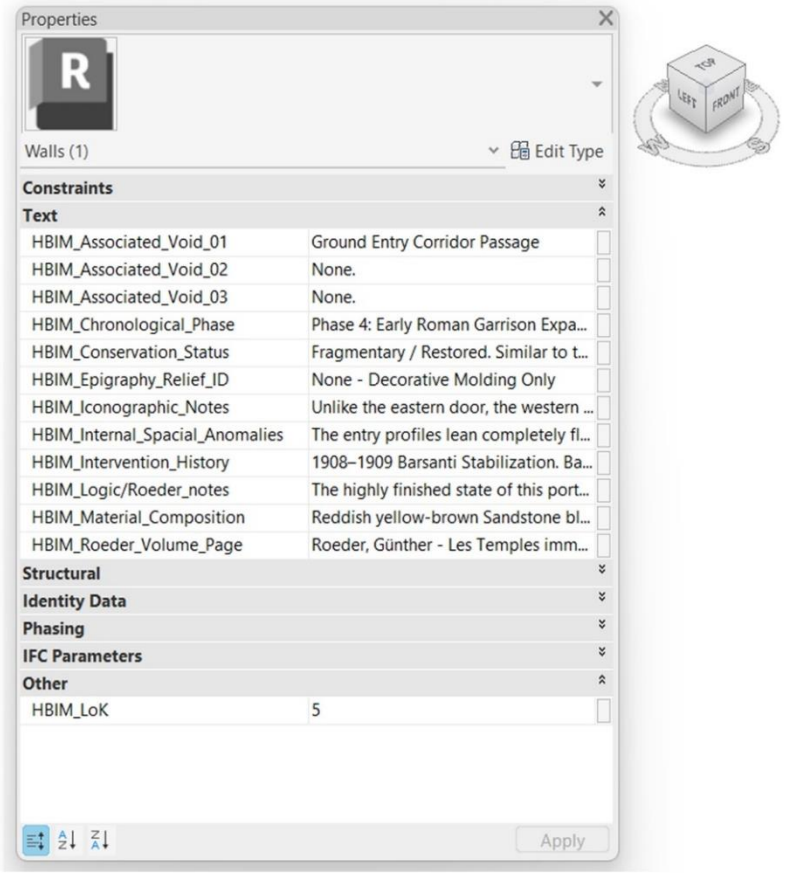
The Pylons:

Western Pylon's Entrance and HBIM parametric values



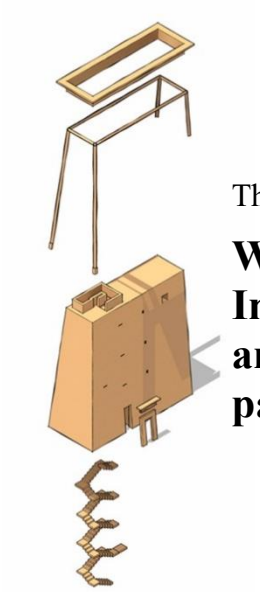






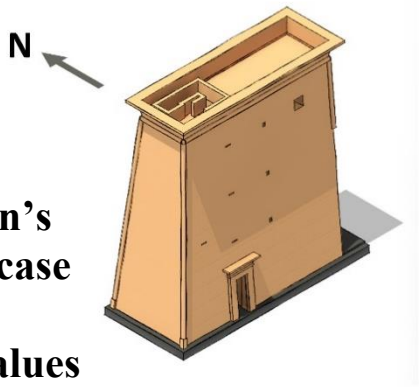
1. HBIM_Associated_Void_01: Ground Entry Corridor Passage
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 4: Early Roman Garrison Expansion / Late Ptolemaic Finishing Era
5. HBIM_The Conservation_Status: Fragmentary / Restored. Similar to the Eastern Pylon, this portal suffered significant structural trauma during the 1896 collapse. The current assembly incorporates original stone jamb fragments, while the cavetto cornice has required extensive restorative mortar and stone patching to regain structural profile.
6. HBIM_Epigraphy_Relief_ID: None - Decorative Molding Only
7. HBIM_Iconographic_Notes: Unlike the eastern door, the western southern gateway portal was completely carved and finished with an architectural hierarchy. The cavetto cornice is fully decorated with a distinct vertical feather pattern (*Federmuster*), displaying brilliant residual pigments of alternating blue, green, and red stripes. A detailed winged sun disk with outspread wings wraps around the center; its inner section retains tiny rounded scales painted green with a clear red chevron accent. The left (west) and right (east) framing uraei wear the Upper Egyptian crown with ostrich feathers and the Lower Egyptian crown, respectively.
8. HBIM_Internal_Spacial_Anomalies: The entry profiles lean completely flat with the general outward slope (*Böschung*) of the tower facade. The lower hinge sockets are currently sealed beneath restoration zement.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti stabilized the portal's lintel and jambs. The cavetto cornice was reconstructed and consolidated using cement-based mortar to prevent water ingress and further separation of the masonry blocks above the door opening.
10. HBIM_Logic/Roeder_notes: The highly finished state of this portal reinforces that the primary interior procession and ceremonial access to the tower rooms entered solely through this gateway.
11. HBIM_Material_Composition: Reddish yellow-brown Sandstone block masonry.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 21 (§ 35)
13. HBIM_Lok: LOK 5.1.3.

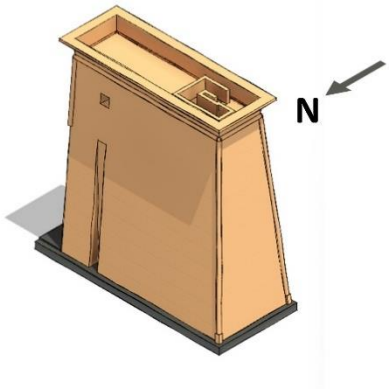
This designation covers the specific portal assembly, including the door frame and crowning cavetto cornice on the southern face of the Western Pylon.

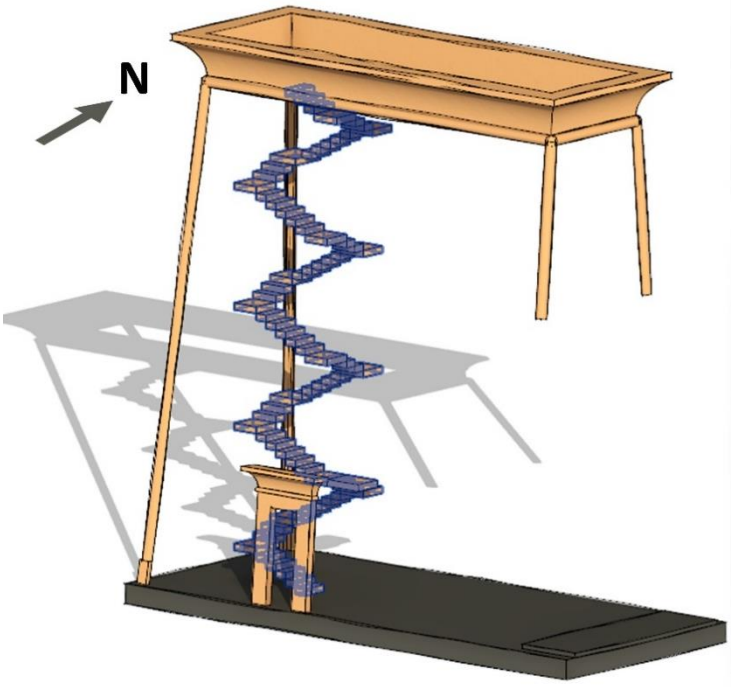


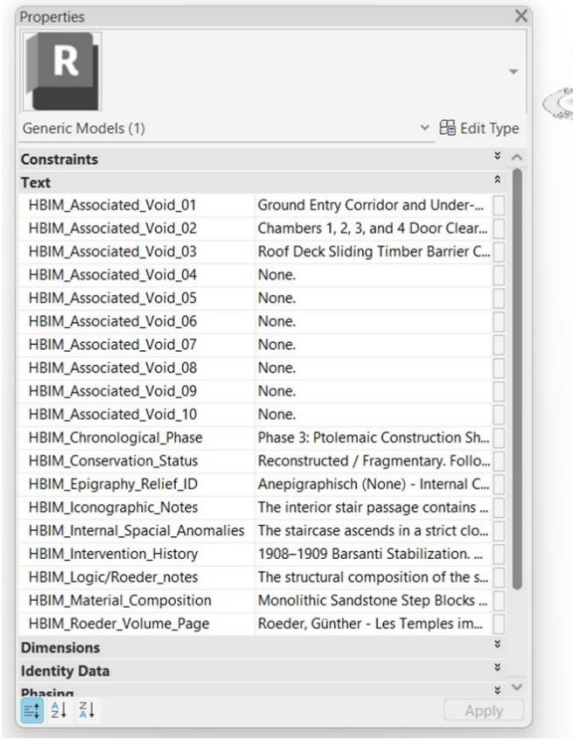
The Pylons:

Western Pylon's Internal staircase and HBIM parametric values







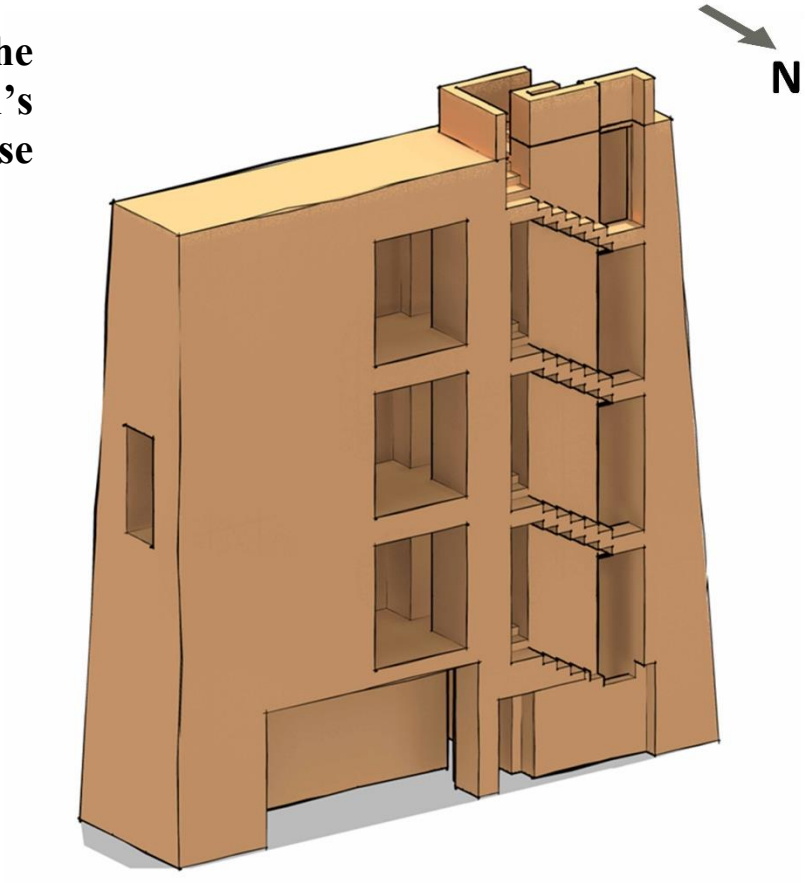


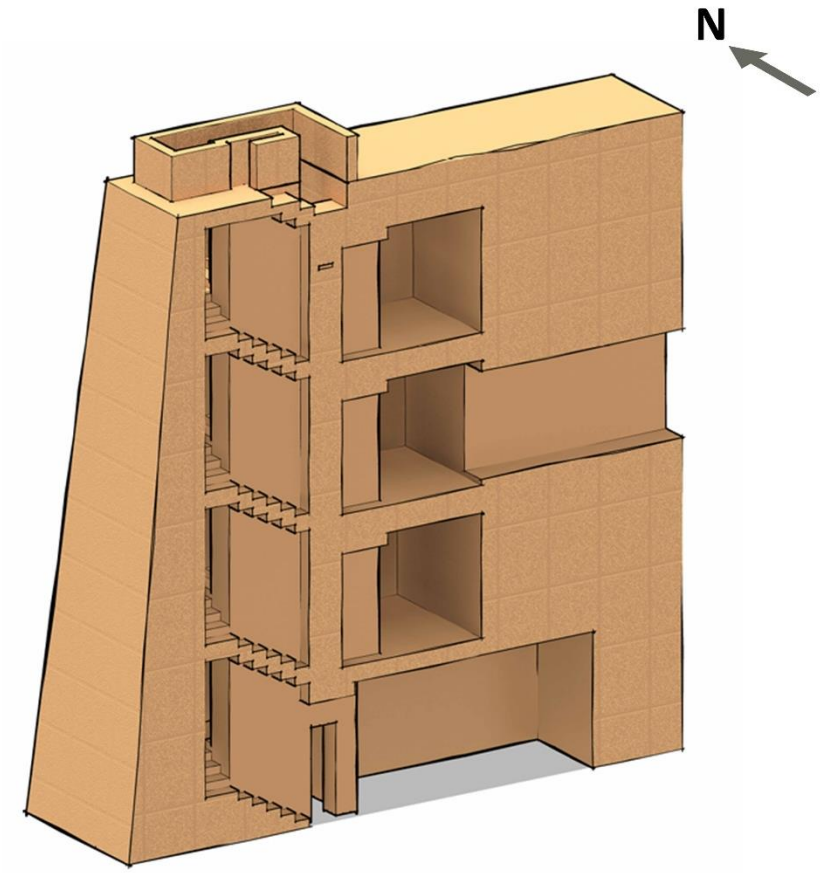


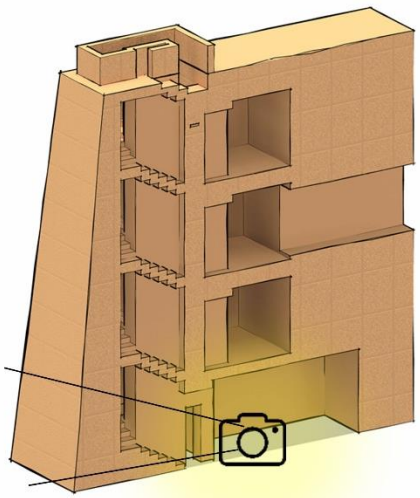
1. HBIM_Associated_Void_01: Ground Entry Corridor and Under-Stair Space
2. HBIM_Associated_Void_02: Chambers 1, 2, 3, and 4 Door Clearances
3. HBIM_Associated_Void_03: Roof Deck Sliding Timber Barrier Channel
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Construction Shell / Roman Finished Infrastructure
5. HBIM_Epigraphy_Relief_ID: Anepigraphisch (None) - Internal Circulation Fabric
6. HBIM_Iconographic_Notes: The interior stair passage contains zero official Pharaonic relief scenes or hieroglyphic inscriptions. The corridor surfaces preserve a heavy texture of raw quarry blocks and prominent tool bumps (*starke Bossen*) . The only non-architectural markings are early Coptic Christian frescoes located inside the adjacent Chamber 2 at Step 18, consisting of a large white lime-wash cross (65cm x 50cm) on the north wall and a smaller cross (51cm x 40cm) on the south wall.
7. HBIM_Internal_Spacial_Anomalies: The staircase ascends in a strict clockwise spiral configuration. The clear walking width averages 65 cm at the lower runs and narrows under 60 cm in the upper levels. Every monolithic step maintains a precise structural rise of 15 cm. Sharp 90-degree turns occur at Step 6, Step 9, Step 15, Step 24, Step 27, Step 33, Step 36, Step 39, Step 45, Step 51, Step 54, Step 57, Step 63, Step 66, and Step 72, completing 75 total steps to reach the main roof terrace level. The ceiling cuts away completely at Step 63, leaving the remaining top runs entirely open to the sky. The staircase paths directly past Chamber 1 at the ground floor, Chamber 2 at Step 18, Chamber 3 at Step 36 (which features a 1.00 m thick exit passage leading out to the external platform bridge over the main gate), and Chamber 4 at Step 54[cite: 2]. Deeply tapered light slits penetrate the facade mass at Steps 6, 18, 24, 36, 42, and 54 to illuminate specific landing tiers.
8. HBIM_Logic/Roeder_notes: The structural composition of the staircase dictates the spatial syntax of the entire western tower mass. Unlike the simpler layout of the Eastern Tower staircase, this system was highly defensive, integrating multiple heavy door-rebate offsets, internal timber lock slots at the bridge passage, and a sliding wood barrier board track (*Brett*) running in vertical side slots across Step 72. This indicates it functioned as a multi-tiered security checkpoint within the digital memory of the site's garrison history.
9. HBIM_Material_Composition: Monolithic Sandstone Step Blocks embedded into ashlar masonry core.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 22–25 (§ 37–41); Plans Taf. 148, 149
11. HBIM_The Conservation_Status: Reconstructed / Fragmentary. Following the 1896 pylon collapse, the staircase suffered severe structural disruption. Existing treads are heavily restored, with original masonry being sparse and heavily integrated into the post-1896 reconstruction.
12. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti's team prioritized the internal staircase for both structural integrity of the pylon and to facilitate site access. This included the reconstruction of unstable tread sections and the reinforcement of the internal masonry walls housing the staircase shaft.
13. HBIM_Lok: LOK 5.1.3.

This component governs the internal vertical circulation system within the Western Pylon core, specifically the staircase path leading to the upper chambers and roof terrace.

Sections of the Western Pylon's Internal Staircase and Chambers









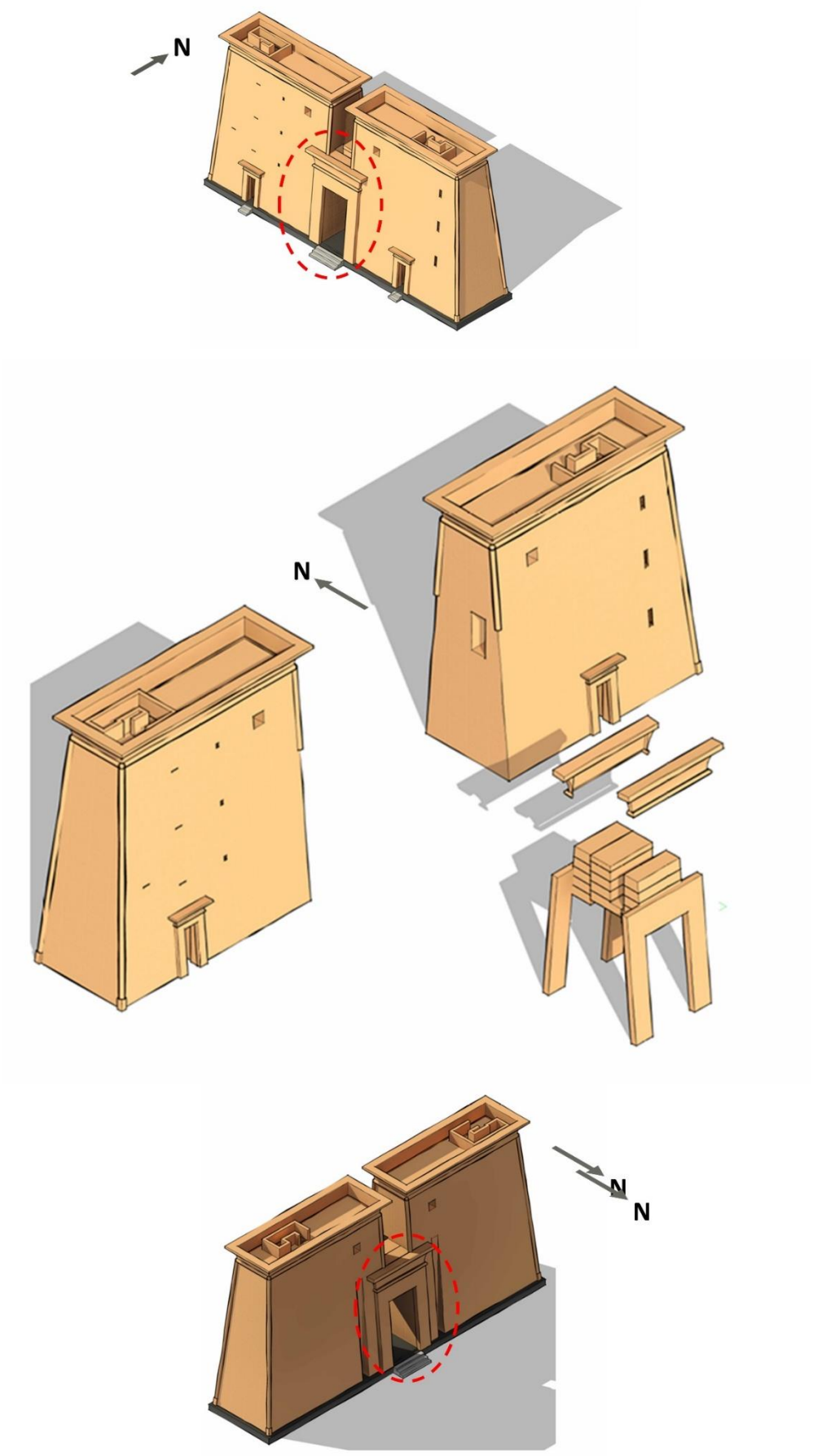


Figure 37. The Pylons: The Main Central gateway (in between the Pylons)

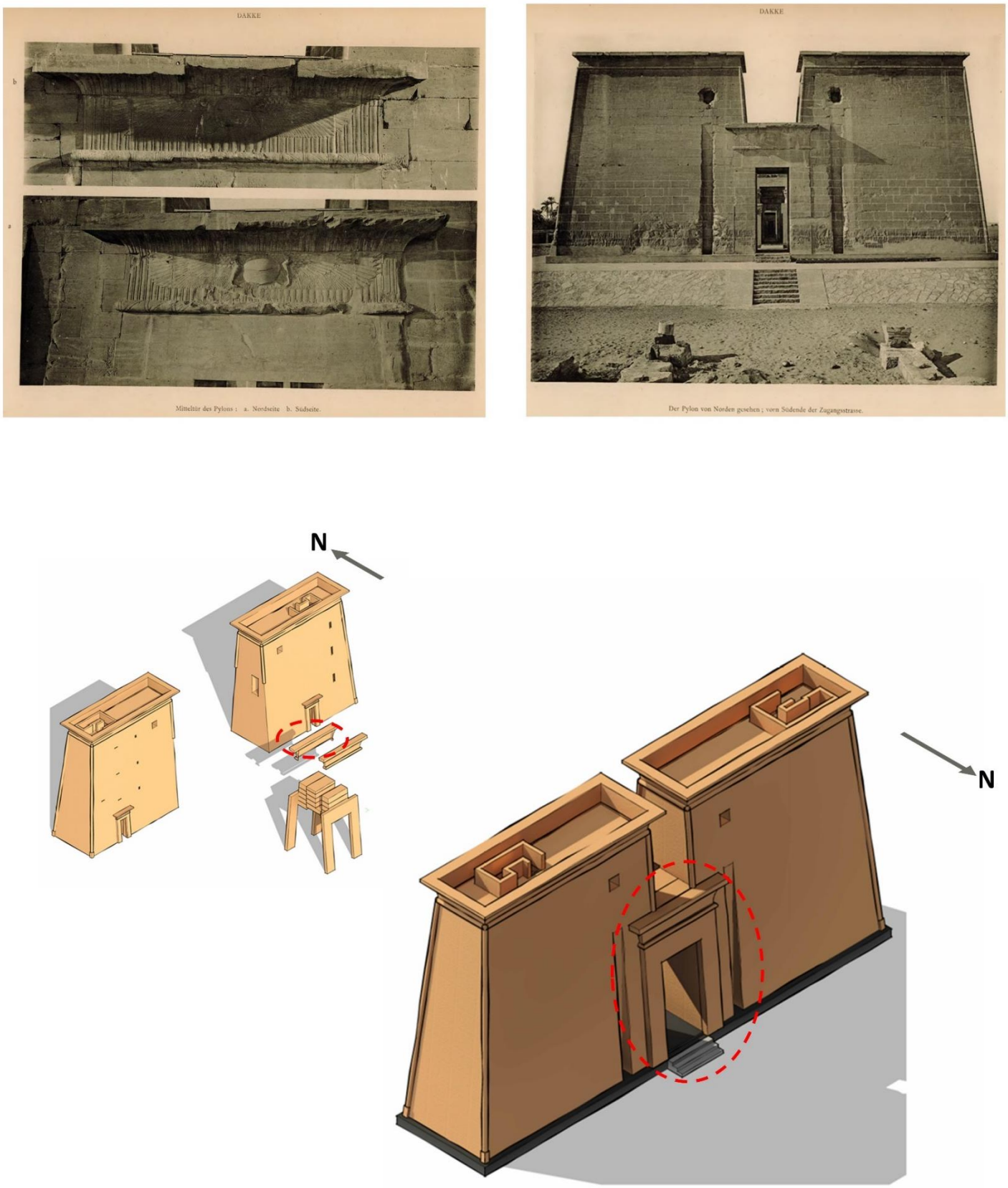
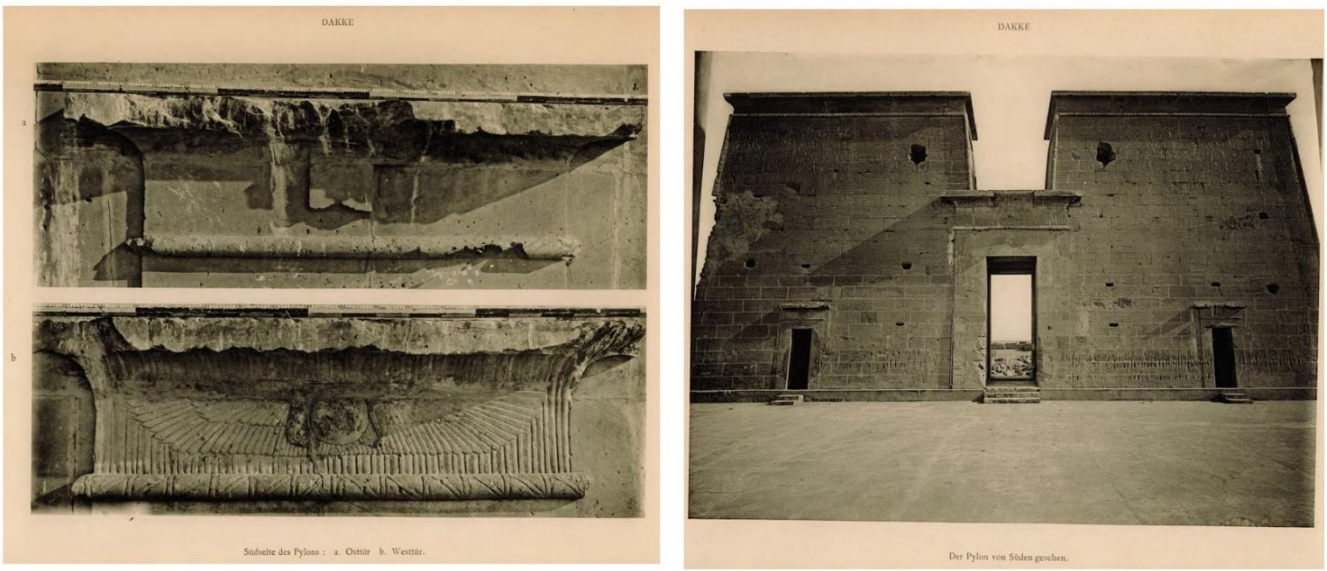


Figure 38. The North Face of the main Entrance gateway in 3D model vs. Roeder's photos



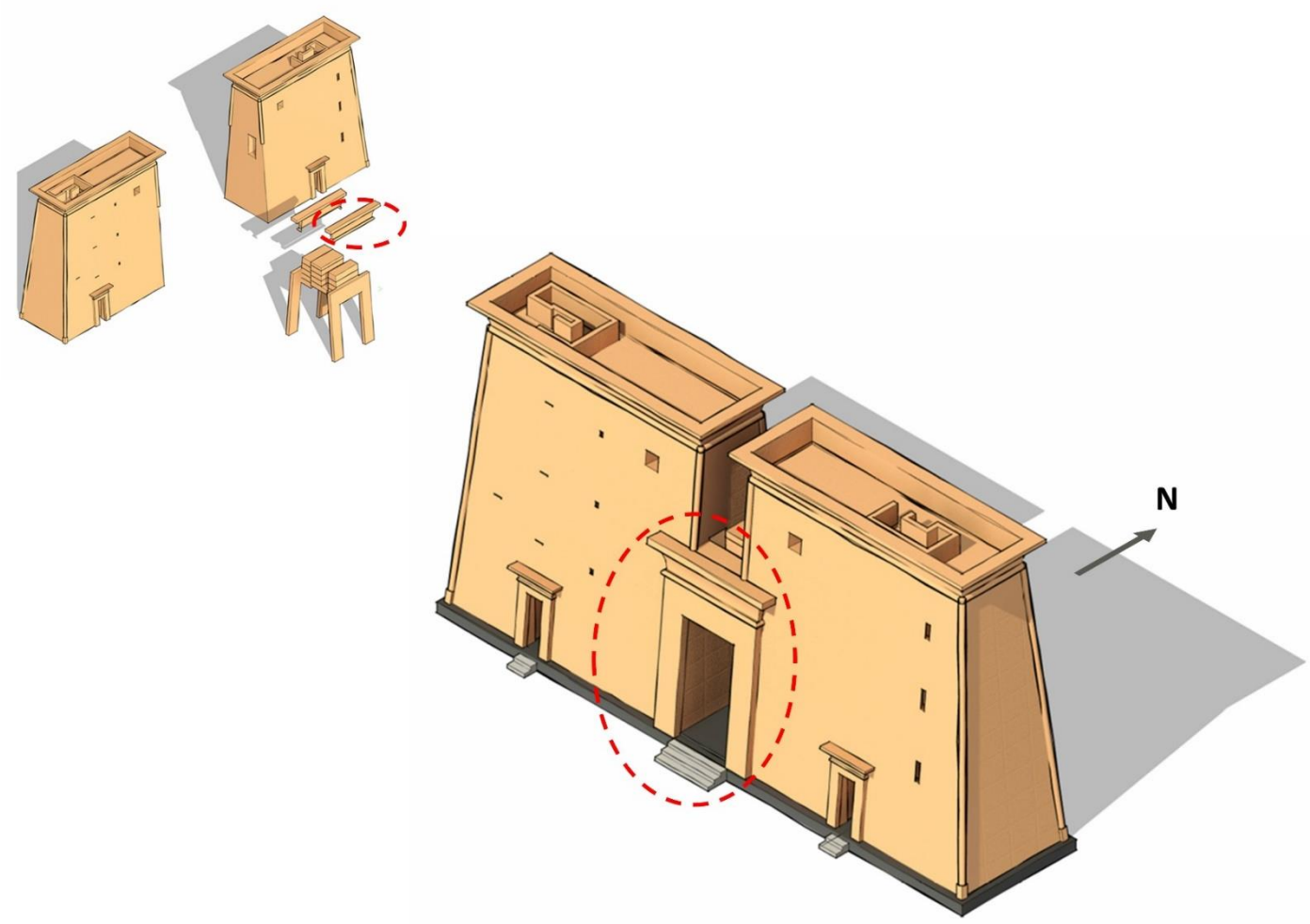
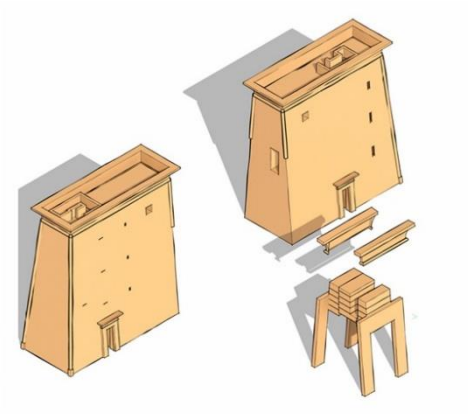
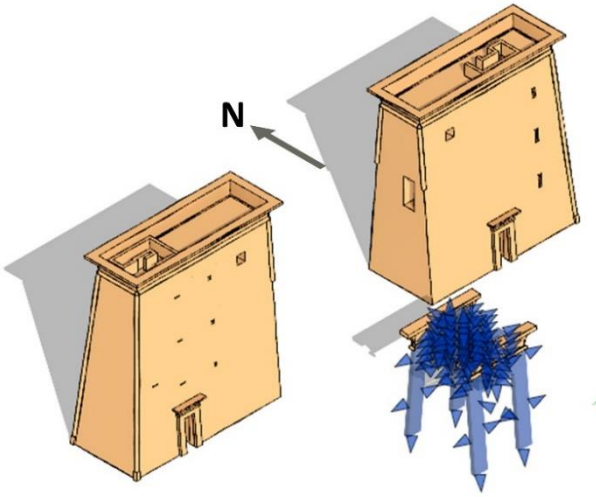


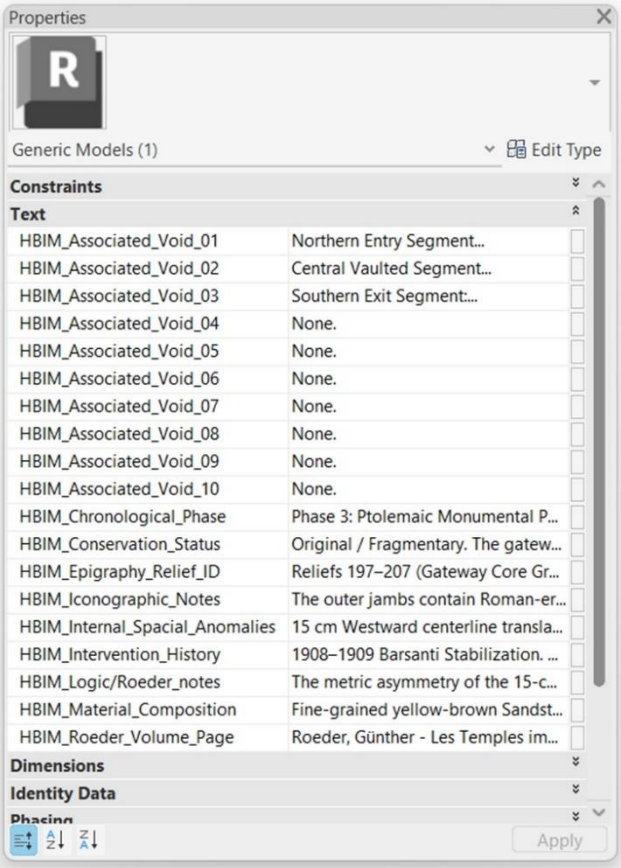
Figure 39. The South Face of the main Entrance gateway in 3D model vs. Roeder's photos



The Pylons:

The Jambs of the Main Central gateway and HBIM parametric values





1. HBIM_Associated_Void_01: Northern Entry Segment

[Dimensions and descriptions]: Corridor width is 1.91 m; clear height under lintel is 4.83 m. Two massive gray granite monoliths are set directly into the floor matrix of the northern and southern entryway slots, each presenting a surface area of exactly 1.90 x 1.50m.

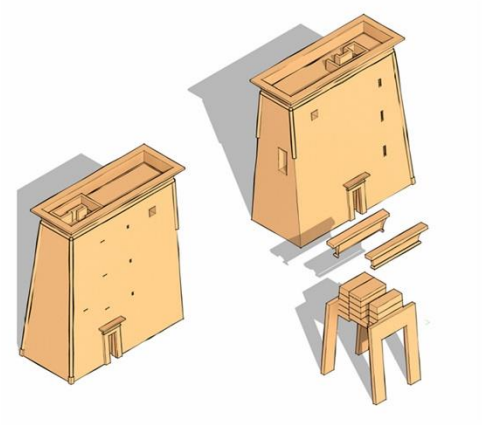
2. HBIM_Associated_Void_02: Central Vaulted Segment

[Dimensions and descriptions]: Expands to a width of 2.43 m; clear height rises to 5.09 m. This is the open-air connecting bridge platform (*Plattform*) between the two pylon towers which sits directly on top of the monumental horizontal stone slabs spanning this gateway corridor. It spans 2.87 m in length (transverse E-W axis) and 2.30 m in width (longitudinal N-S axis). It is bounded on its open North and South exposures by solid stone parapet enclosure walls 1.70 m high

3. HBIM_Associated_Void_03: Southern Exit Segment:

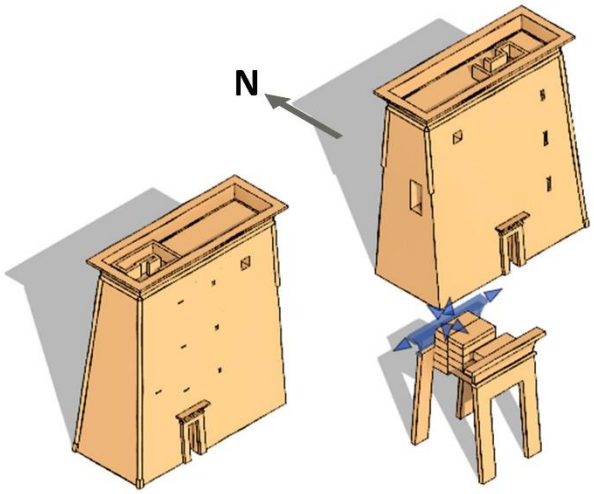
[Dimensions and descriptions]: Narrowing back to a width of 1.91 m; clear height drops to 4.83 m. Two massive gray granite monoliths are set directly into the floor matrix of the northern and southern entryway slots, each presenting a surface area of exactly 1.90 x 1.50m.

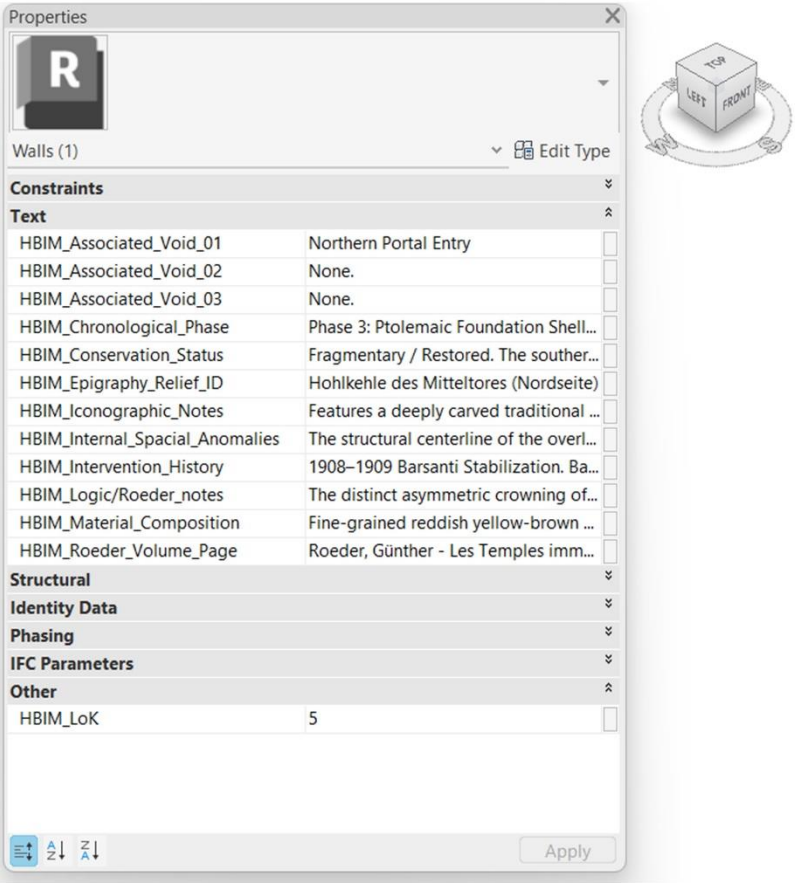
4. HBIM_Chronological_Phase: Phase 3: Ptolemaic Monumental Portal Shell (Ptolemy IX Layout Architecture) / Roman Imperial Carvings
5. HBIM_The Conservation_Status: Original / Fragmentary. The gateway retains its primary structural configuration, although the upper lintel and the cavetto cornice assembly exhibit significant surface degradation and minor structural displacement due to the overall settling of the Pylon towers.
6. HBIM_Epigraphy_Relief_ID: Reliefs 197–207 (Gateway Core Group)
7. HBIM_Iconographic_Notes: The outer jambs contain Roman-era incised images of a falcon-headed deity over old structural flagstaff grooves. The central expanded vault east wall hosts two large classic high-relief panels displaying a Roman Emperor making ritual offerings directly to Thot of Pnubs, Tefenet, and Isis. The west wall face is completely hacked away and missing. The surfaces preserve multiple non-proliferation historical records, including a series of late Greek traveler inscriptions and a Demotic text cut directly into the outer northern jamb corner.
8. HBIM_Internal_Spacial_Anomalies: 15 cm Westward centerline translation offset away from the core temple axis line. East wall central vault is intact with reliefs; West wall central vault is entirely destroyed and filled with restoration cement.
9. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti stabilized the gateway by consolidating the masonry joints and securing the loose structural blocks forming the passage ceiling. No invasive reconstruction of the original threshold or jambs was performed, maintaining the original historical fabric.
10. HBIM_Logic/Roeder_notes: The metric asymmetry of the 15-cm layout deviation confirms that the Pylon system was designed independently of the inner Ergamenes Chapel foundation system. The gateway functioned as a heavy, controlled checkpoint, verified by the deep internal slots where heavy wood double doors swung against the granite threshold flags.
11. HBIM_Material_Composition: Fine-grained yellow-brown Sandstone block framing with crystalline Gray Granite floor threshold blocks.
12. HBIM_Roeder_Volume_Page: Band 1, S. 16–17 (§ 24–25); S. 19–21 (§ 31–33); Plans Taf. 148.
13. HBIM_Lok: LOK 5.2.3.



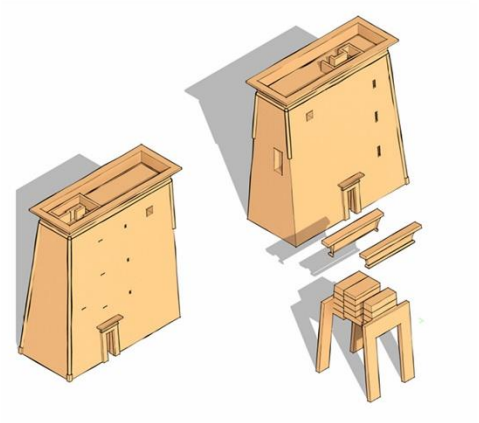
The Pylons:

The Northern Cavetto Cornice and Torus Molding of the Main Central gateway and HBIM parametric values



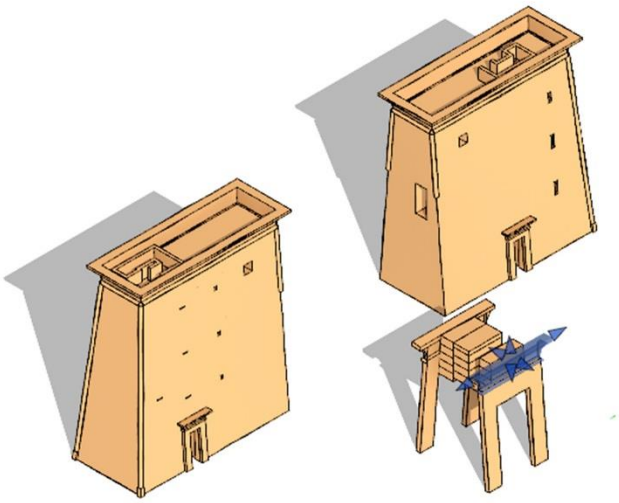


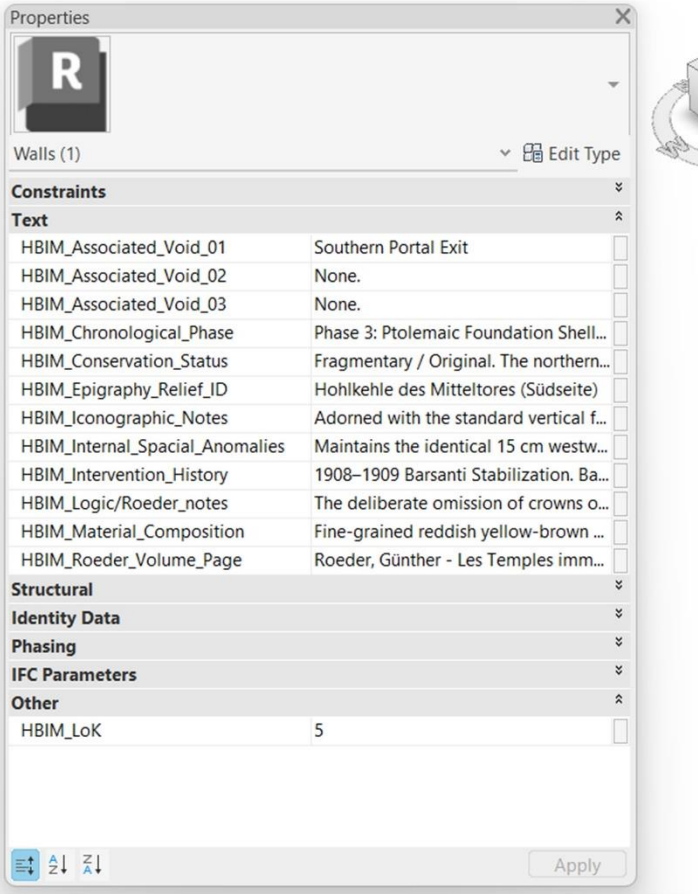
1. HBIM_Associated_Void_01: Northern Portal Entry
2. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell (Ptolemy IX Euergetes II)
3. HBIM_The Conservation_Status: Fragmentary / Original. The northern cavetto profile is largely original sandstone but exhibits significant erosion due to its exposed position on the northern face of the pylon gateway.
4. HBIM_Epigraphy_Relief_ID: Hohlkehle des Mitteltores (Nordseite)
5. HBIM_Iconographic_Notes: Features a deeply carved traditional Egyptian feather pattern (*Federmuster*). The recessed feather elements are painted in an alternating, repeating polychromatic sequence of blue, green, blue, and red (or yellow). The dead center of the cornice features a prominent high-relief winged sun disk (*geflügelte Sonne*) flanked by two highly detailed central decoration uräen. The eastern uräus wears the Upper Egyptian crown with two ostrich feathers, while the western uräus wears the Lower Egyptian crown. The underlying outspread wings are strictly divided into three distinct iconographic zones of feathers: the innermost section consists of small, rounded scales originally painted green with a red chevron 'V' accent, while the middle and outer zones display elongated flight feathers with green pigments.
6. HBIM_Internal_Spacial_Anomalies: The structural centerline of the overlying sun disk is translated 15 cm West of the core temple axis due to the general pylon gateway alignment shift.
7. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti consolidated the masonry units of the northern cornice with lime-based mortar to prevent further edge degradation of the cavetto profile.
8. HBIM_Logic/Roeder_notes: The distinct asymmetric crowning of the uräi explicitly denotes the geographical and theological anchoring of the temple gateway as the transitional legal threshold between the two lands, unified under ptolemaic kingship.
9. HBIM_Material_Composition: Fine-grained reddish yellow-brown sandstone block.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 19–20 (§ 31); S. 21 (§ 35); Plans Taf. 166 a, b, c
11. HBIM_Lok: LOK 5.2.3.1.



The Pylons:

The Southern Cavetto Cornice and Torus Molding of the Main Central gateway and HBIM parametric values





1. HBIM_Associated_Void_01: Southern Portal Exit
2. HBIM_Chronological_Phase: Phase 3: Ptolemaic Foundation Shell (Ptolemy IX Euergetes II)
3. HBIM_The Conservation_Status: Fragmentary / Restored. The southern cornice assembly was subject to higher rates of structural instability; sections were reset during the 1908–1909 campaign, and it retains partial original profile integrity with localized cement pointing.
4. HBIM_Epigraphy_Relief_ID: Hohlkehle des Mitteltores (Südseite)
5. HBIM_Iconographic_Notes: Adorned with the standard vertical feather pattern matching the northern side in its blue-red-blue-green color progression. It features a large central winged sun disk, but exhibits distinct iconographic variations from the northern facade: the top border strip of the innermost wing section is explicitly wavy and organic rather than straight, terminating in a sharply downward-curving tip right over the 11th rounded feather. Furthermore, the continuous central rib running down the bodies of the framing uräi features incised, parallel horizontal cross-stripes. Crucially, these southern companion uräi completely lack any crowns. The only remaining legible wing pigments consist of overall green traces on the intermediate wing zone and red spots dotting the rounded tips of the outer feathers.
6. HBIM_Internal_Spacial_Anomalies: Maintains the identical 15 cm westward centerline shift relative to the southern temple complex axis.
7. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. Barsanti re-anchored loose cornice segments and utilized cement-based mortar for joint stabilization to secure the gateway's structural termination.
8. HBIM_Logic/Roeder_notes: The deliberate omission of crowns on the southern gateway uräi signifies an intentional stylistic shift meant for an interior audience. While the outer north face strictly project imperial state sovereignty to those approaching the pylon, the inside south face frames the localized, internal sacred temple courtyard space.
9. HBIM_Material_Composition: Fine-grained reddish yellow-brown sandstone block.
10. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 20–21 (§ 34); Plans Taf. 166 e, g
11. HBIM_Lok: LOK 5.2.3.2.

5.2.8 The Courtyard Well Basin *(Brunnen)* and Approach Infrastructure

- Documents the contextual utility elements, including the courtyard well basin.
- Illustrates the foundational retaining elements of the approach road (*Zugangsstrasse*), and the northern portal threshold (*Nullpunkt datum*).

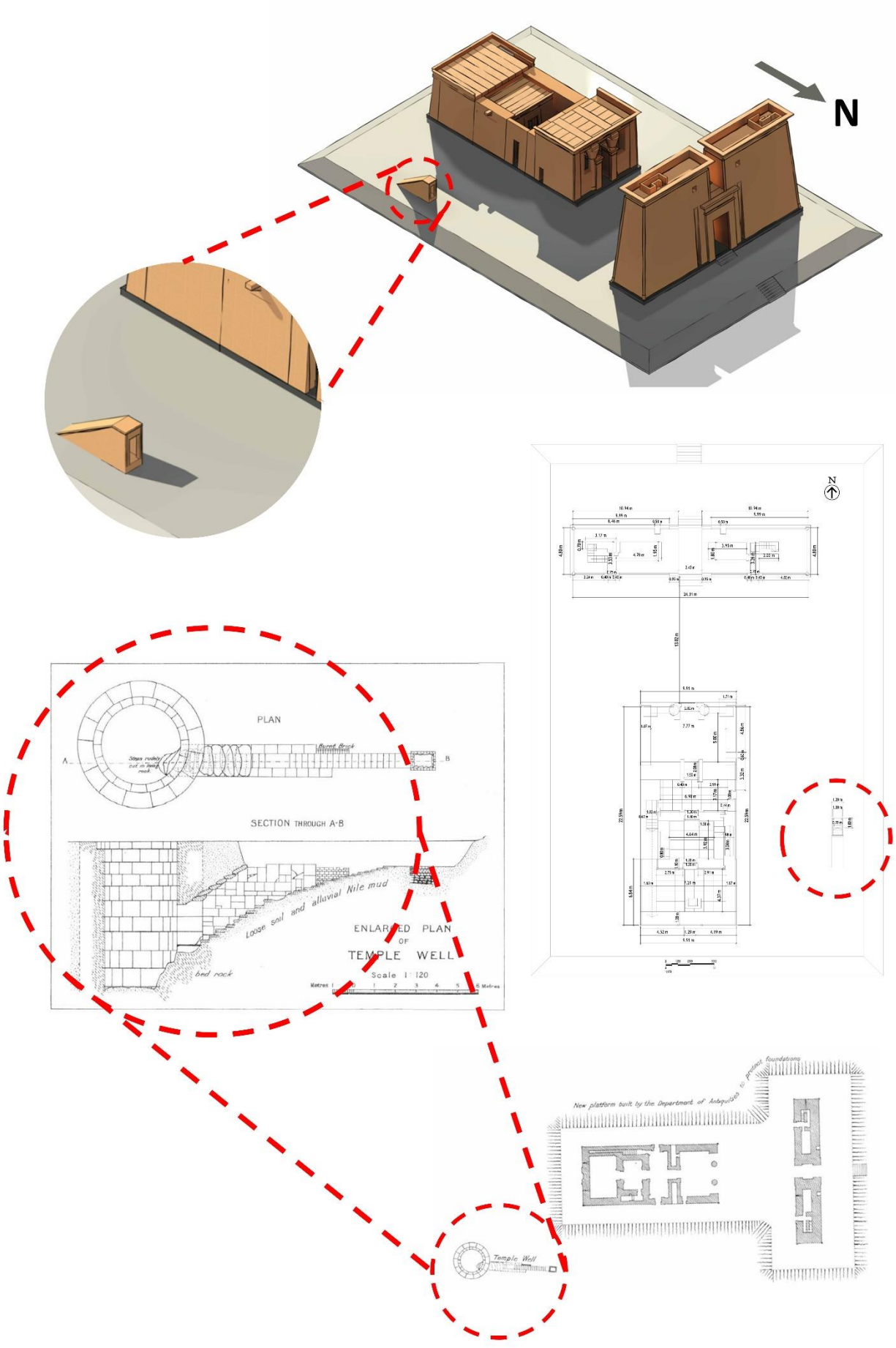
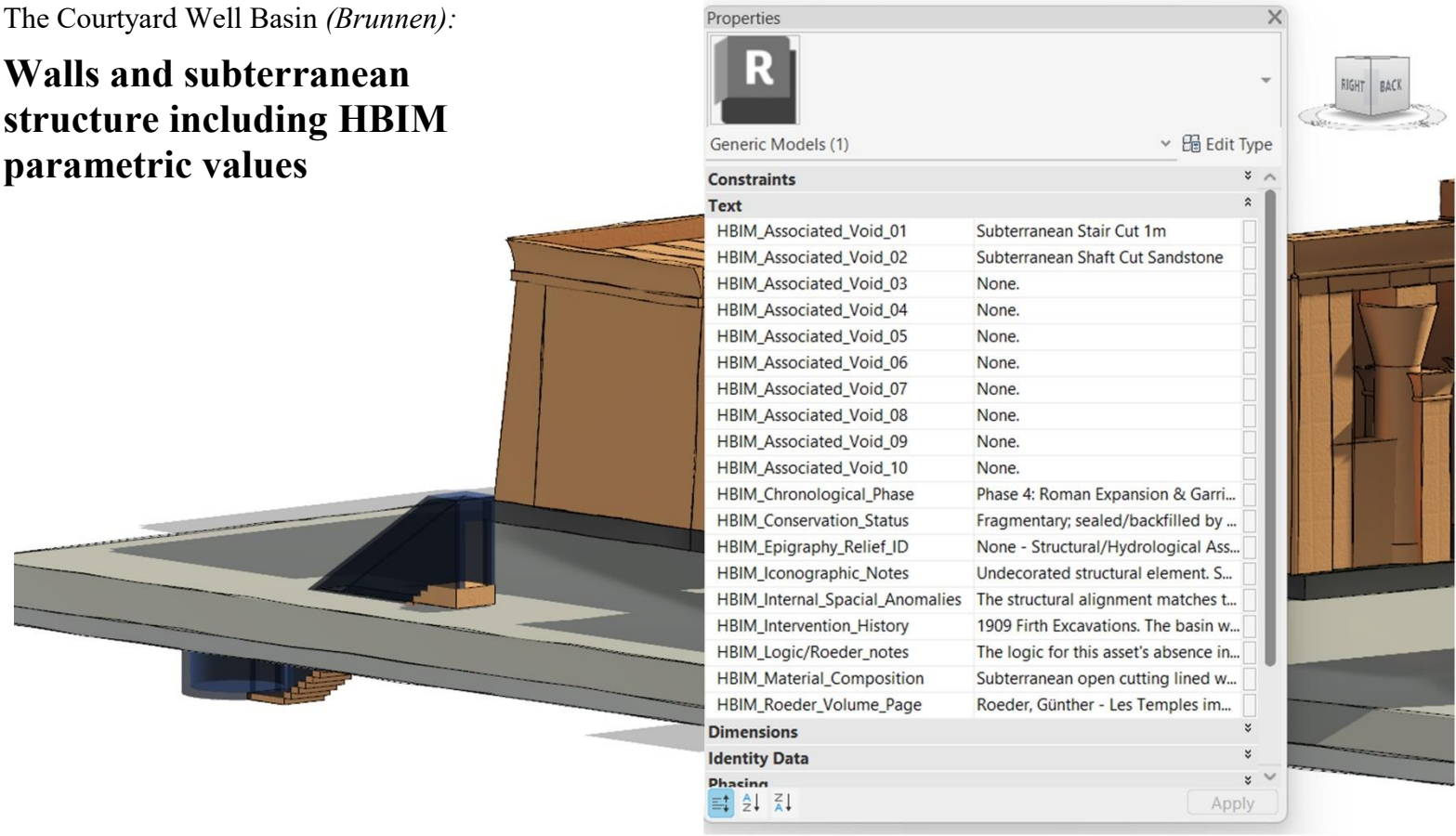
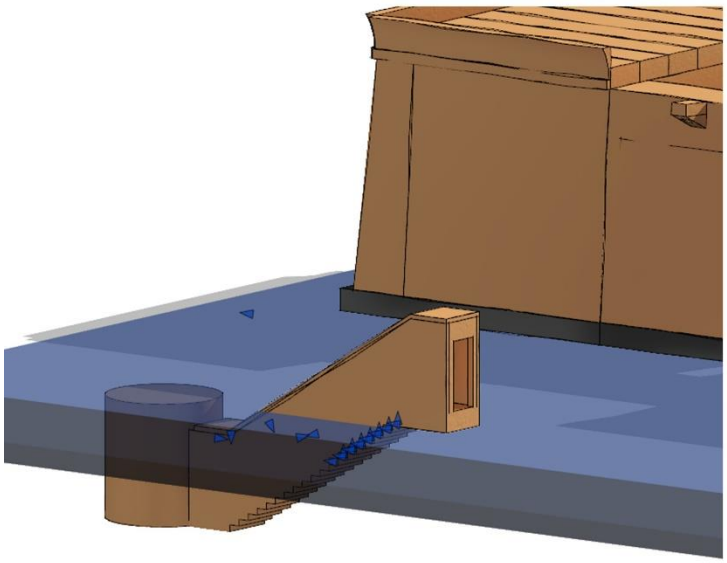


Figure 40. The Courtyard Well Basin *(Brunnen)*

The Courtyard Well Basin *(Brunnen):*

Walls and subterranean structure including HBIM parametric values



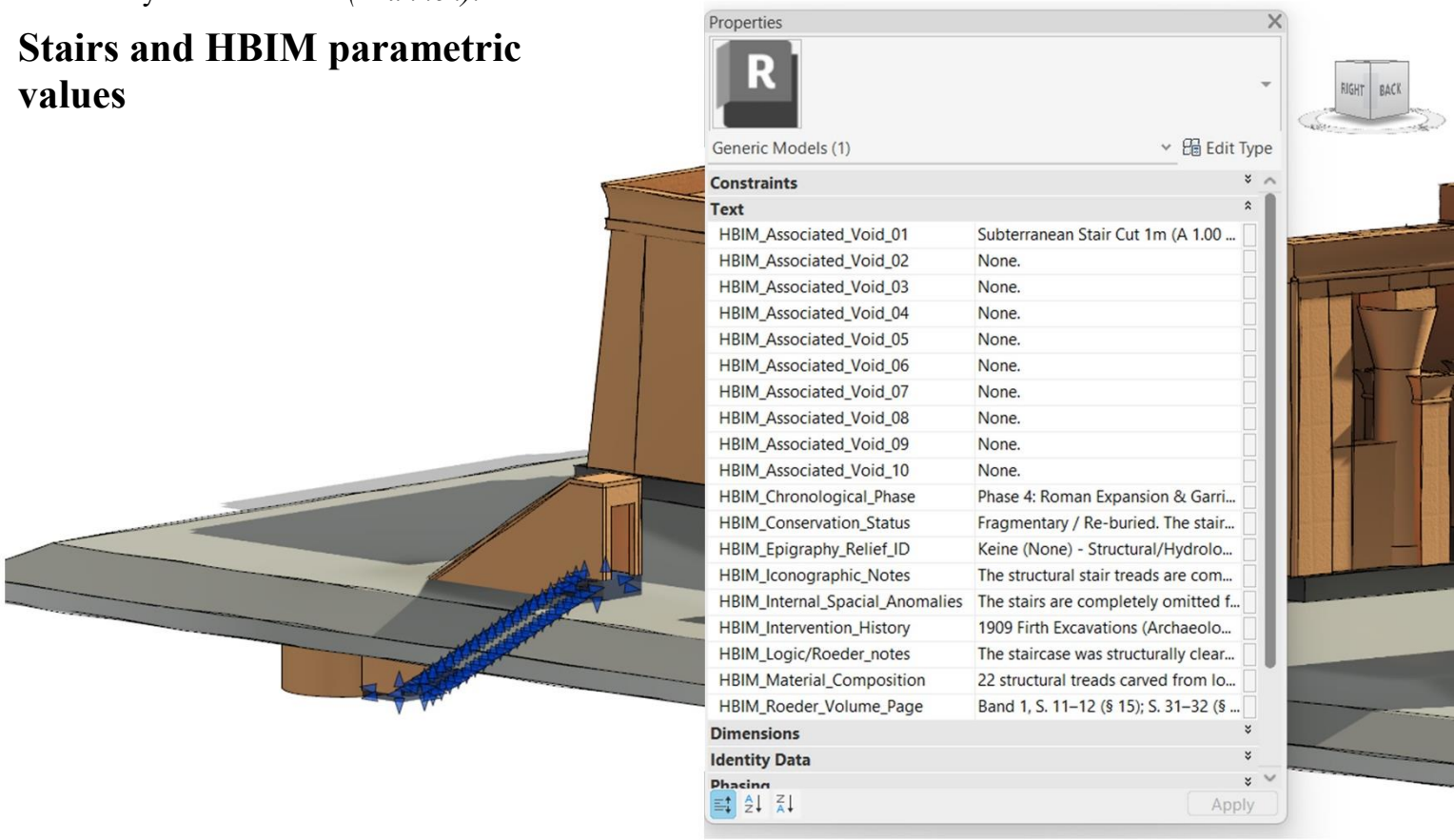


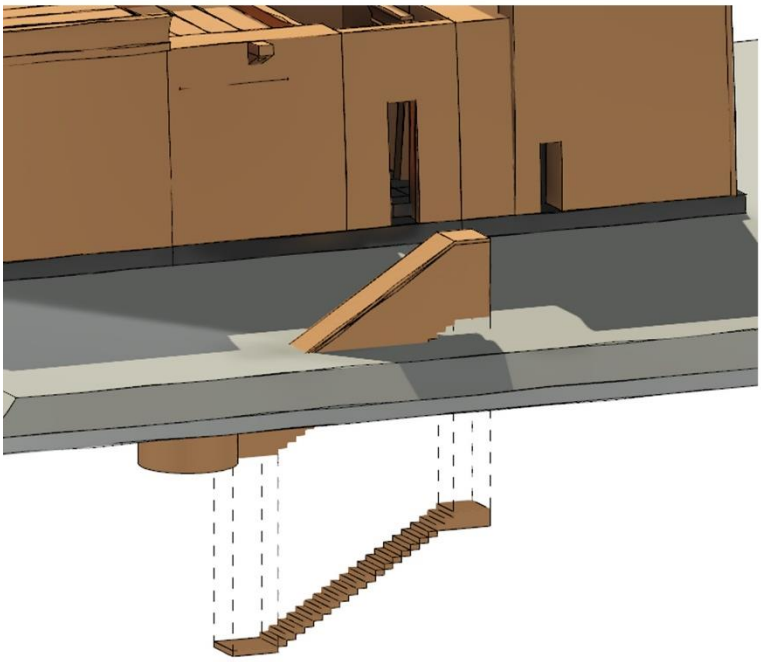
1. HBIM_Associated_Void_01: Subterranean Stair Cut 1m
2. HBIM_Associated_Void_02: Subterranean Shaft Cut Sandstone
3. HBIM_Associated_Void_03: None.
4. HBIM_Chronological_Phase: Phase 4: Roman Expansion & Garrison Infrastructure (Augustus Era)
5. HBIM_The Conservation_Status: Fragmentary; sealed/backfilled by Firth in 1909. The basin structure was exposed during the Archaeological Survey of Nubia but was subsequently re-buried/backfilled to preserve the integrity of the surrounding temple courtyard foundation layers.
6. HBIM_Epigraphy_Relief_ID: None - Structural/Hydrological Asset
7. HBIM_Iconographic_Notes: Undecorated structural element. Sandstone masonry blocks frame the lower subterranean basin shaft to secure the water table access point for the temple precinct and garrison forces.
8. HBIM_Internal_Spacial_Anomalies: The structural alignment matches the 1842 Saint-Ferriol graphic baseline but stands completely omitted from Roeder's 1913/1930 architectural master plan survey (Taf. 148).
9. HBIM_Intervention_History: 1909 Firth Excavations. The basin was uncovered by Firth during the Archaeological Survey, documented, and then sealed to protect it from environmental degradation.
10. HBIM_Logic/Roeder_notes: The logic for this asset's absence in the primary plan is a critical semantic layer for digital heritage preservation: Roeder explicitly states that the well was uncovered by C. M. Firth during the Archaeological Survey excavations in the autumn of 1909, but it was completely backfilled with sand in January 1910 before Roeder arrived on site. Because it was buried under sand during his survey and later sealed beneath Barsanti's modern concrete courtyard terrace beds, Roeder could not physically measure it or include it in his primary ground plan (Taf. 148). He relies directly on Firth's field data and historical accounts like Saint-Ferriol's (1842) to verify its structural coordinates.
11. HBIM_Material_Composition: subterranean open cutting lined with roughly dressed sandstone framing blocks.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 11–12 (§ 15); S. 31–32 (§ 60).
13. HBIM_Lok: 6.1

Specifically refers to the **Well Basin**, the sub-surface reservoir structure.

The Courtyard Well Basin *(Brunnen):*

Stairs and HBIM parametric values





1. HBIM_Associated_Void_01: Subterranean Stair Cut 1m (A 1.00 m wide sloped extrusion family that cuts cleanly through the courtyard ground plane).
2. HBIM_Associated_Void_02: None.
3. HBIM_Associated_Void_03: None
4. HBIM_Chronological_Phase: Phase 4: Roman Expansion & Garrison Infrastructure Layer (Augustus Era).
5. HBIM_The Conservation_Status: Fragmentary / Re-buried. The staircase leading down to the water source was exposed by Firth, mapped, and subsequently backfilled for site preservation.
6. HBIM_Epigraphy_Relief_ID: None - Structural/Hydrological Sub-component.
7. HBIM_Iconographic_Notes: The structural stair treads are completely unadorned. Traces of ancient plastering techniques are noted along the rough-cut side masonry channels. Post-pharaonic koptische Kreuze (Coptic crosses) are not present here, unlike the adjacent roof staircase systems.
8. HBIM_Internal_Spacial_Anomalies: The stairs are completely omitted from Roeder's primary architectural master plan survey (Taf. 148). However, their precise footprint is mapped in the historical 1842 plans of Comte Louis de Saint-Ferriol (Taf. 167b)
9. HBIM_Intervention_History: 1909 Firth Excavations (Archaeological Survey of Nubia). Documentation and mapping of the staircase descent occurred during the initial Survey; no restorative masonry work was undertaken, ensuring the archaeological context remained untouched.
10. HBIM_Logic/Roeder_notes: The staircase was structurally cleared and mapped by C. M. Firth during the Archaeological Survey of Nubia excavations in the autumn of 1909. Because the entire assembly was backfilled with desert sand in January 1910 before Roeder arrived on-site, it could not be physically measured by his team . He relies exclusively on Firth's field coordinates and historical documentation to verify its trajectory. To resolve the step count discrepancy in the historical collective memory layer, the model utilizes the explicit 1831 survey by Prokesch Bitter von Osten, who counted exactly 22 descending stairs.
11. HBIM_Material_Composition: 22 structural treads carved from local dense-grained sandstone blocks. The stair run features an average width of exactly 1.00 m. The system tracks a sloped descent slanting due South over a total length of approximately 10.00 m before terminating at the masonry edge of the square well basin.
12. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), Band 1, S. 11–12 (§ 15); S. 31–32 (§ 60).
13. HBIM_Lok: 6.2

Specifically refers to the **Well Access Staircase**, the infrastructural descent leading to the basin.

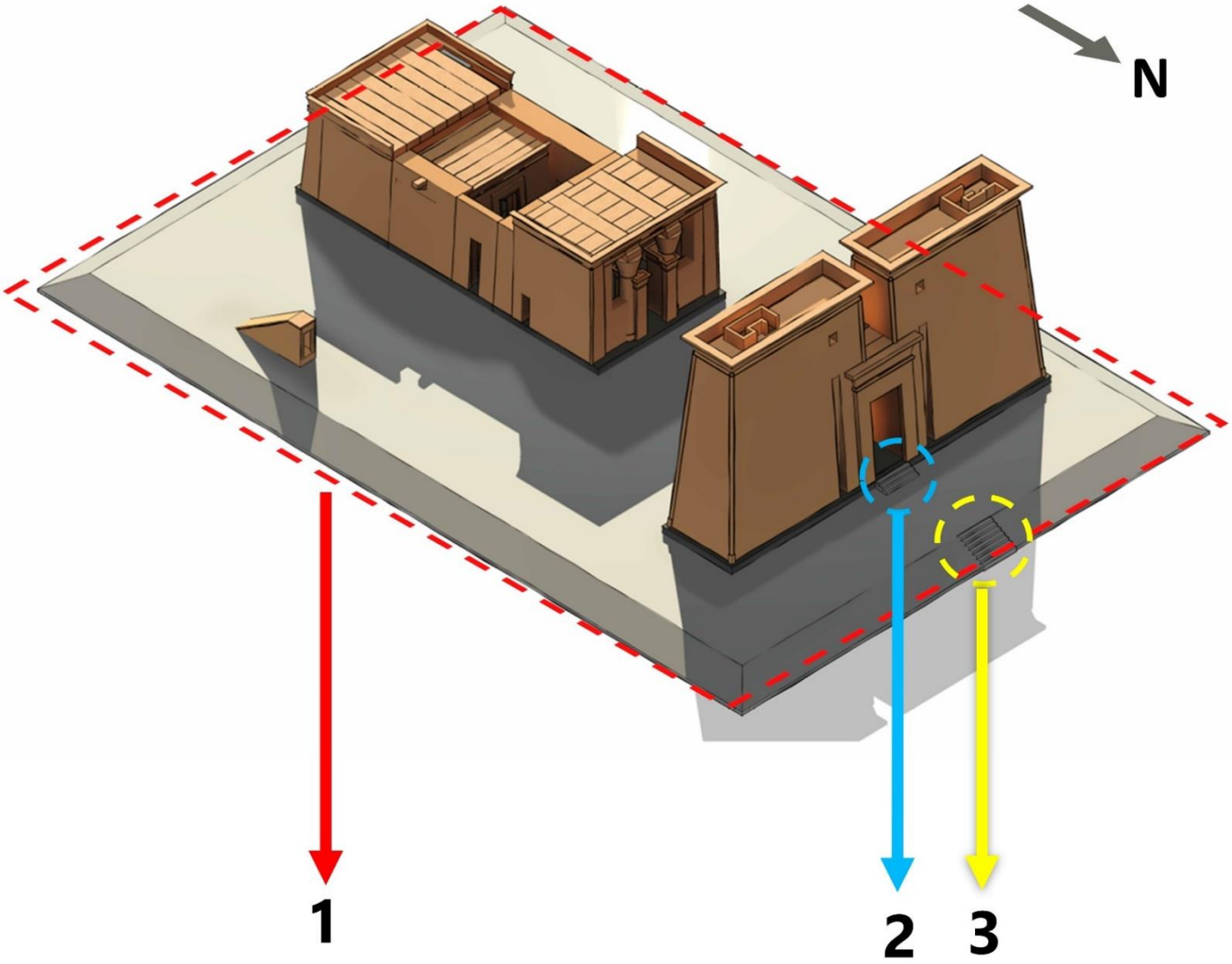
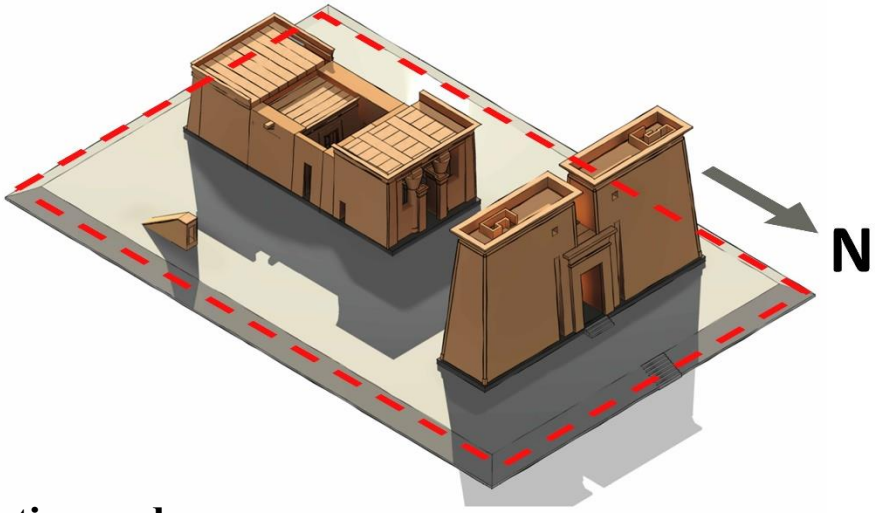
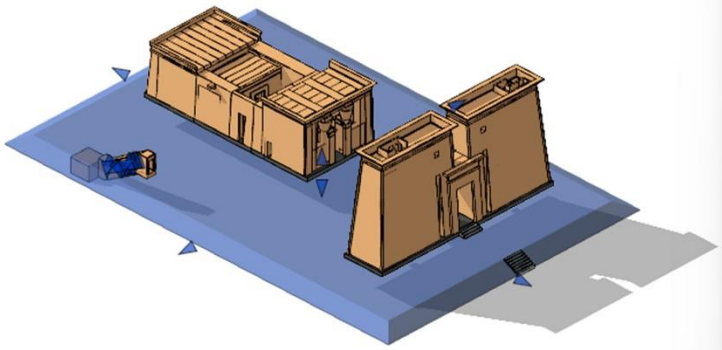


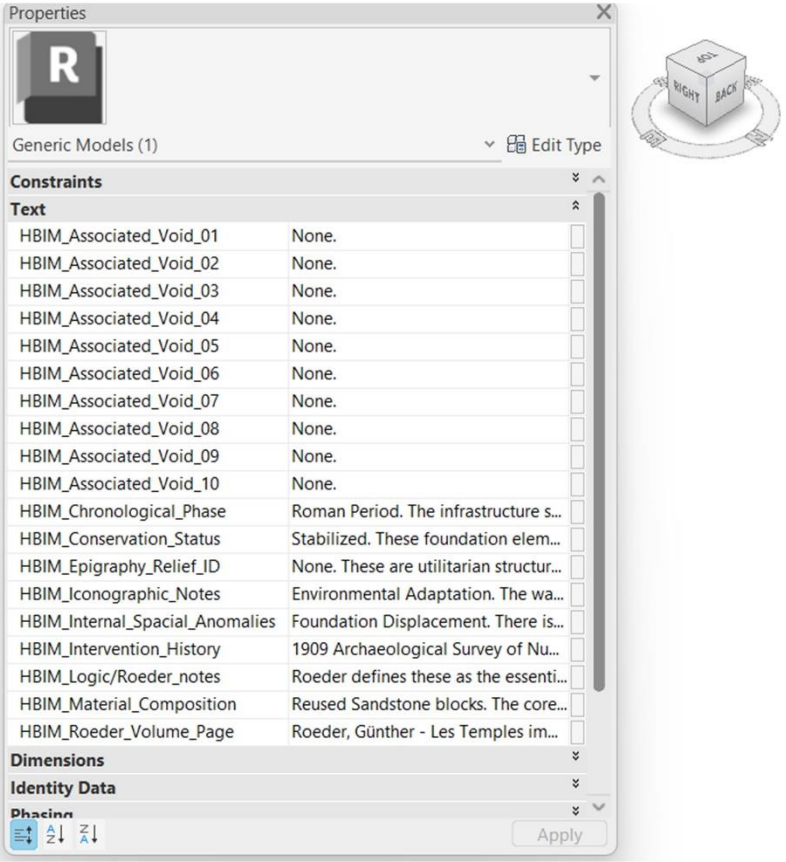
Figure 41. Approach Infrastructure: 1) The Pylons' Approach/Foundation, 2) The northern portal threshold, 3) The Main stairs on the Northern portal



Approach Infrastructure:

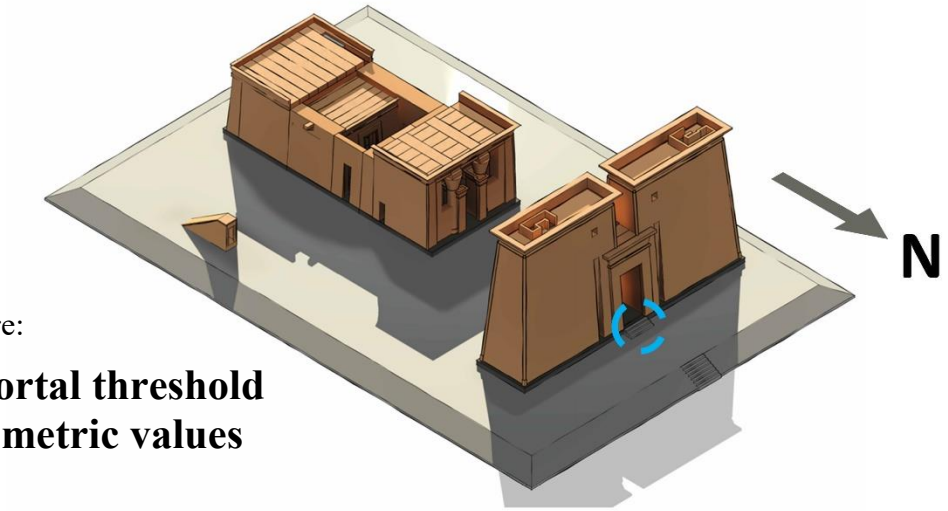
The Pylons' Approach/Foundation and HBIM parametric values





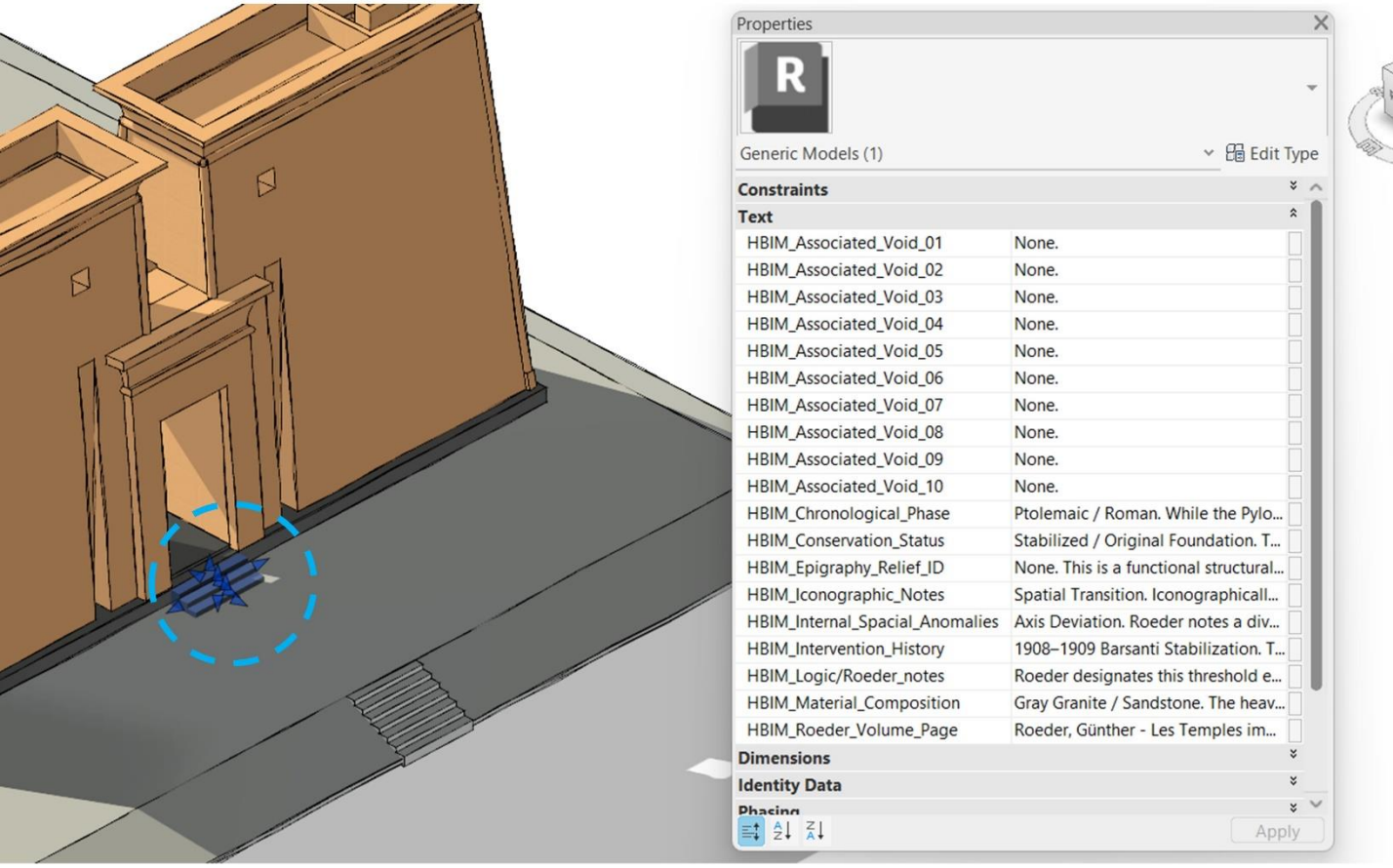
1. HBIM_Chronological_Phase: Roman Period. The infrastructure supporting the access road, including the retaining wall elements, was established primarily during the Roman era expansion of the temple precinct.
2. HBIM_Conservation_Status: Stabilized. These foundation elements remain largely submerged or buried, with exposed masonry requiring structural stabilization to support the pylon's weight above the shifting desert topography.
3. HBIM_Epigraphy_Relief_ID: None. These are utilitarian structural foundations and do not feature epigraphic or relief registers.
4. HBIM_Iconographic_Notes: Environmental Adaptation. The walls signify a Roman-era modification to manage the temple's topography and drainage, reflecting a shift toward Roman structural engineering standards to stabilize the site against the fluctuating Nile environment.
5. HBIM_Internal_Spacial_Anomalies: Foundation Displacement. There is noted irregularity in the foundation alignment compared to the pylon's main axis, attributed to the reuse of material from earlier, non-aligned structures.
6. HBIM_Intervention_History: 1909 Archaeological Survey of Nubia / Barsanti Campaigns. Cleared by Firth (1909) and subsequently stabilized by Barsanti to prevent the collapse of the pylon approach.
7. HBIM_Logic/Roeder_notes: Roeder defines these as the essential foundation and retaining infrastructure for the Zugangsstrasse (access road), which integrated the Pylon into the broader topography of the Roman-era temple district.
8. HBIM_Material_Composition: Reused Sandstone blocks. The core consists of mixed rubble and earth fill, encased in masonry blocks repurposed from earlier 18th-Dynasty structures (specifically those attributed to Thutmosis III at Kubban).
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), p. 14–15, §20–22;

10. Lok: 5

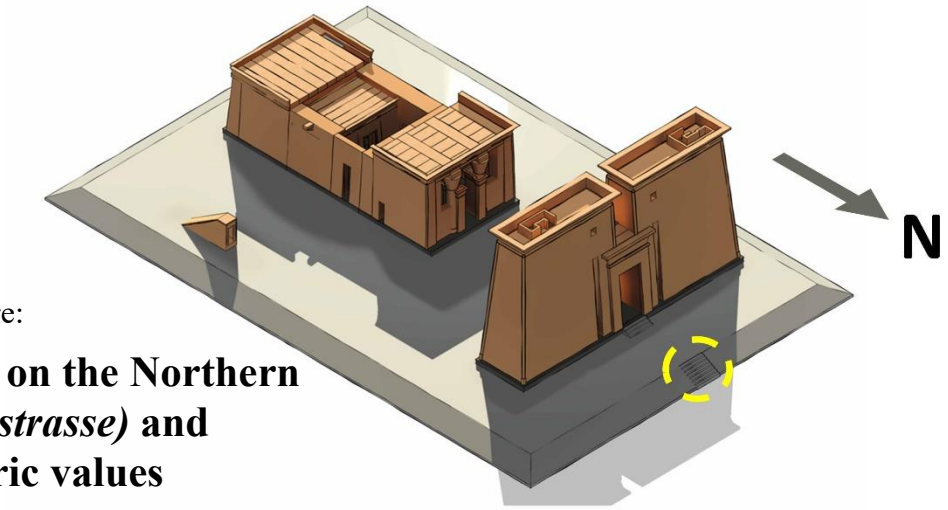


Approach Infrastructure:

The Northern portal threshold and HBIM parametric values

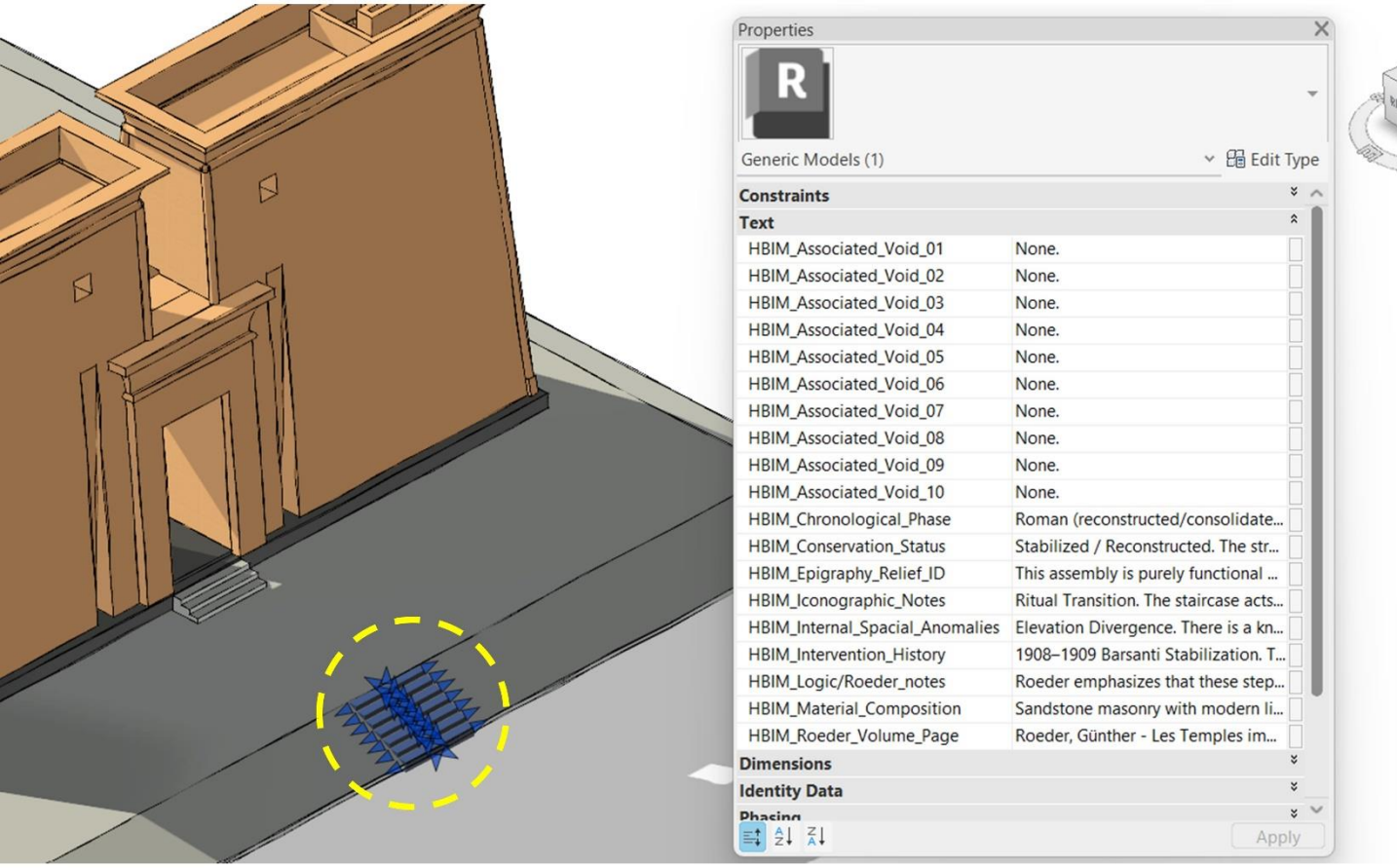


1. HBIM_Chronological_Phase: Ptolemaic / Roman. While the Pylon itself reflects later construction phases, this threshold level is the baseline for the temple's primary axis, reflecting the architectural logic established during the site's major renovations.
2. HBIM_Conservation_Status: Stabilized / Original Foundation. The threshold remains one of the more stable elements of the Pylon gateway, though it has been consolidated to prevent erosion at the entry transition.
3. HBIM_Epigraphy_Relief_ID: None. This is a functional structural element lacking epigraphic decoration.
4. HBIM_Iconographic_Notes: Spatial Transition. Iconographically, this threshold represents the physical divide between the outer access space (Zugangsstrasse) and the internal sanctity of the temple's central axis.
5. HBIM_Internal_Spacial_Anomalies: Axis Deviation. Roeder notes a divergence of approximately 15 cm between the Pylon's central axis and the main temple house axis—a crucial anomaly to account for when aligning the floor plans in Revit.
6. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The threshold was cleared and leveled during the stabilization campaign to ensure uniform transit and to secure the pylon door jambs against the foundation.
7. HBIM_Logic/Roeder_notes: Roeder designates this threshold elevation as the "Nullpunkt". All elevations in the model measured from this datum to maintain the spatial accuracy of the temple's reconstruction.
8. HBIM_Material_Composition: Gray Granite / Sandstone. The heavy-duty threshold blocks are composed of granite, chosen for its superior durability against the high traffic of the temple entrance.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930),, p. 16, §25-26;
10. Lok: 5



Approach Infrastructure:

The Main stairs on the Northern portal (*Zugangsstrasse)* and HBIM parametric values



1. HBIM_Chronological_Phase: Roman (reconstructed/consolidated 20th C.) – While the access ramp is a functional necessity of the pylon design, the masonry and tread configuration reflect Roman-era infrastructure principles, heavily subjected to modern stabilization.
2. HBIM_Conservation_Status: Stabilized / Reconstructed. The structural integrity of the steps is maintained through 20th-century intervention, as the original sandstone surfaces suffered significant erosion and displacement prior to the Barsanti campaigns.
3. HBIM_Epigraphy_Relief_ID: None. This assembly is purely functional and lacks decorative relief or epigraphic registers.
4. HBIM_Iconographic_Notes: Ritual Transition. The staircase acts as the physical 'bridge' between the secular Zugangsstrasse and the sacred precinct, marking a change in elevation and spatial status for the practitioner.
5. HBIM_Internal_Spacial_Anomalies: Elevation Divergence. There is a known discrepancy in the threshold elevation of this staircase compared to the original pharaonic site, likely due to debris accumulation and subsequent raising of floor levels in antiquity.
6. HBIM_Intervention_History: 1908–1909 Barsanti Stabilization. The staircase was cleared of sand, structural masonry was re-aligned, and degraded treads were patched with cement to ensure safety and prevent the pylon foundation from undermining.
7. HBIM_Logic/Roeder_notes: Roeder emphasizes that these steps provide the functional elevation change required to enter the pylon's central axis; they are an essential component of the "access road" infrastructure.
8. HBIM_Material_Composition: Sandstone masonry with modern lime/cement-based mortar infill.
9. HBIM_Roeder_Volume_Page: Roeder, Günther - Les Temples immergés de Nubie Der tempel von Dakke Vol 1 (1930), p. 16, §26;
10. Lok: 5

5.3 Architectural Elevations and Section Cuts of the Revit Model

Provides the full collection of digital architectural drawings, generated directly from the Revit workspace, featuring high-resolution cross-sections, four-sided elevations, and multi-level floor cut plans that verify the metric accuracy of the reconstruction against Roeder's 1913 documentation.

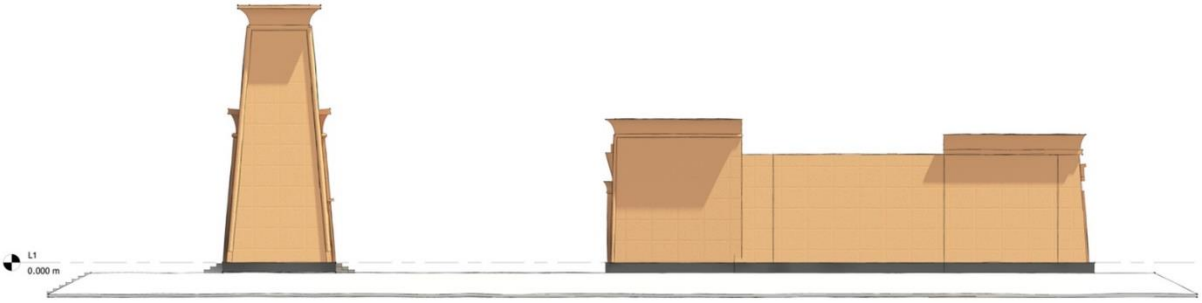
5. 3.1 Architectural Elevations



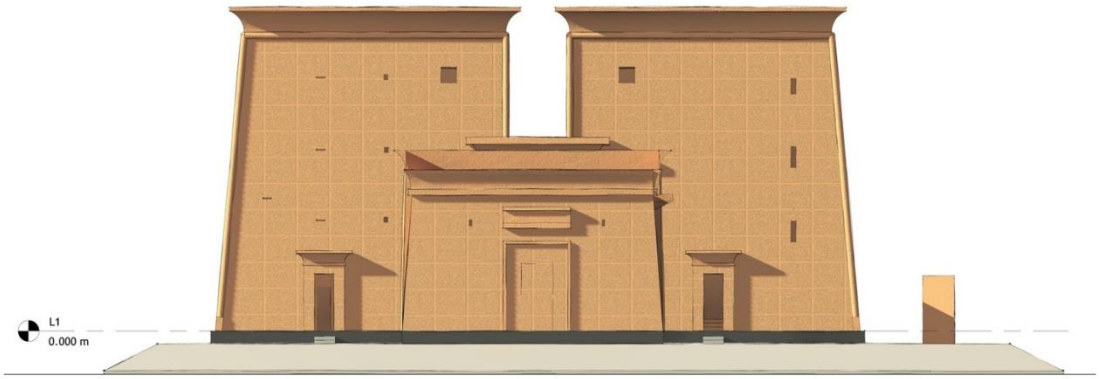
East Elevation



North Elevation

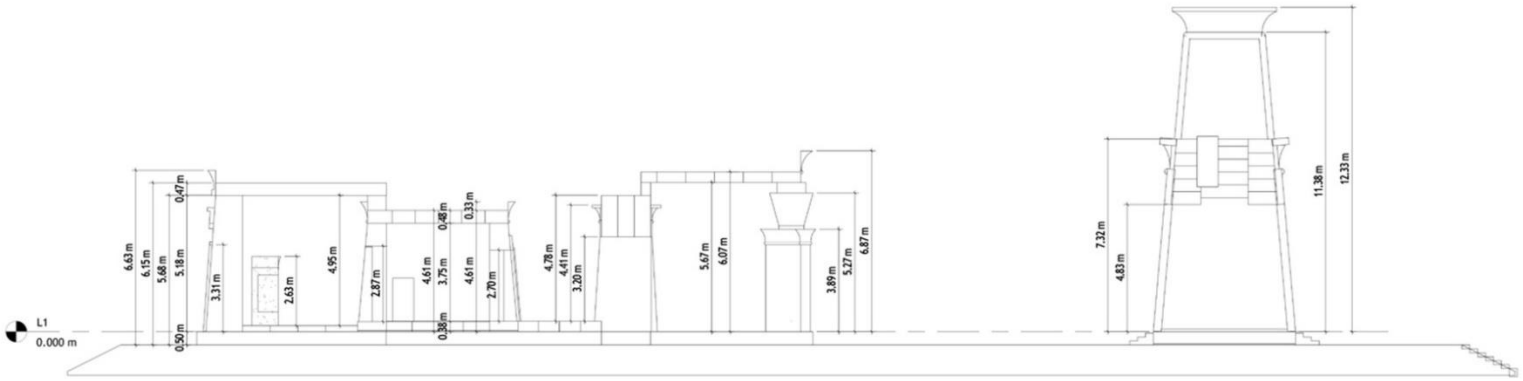


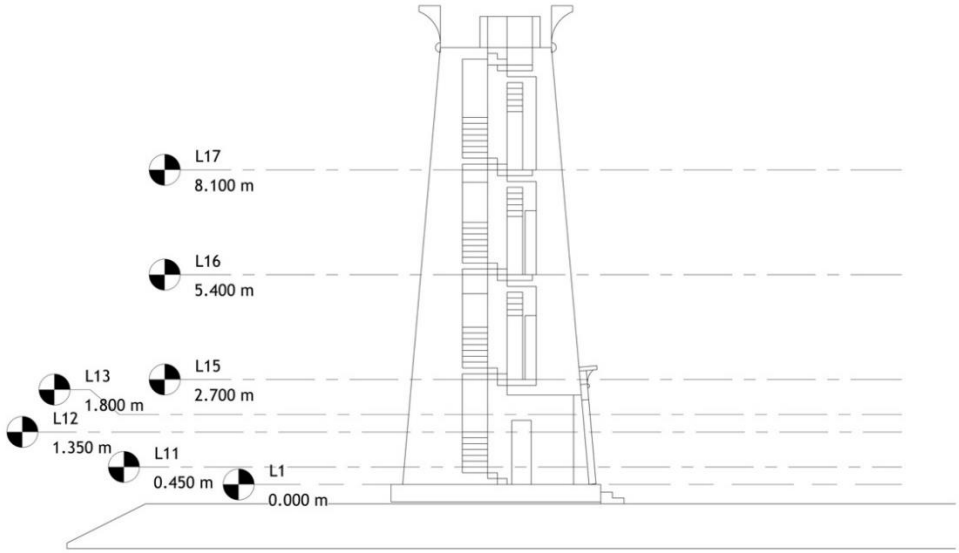
West Elevation

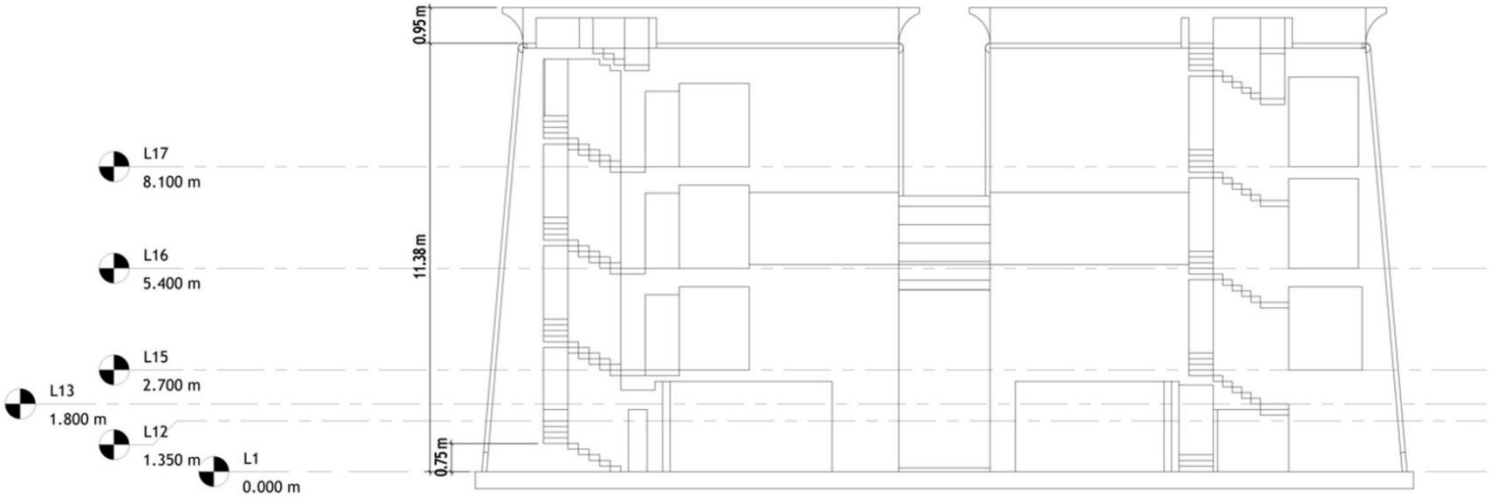


South Elevation

5.3.2 Architectural Sections







5.4 Cartographic and Landscape Outputs: Dual-Terrain Integrations and Hydrological Simulations

5.4.1 Phase 1:

Current Situation of the Dakka Temple (Modern Baseline Assembly)

Integrates the USGS-derived[2] modern topography developed in QGIS with the 3D model of Dakka temple reconstructed in the Autodesk Revit to determine the baseline context of the relocation site at Wadi es-Sebua.

[2] https://earthexplorer.usgs.gov/ [1]

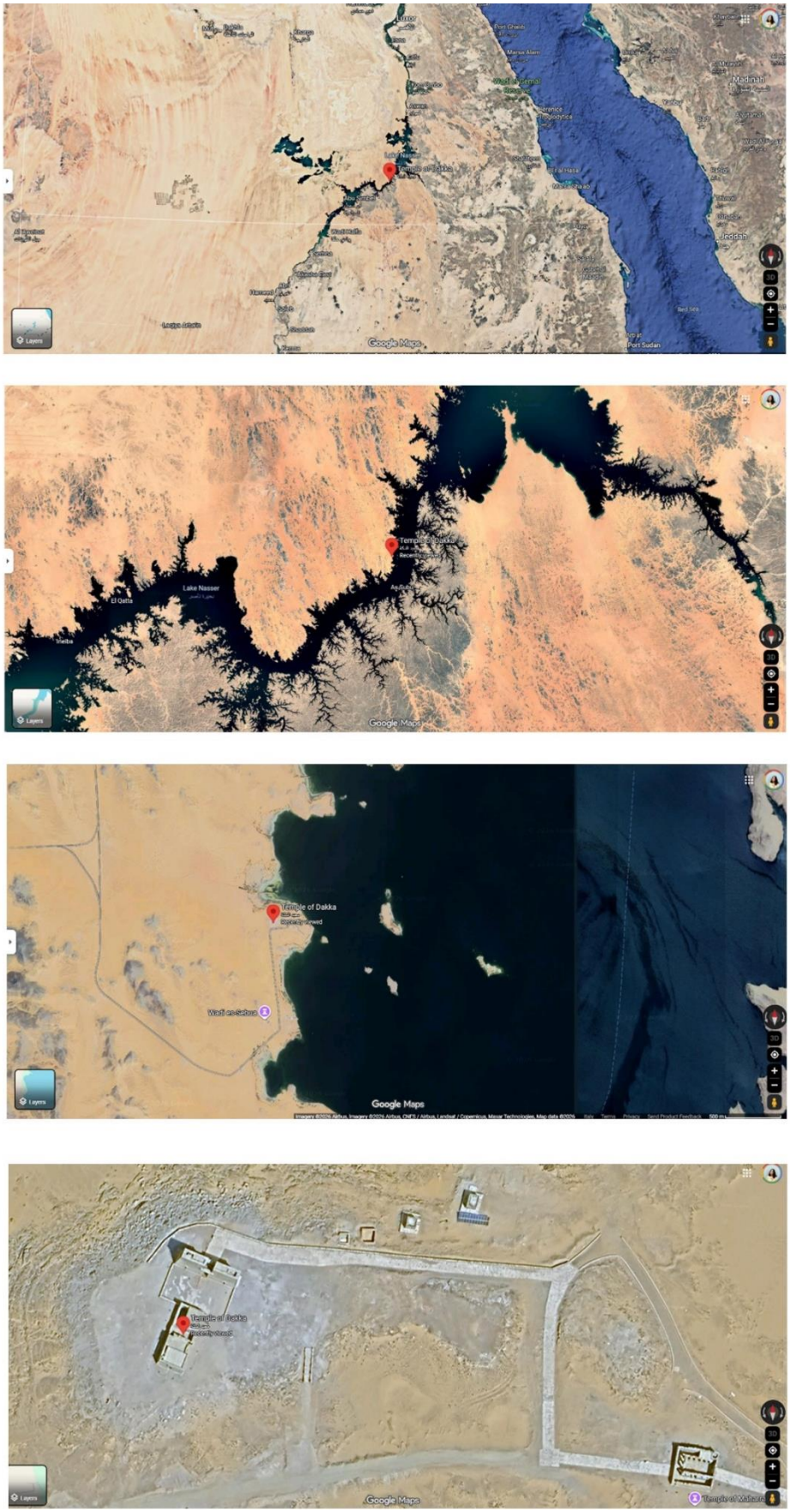


Figure 42. Current Location of Dakka temple in Aswan, Egypt. *Googlemaps.com*

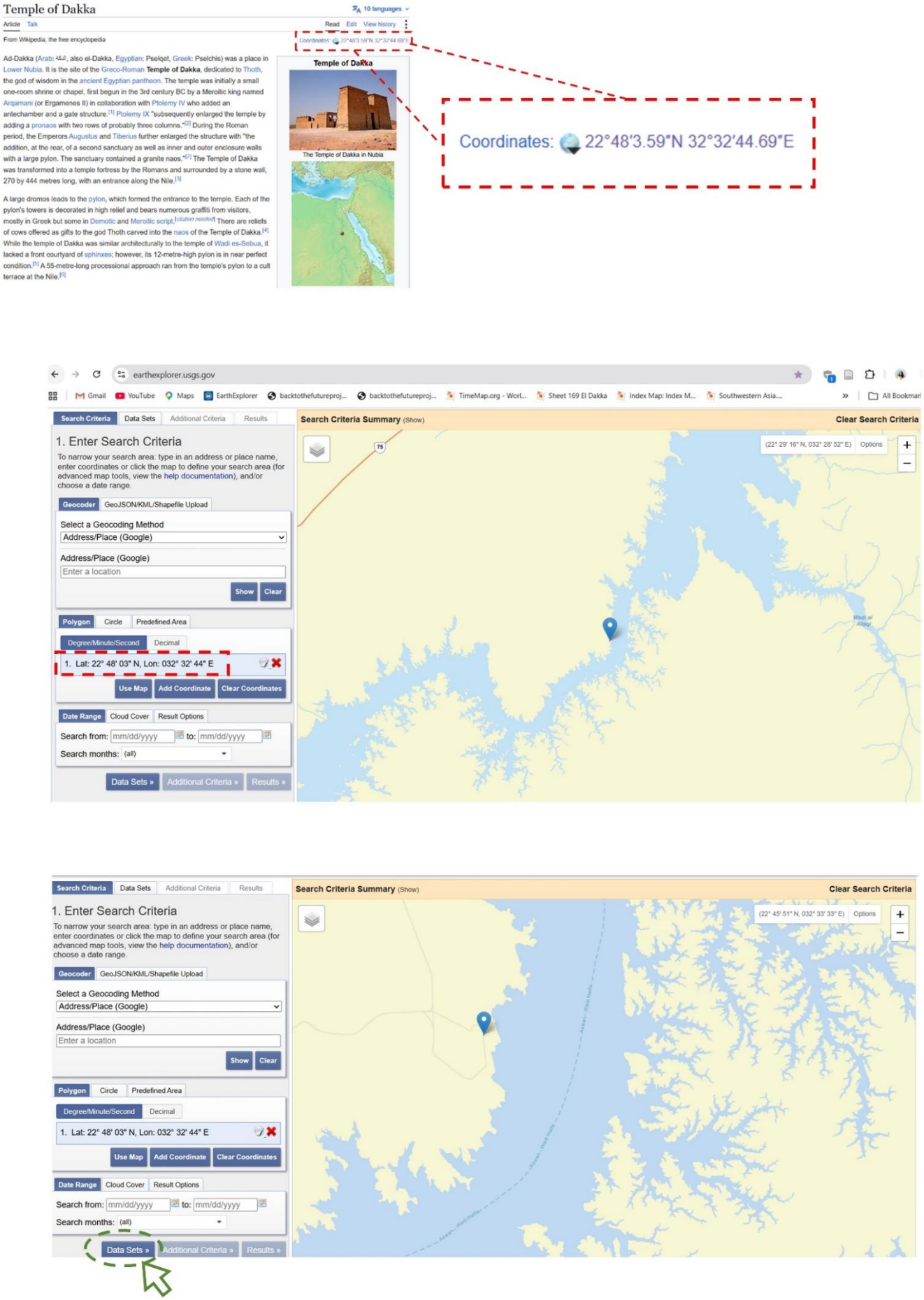


Figure 43. The Coordinates of Dakka temple in https://earthexplorer.usgs.gov

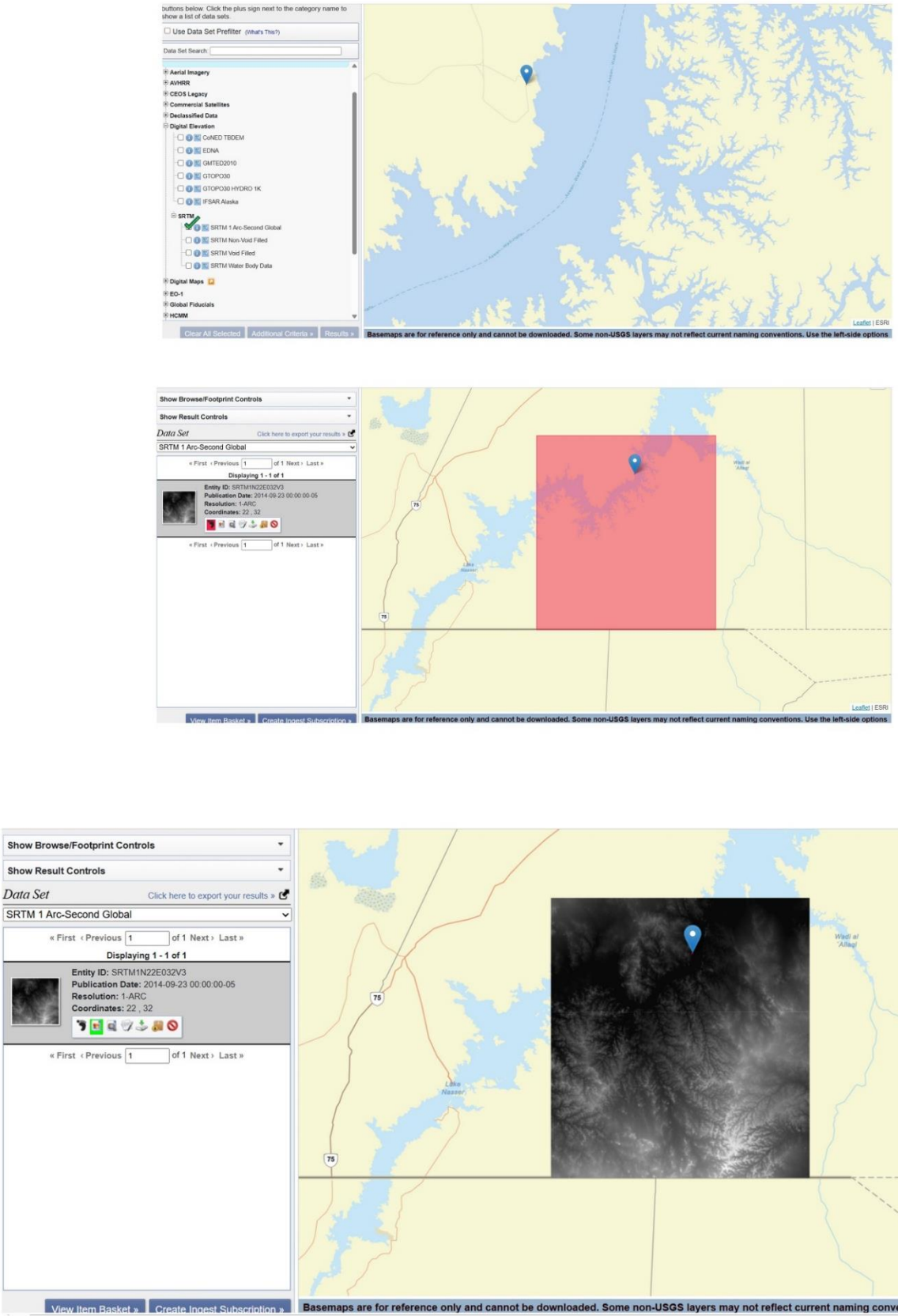


Figure 44. The DEM of the area around Dakka temple

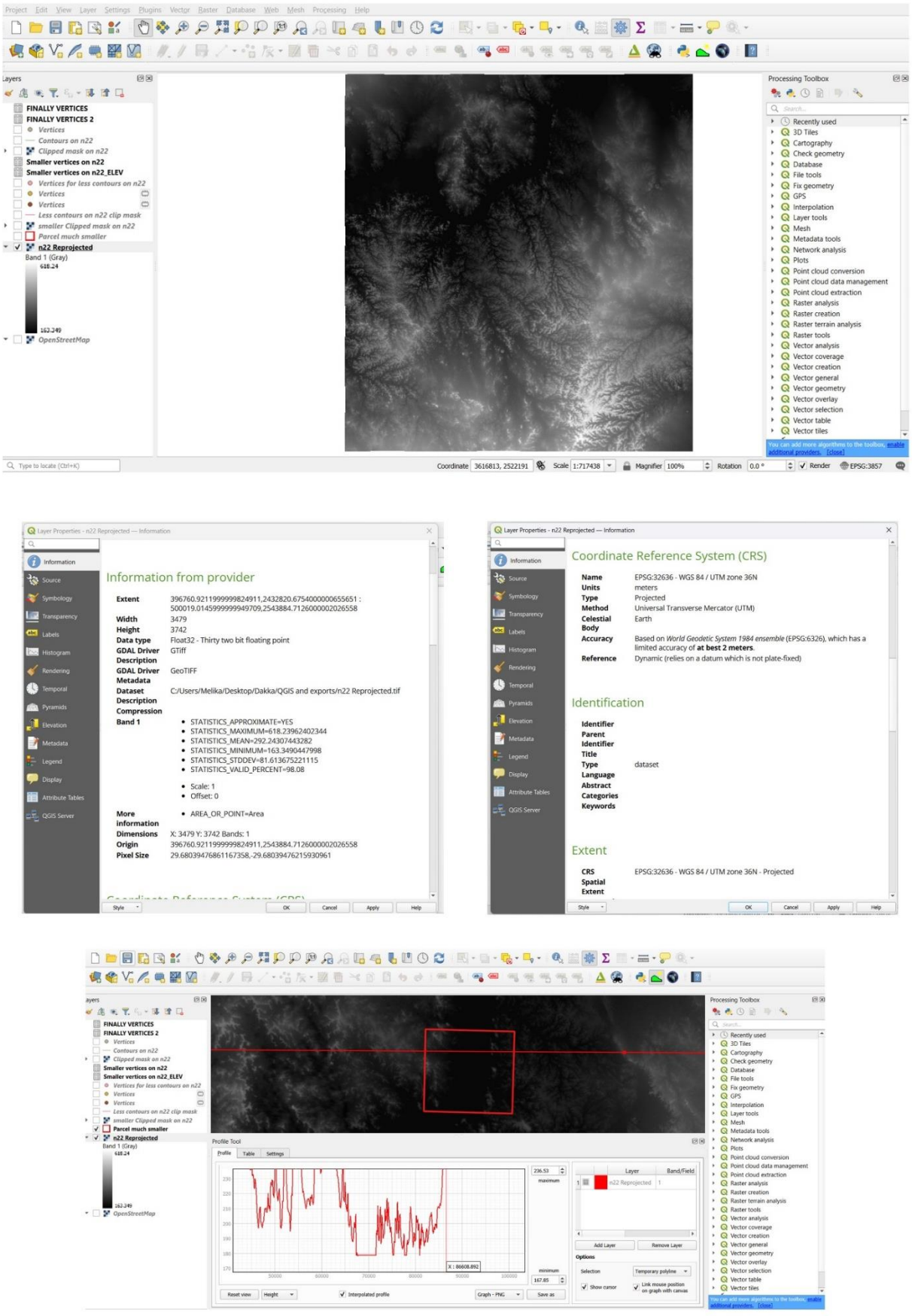
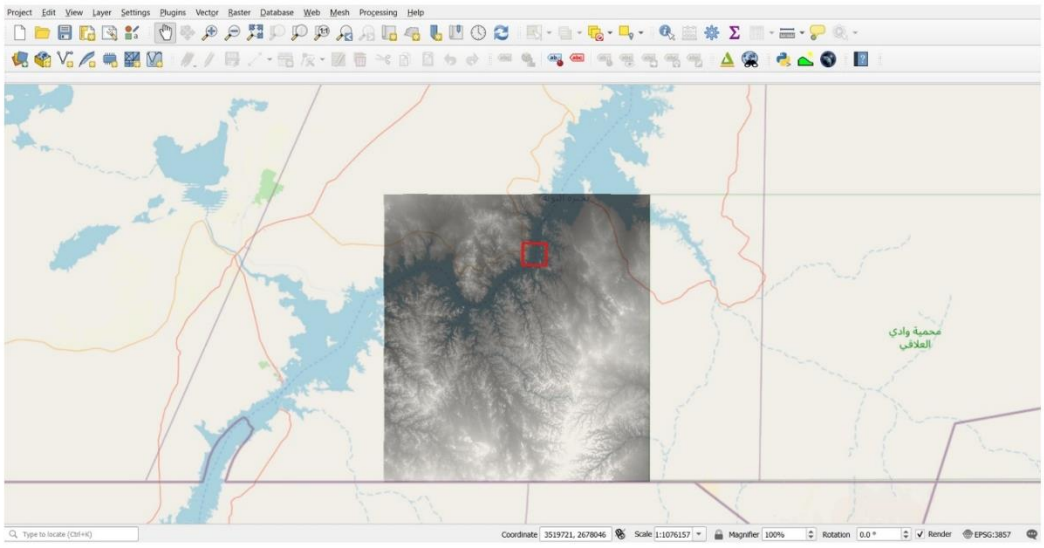
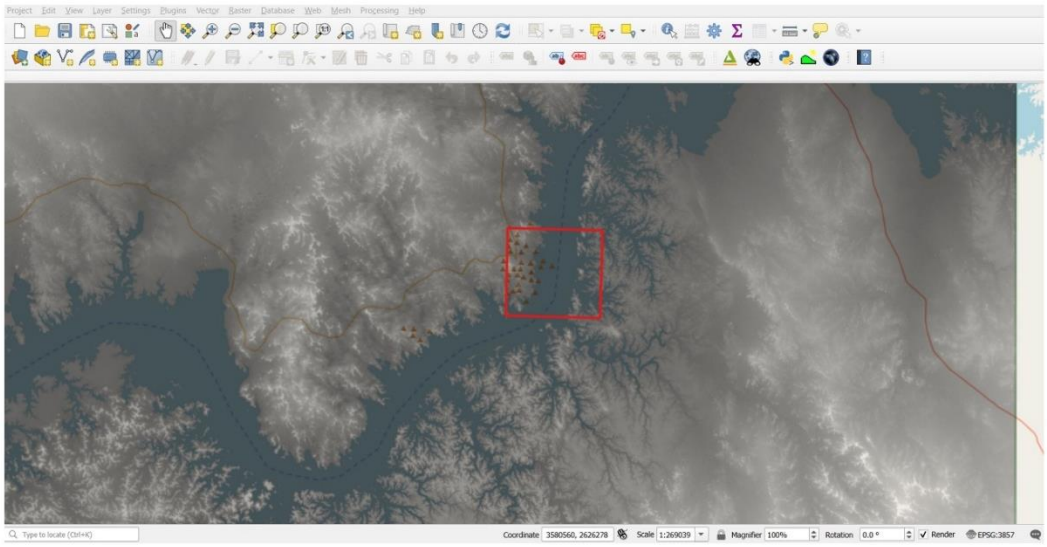


Figure 45. Importing the DEM from USGS into QGIS and controlling the Z elevations





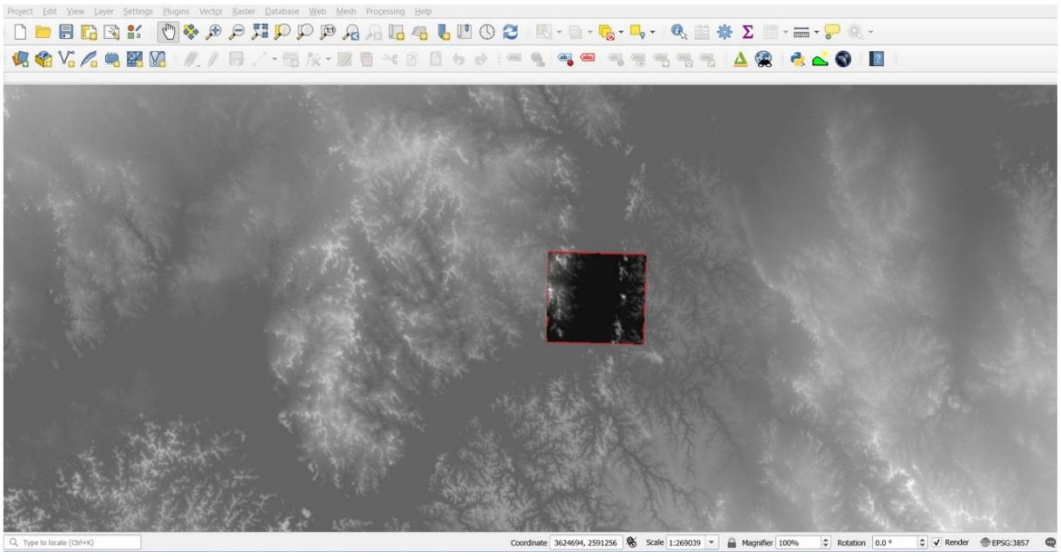
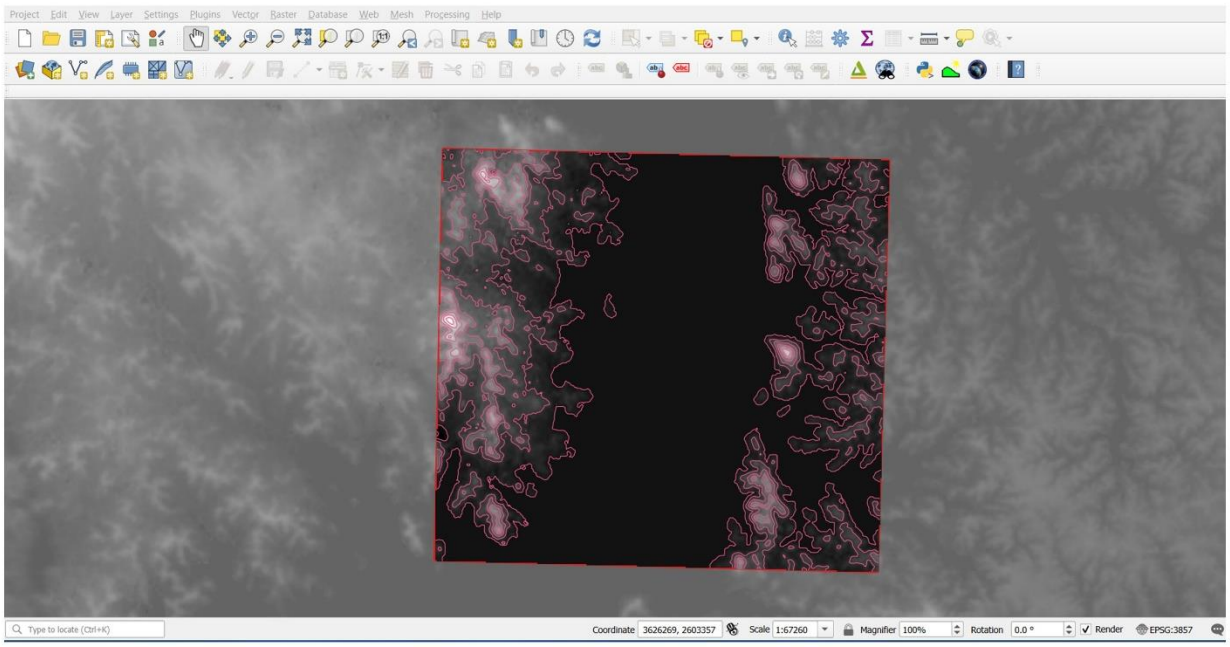


Figure 46. Selecting a small portion of terrain close to Dakka temple

a)



b)

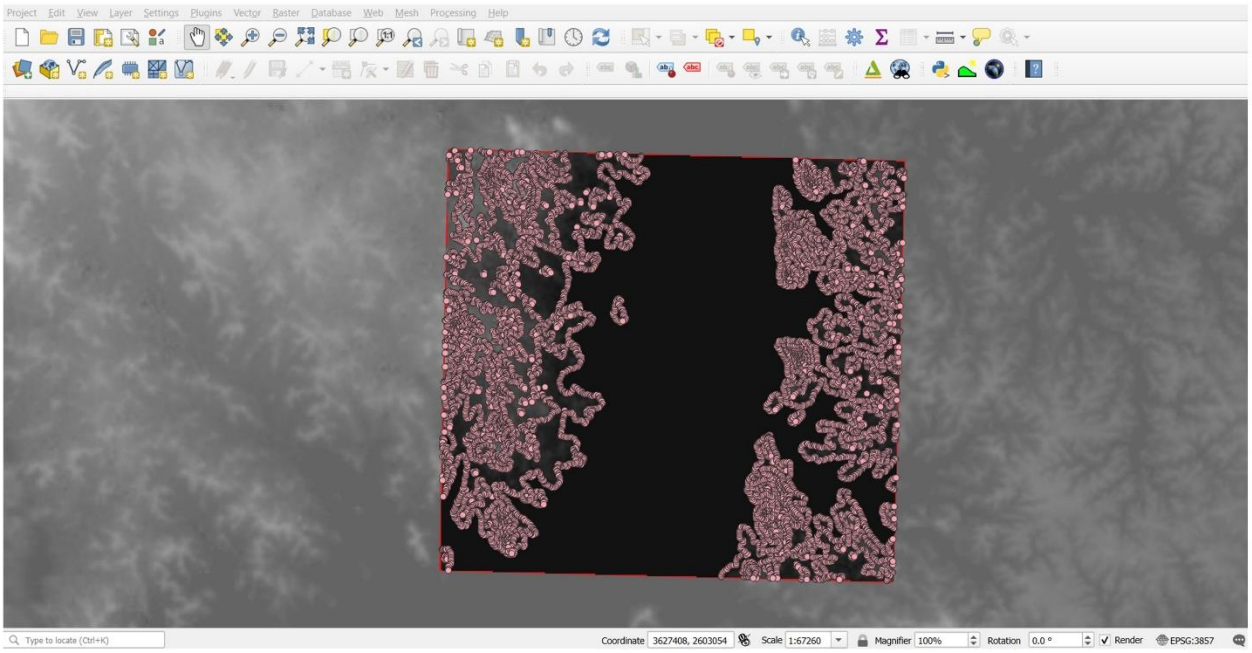


Figure 47. a) Contours and b) Vertices in QGIS on the selected area for preparing the terrain to import in Revit

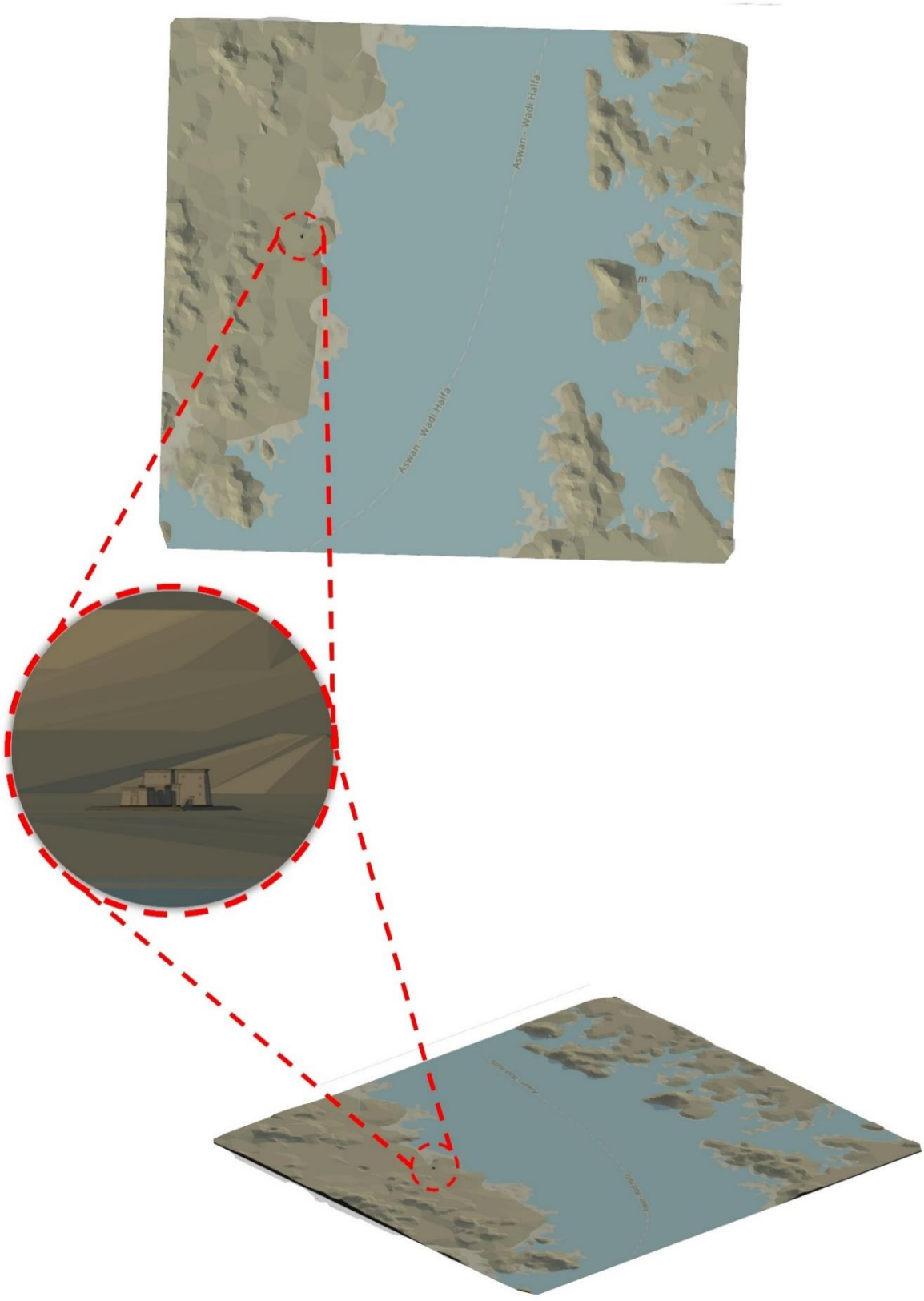
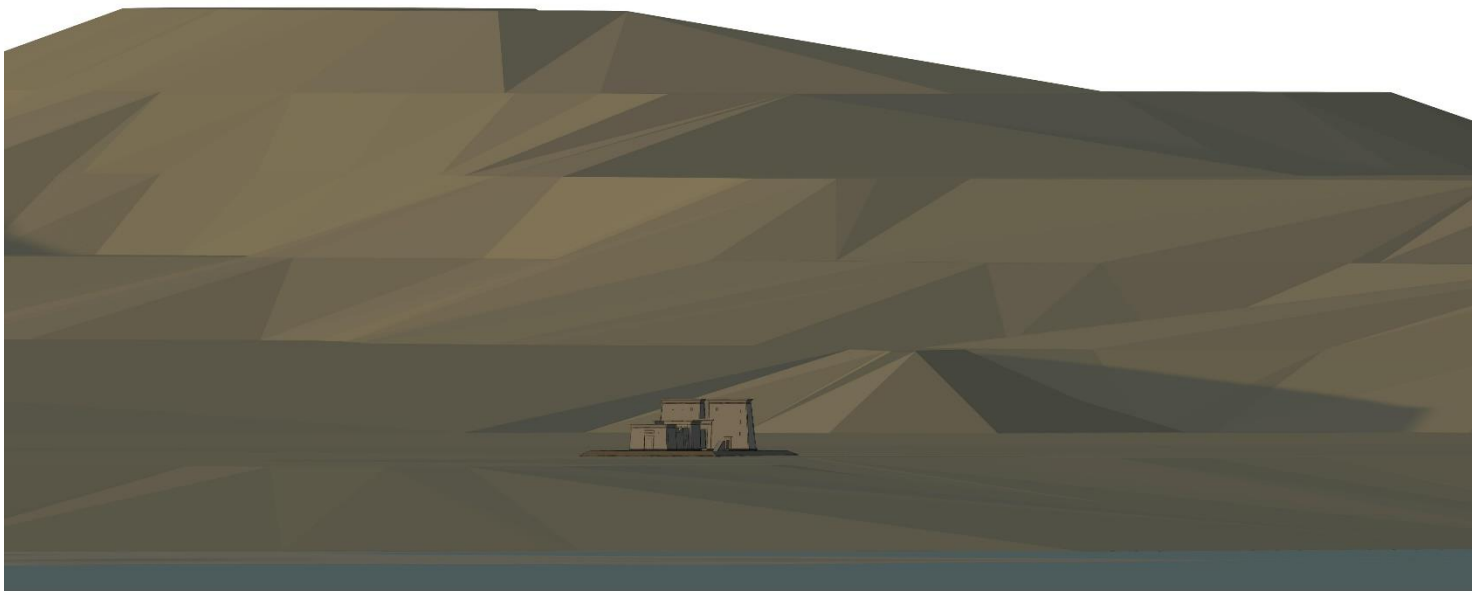
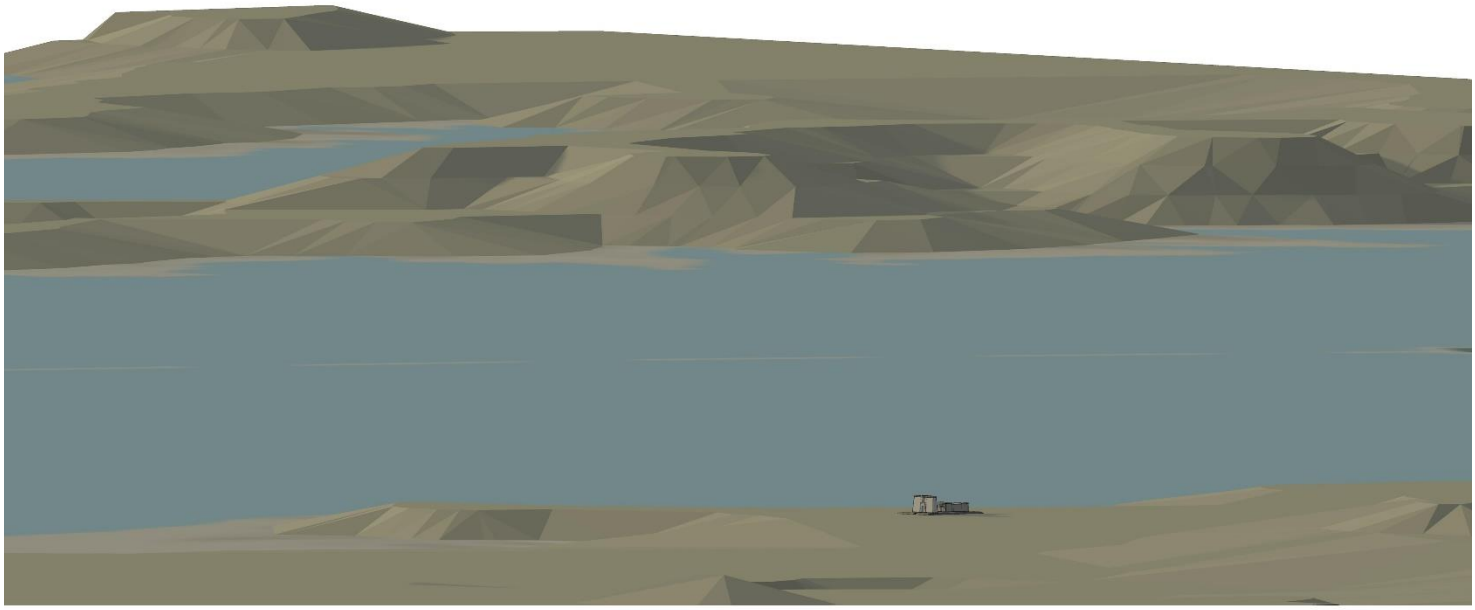


Figure 48. The terrain of QGIS in Revit as the topography base around Dakka temple and positioning the temple On it







5.4.2 Phase 2:

Historical Situation in the Original Location (Photo-Reconstructed Historical DEM)

- Demonstrates the photo-reconstructed historical Digital Elevation Model (DEM)—generated from archival aerial photography and Corona satellite data.
- The integration of the imported 3D model of Dakka temple into QGIS with the historical DEM

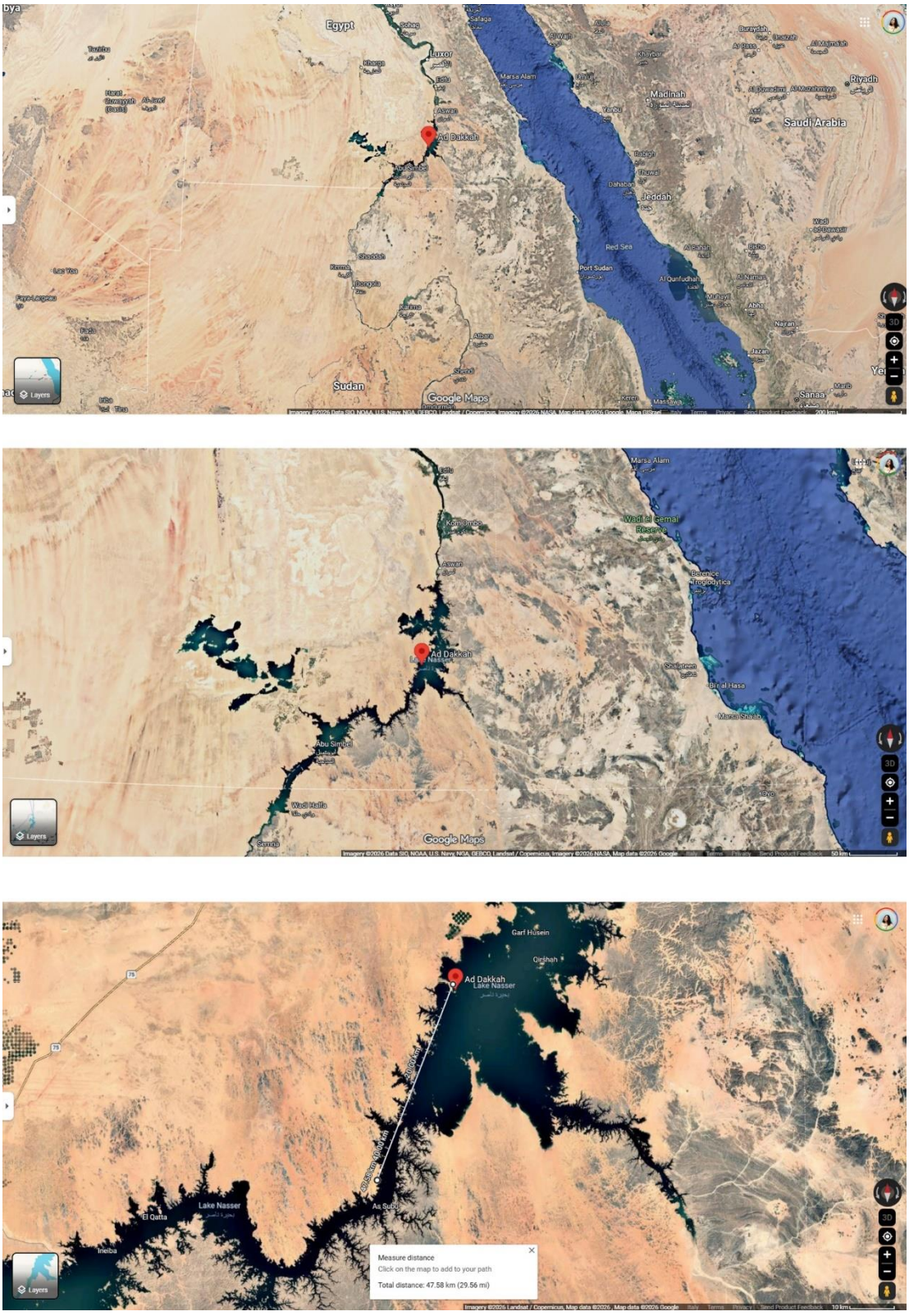


Figure 49. The Original Location of Dakka temple (Ed Dakke) on google maps and the distance from the current one.

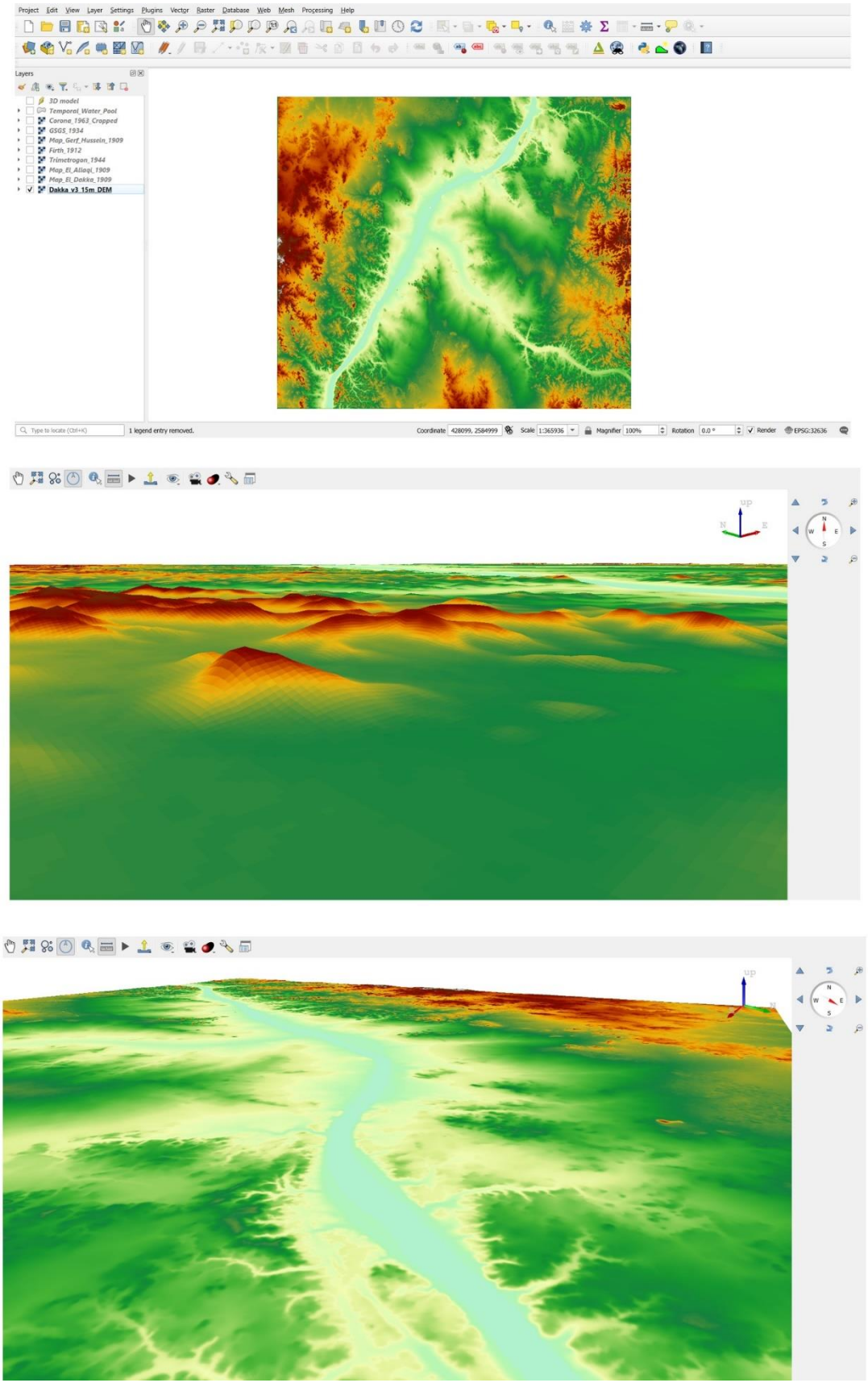


Figure 50. The generated Historical (20th century) DEM in QGIS

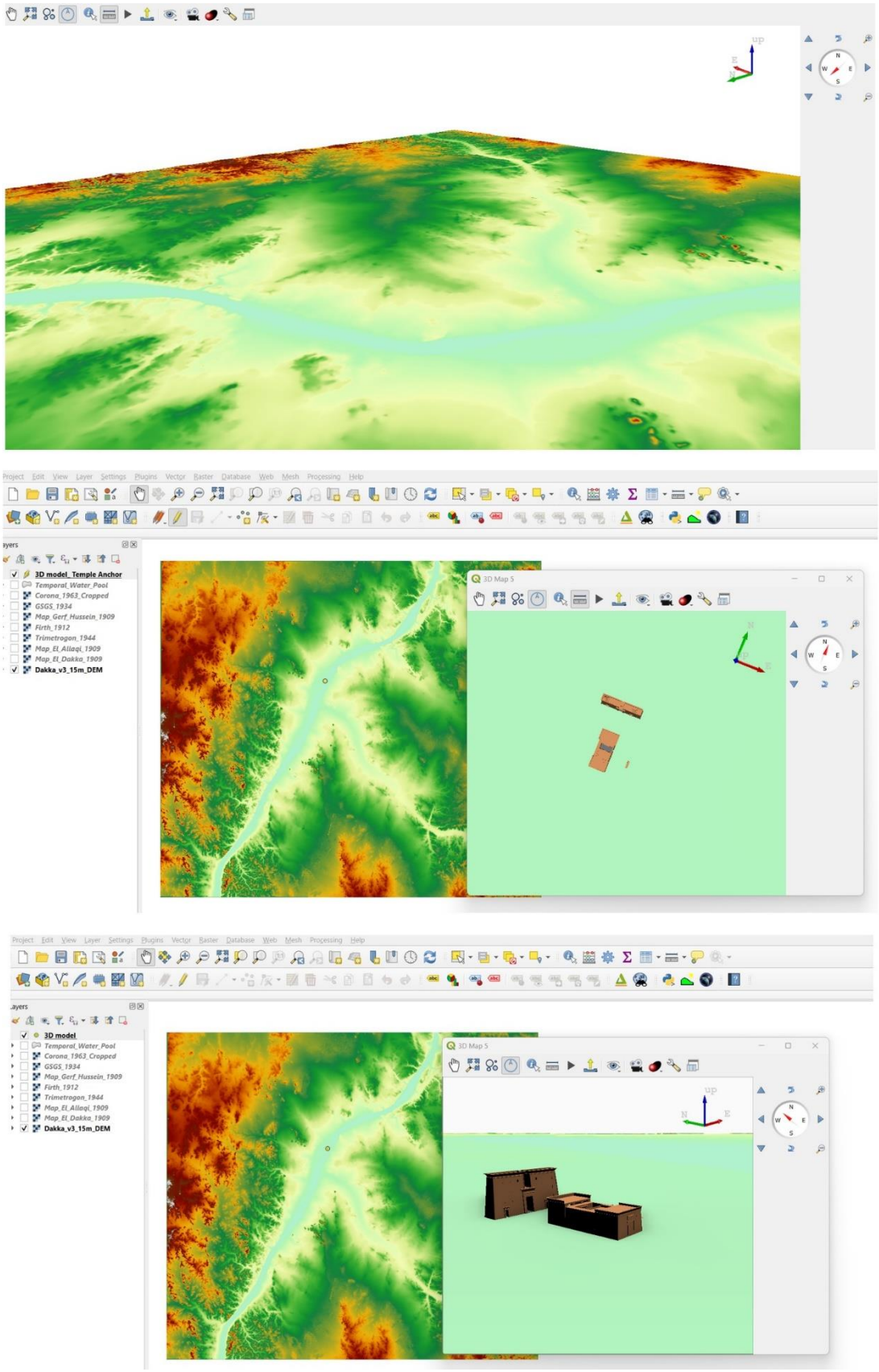


Figure 51. Importing the 3D model of Revit in QGIS and place it on its true position and coordinates over historical DEM

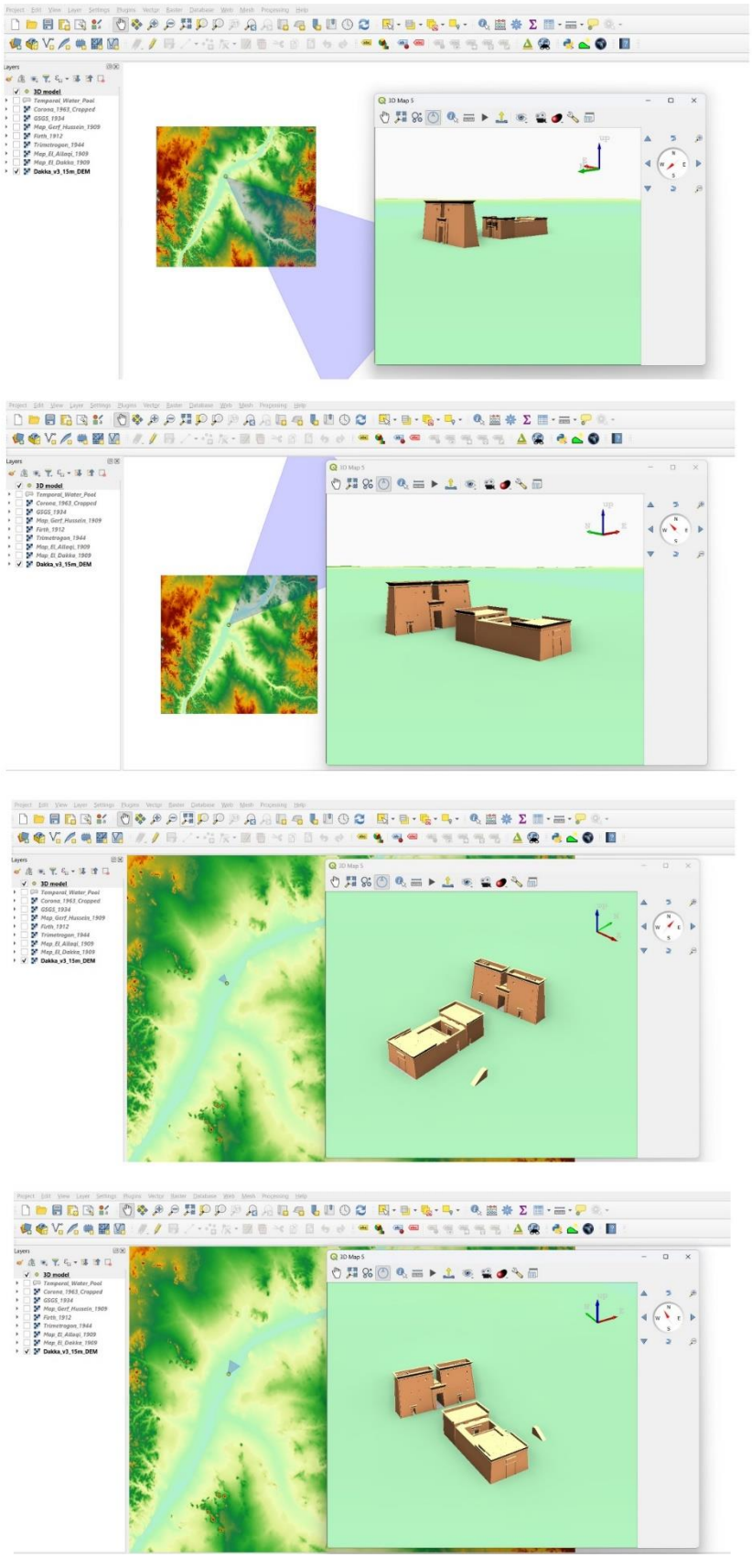
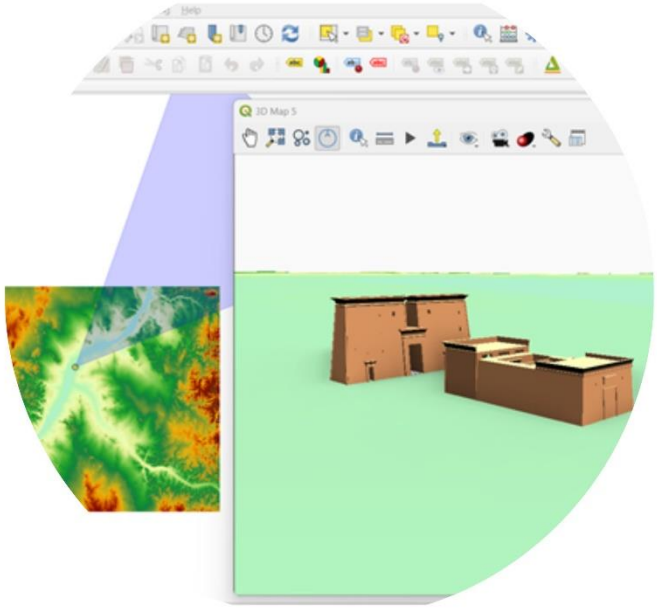


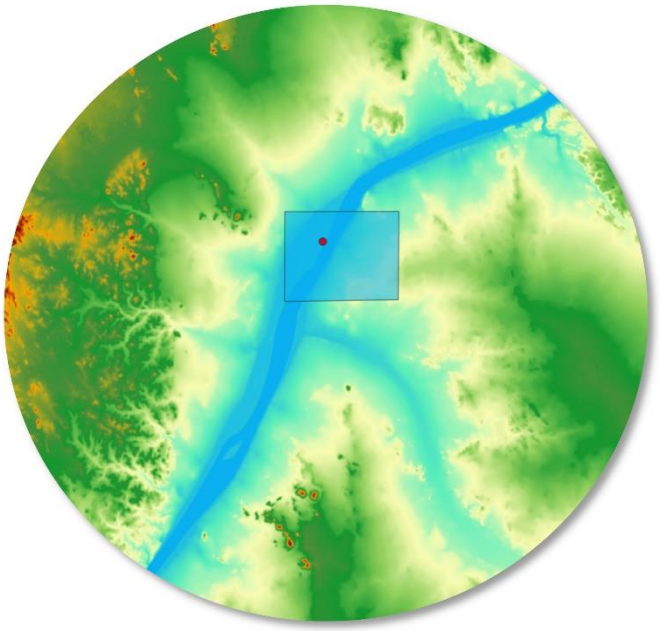
Figure 52. Different views of Dakka temple on its original location

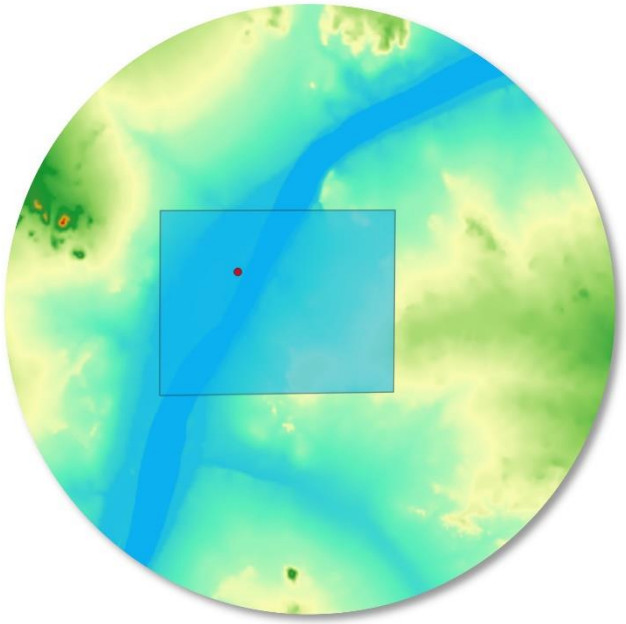
5.4.3 Phase 3: Hydrological and Gauge Records (Temporal Water-Level Matrix, 1902–1963)

Shows the gradual hydrological change of the region using temporal QGIS water-level planes, particularly near Dakka temple, and simulates the annual reservoir rise from the Low Aswan Dam baseline (1902) to the final filling of Lake Nasser (1963).[2] [2]

[2] For Hydrologic & Gauge Records (The Water Heights) see *The Nile Basin, Volume 3 (Supplements 2–13)*, for Architectural Survey & documentation (The Slicing Constraints) see *Günther Roeder — Der Tempel von Dakke, Tome Premier (Texte) (1930); Pages 10–12 (§§ 9–17) and Vorwort, Pages V–VIII & Pages 7–9 (§§ 6–8),* and for Cartographic & Field Survey Baselines seasonal submersion, and subsequent structural stabilization see *C. M. Firth The Archæological Survey of Nubia: Report for 1909–1910, Part I (1915); Pages 3–5 (Section I & Section III) and Page 4 (Section III: "The Archaeological Condition of the Site") & Pages 34–37.*



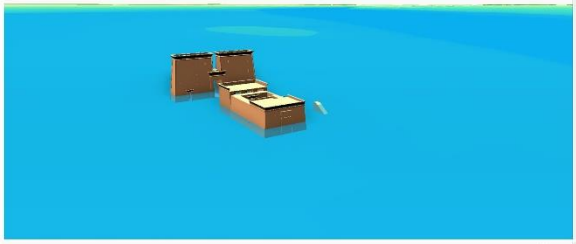




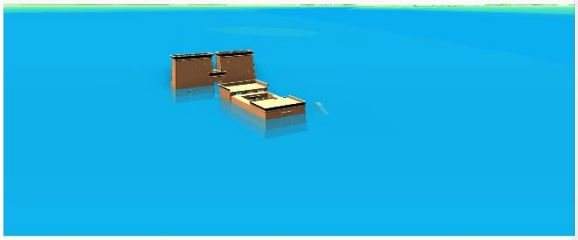
Phase 1- 1902



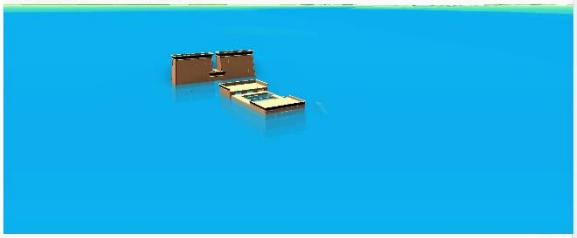
Phase 2- 1908



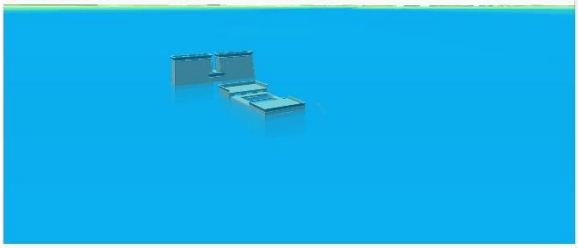
Phase 3- 1912



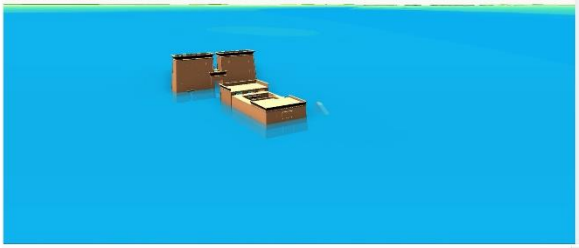
Phase 4- 1934



Phase 5- Winter of 1944



Phase 6- Summer of 1944



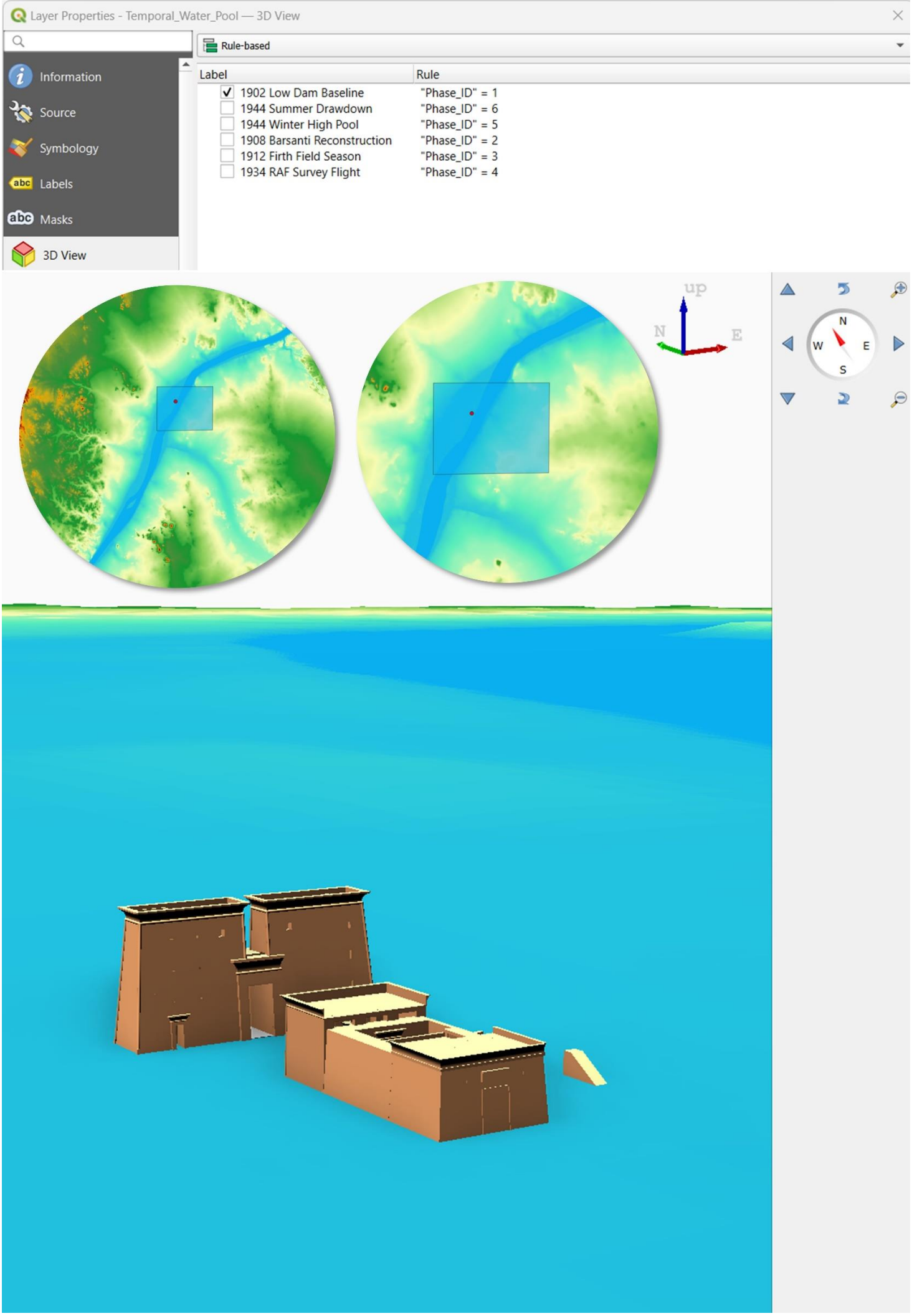
Phase 7- 1963



Temporal Matrix Phase 1: 1902 — The Aswan Low Dam Baseline Inundation[2]

- QGIS Elevation Input: **~108.00 m to 110.00 m a.s.l.**
- The Architectural Visual: At this initial height, the **water line rises 3 to 5 meters above the natural riverbanks.** It will **completely drown the lower foundations of the *Zugangsstrasse* (Access Street) and cross over the temple courtyard floor**. The main structures—the Pylon, Pronaos, and inner rooms—remain dry inside, but **are completely surrounded by water on the map landscape**.

[2] 1902 and 1963 have almost the same water elevations.


Layer Properties - Temporal_Water_Pool — 3D View
Rule-based
Information
Source
Symbology
Labels
Masks
3D View
Label
Rule
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"Phase_ID" = 1
1944 Summer Drawdown
"Phase_ID" = 6
1944 Winter High Pool
"Phase_ID" = 5
1908 Barsanti Reconstruction
"Phase_ID" = 2
1912 Firth Field Season
"Phase_ID" = 3
1934 RAF Survey Flight
"Phase_ID" = 4
up
N
E
N
W
E
S

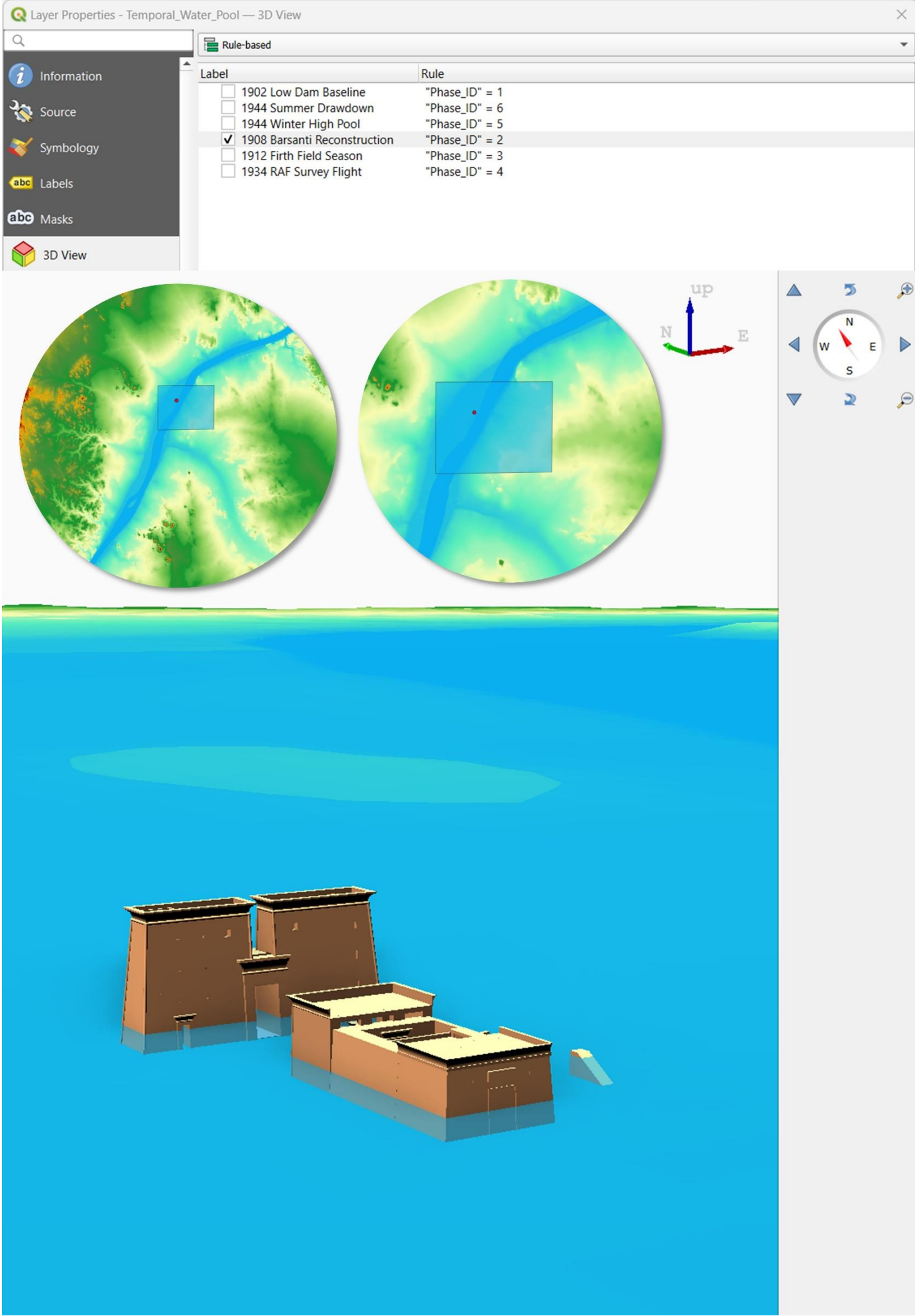
Phase 2: 1908–1909 — The Barsanti Restoration

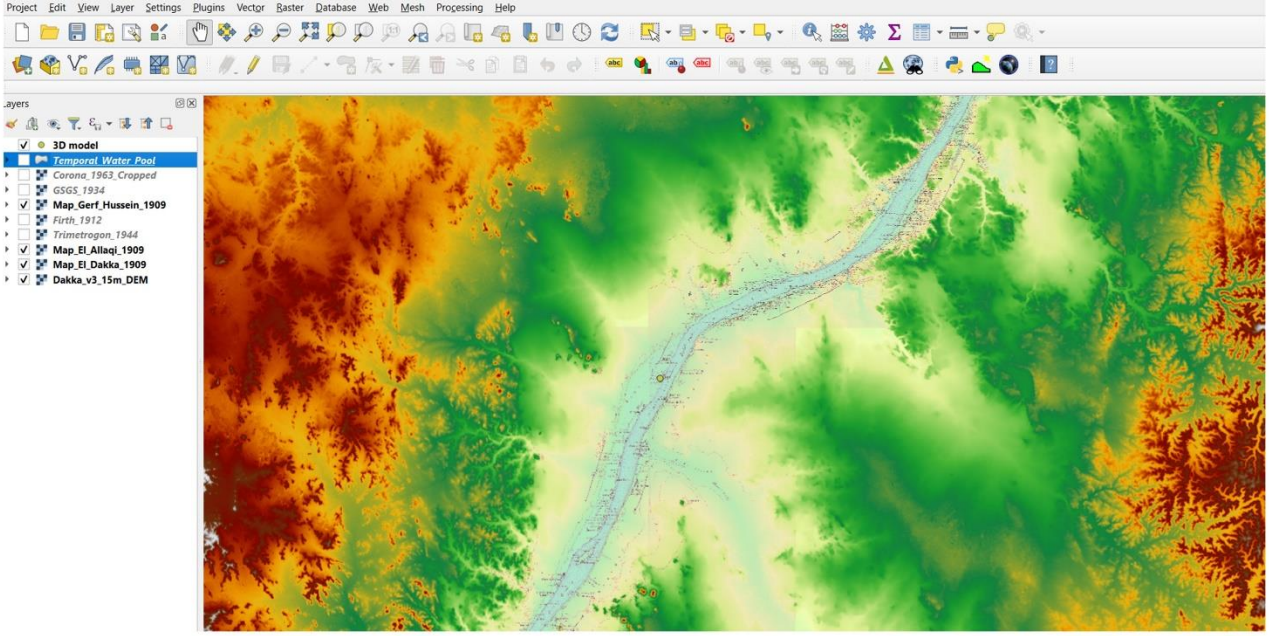
- QGIS Elevation Input: **~113.00 m to 114.00 m a.s.l.**
- The Architectural Visual: Following the first heightening of the dam, the winter storage level deepens significantly:

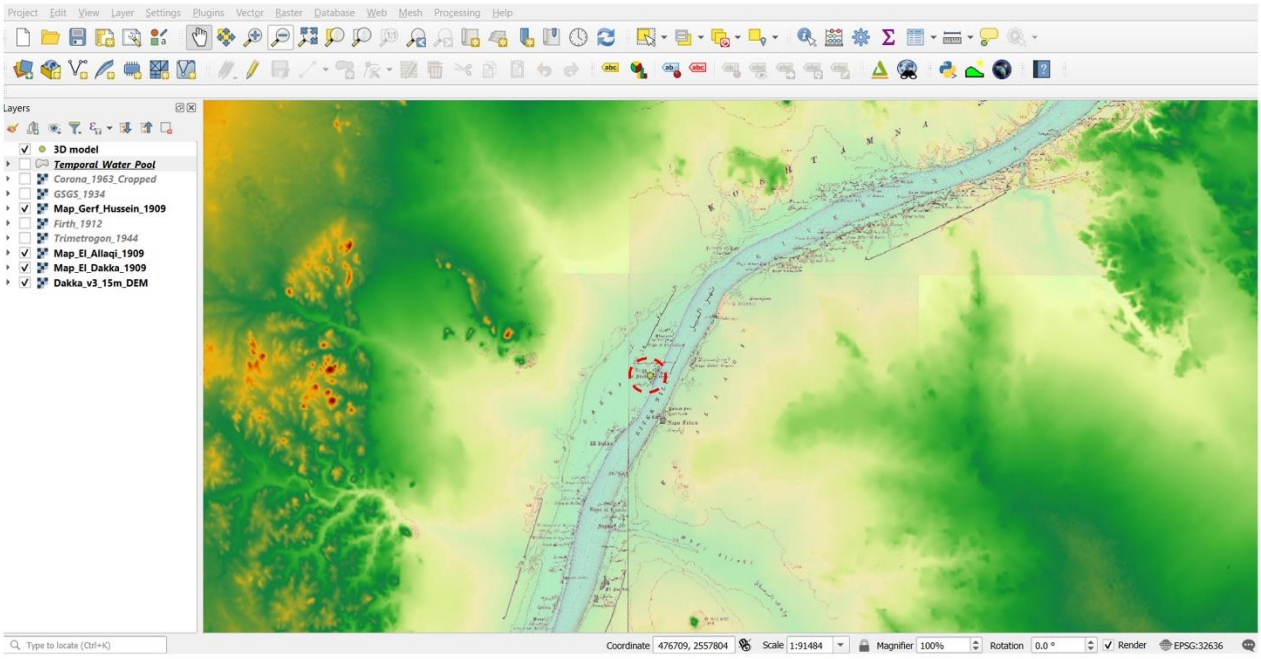
1. At ~113.50 m a.s.l., the water reaches exactly **8.5 meters above the ancient threshold base.**

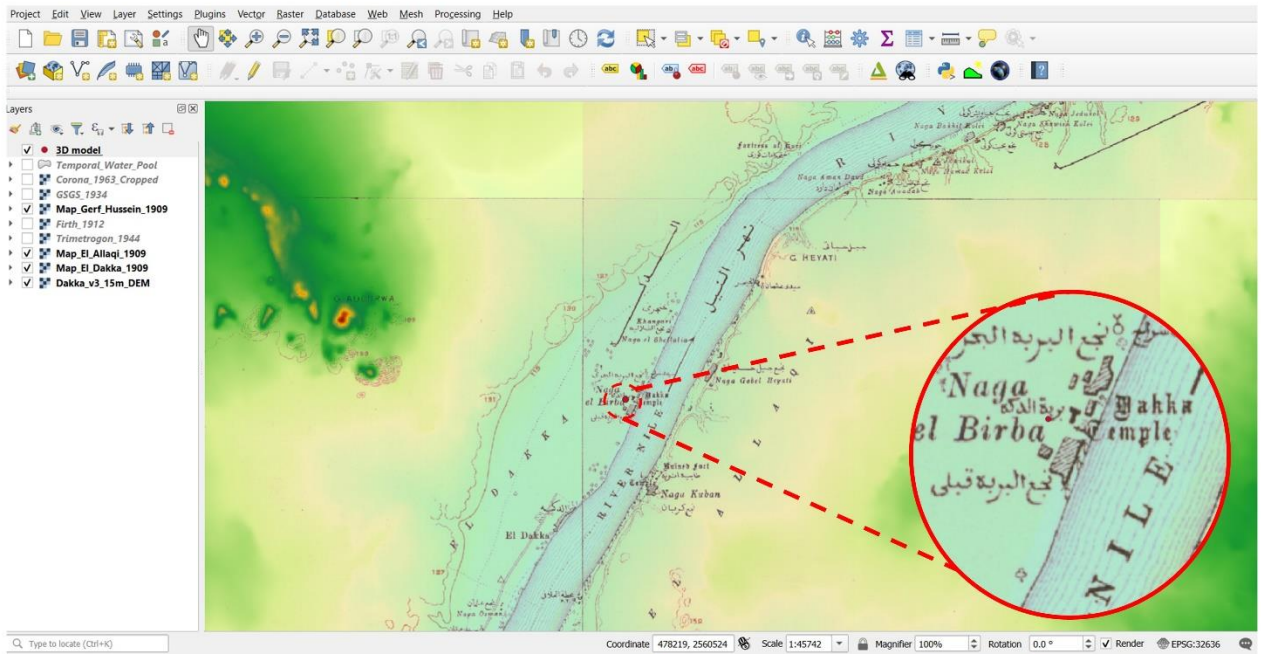
This height will completely **submerge the Pronaos (Hypostyle Hall) ceiling slabs,** which top out vertically at 6.43m above the courtyard level.

2. The water will climb up the face of the Great Pylon, **partially drowning the central portal opening** (which stands 7.32m high). Only the upper third of the Pylon towers will remain visible above the blue water polygon.


Layer Properties - Temporal_Water_Pool — 3D View
Rule-based
Information
Source
Symbology
Labels
Masks
3D View
Label
Rule
1902 Low Dam Baseline
"Phase_ID" = 1
1944 Summer Drawdown
"Phase_ID" = 6
1944 Winter High Pool
"Phase_ID" = 5
1908 Barsanti Reconstruction
"Phase_ID" = 2
1912 Firth Field Season
"Phase_ID" = 3
1934 RAF Survey Flight
"Phase_ID" = 4
up
N
E
N
W
E
S

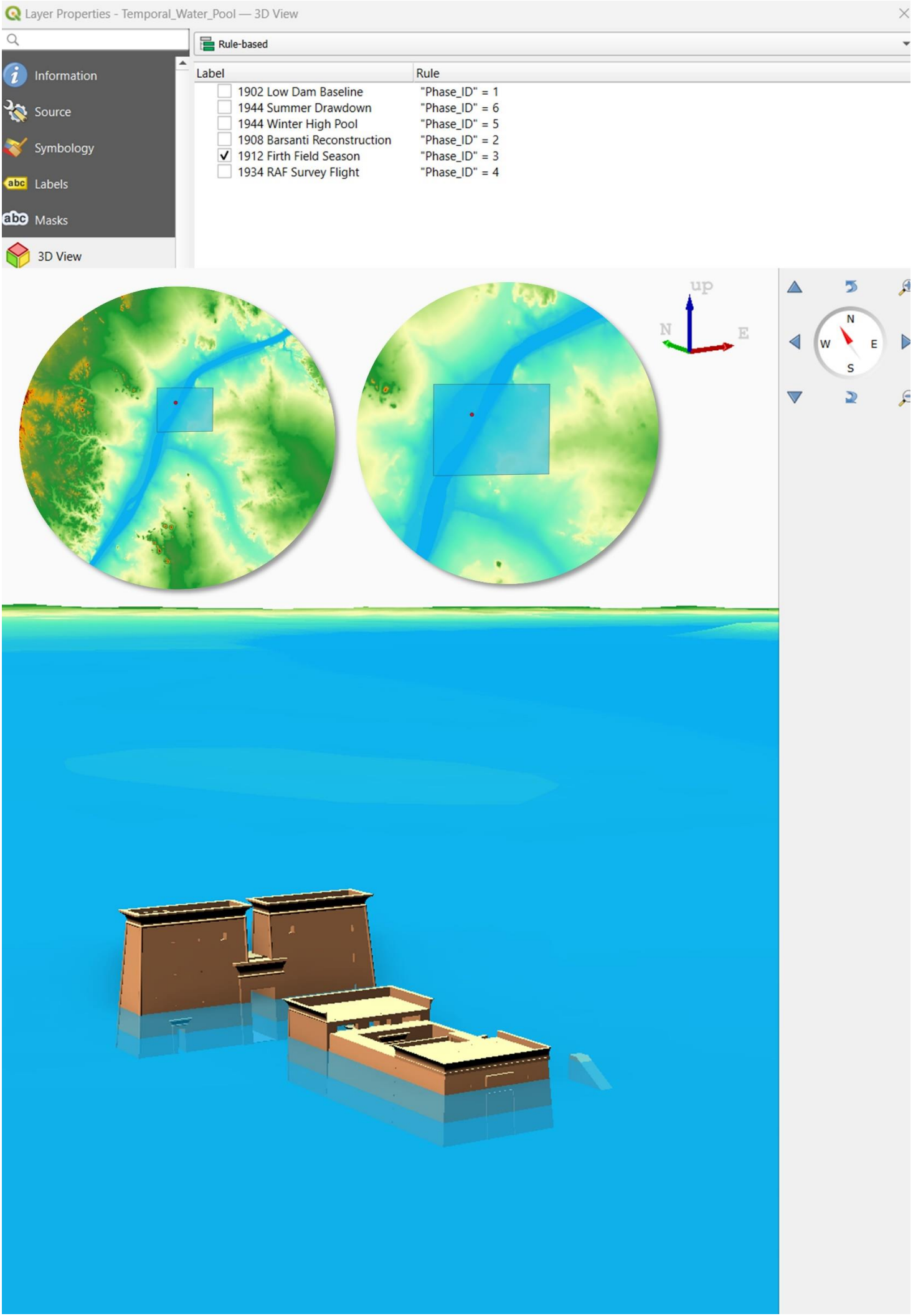

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal_Water_Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM

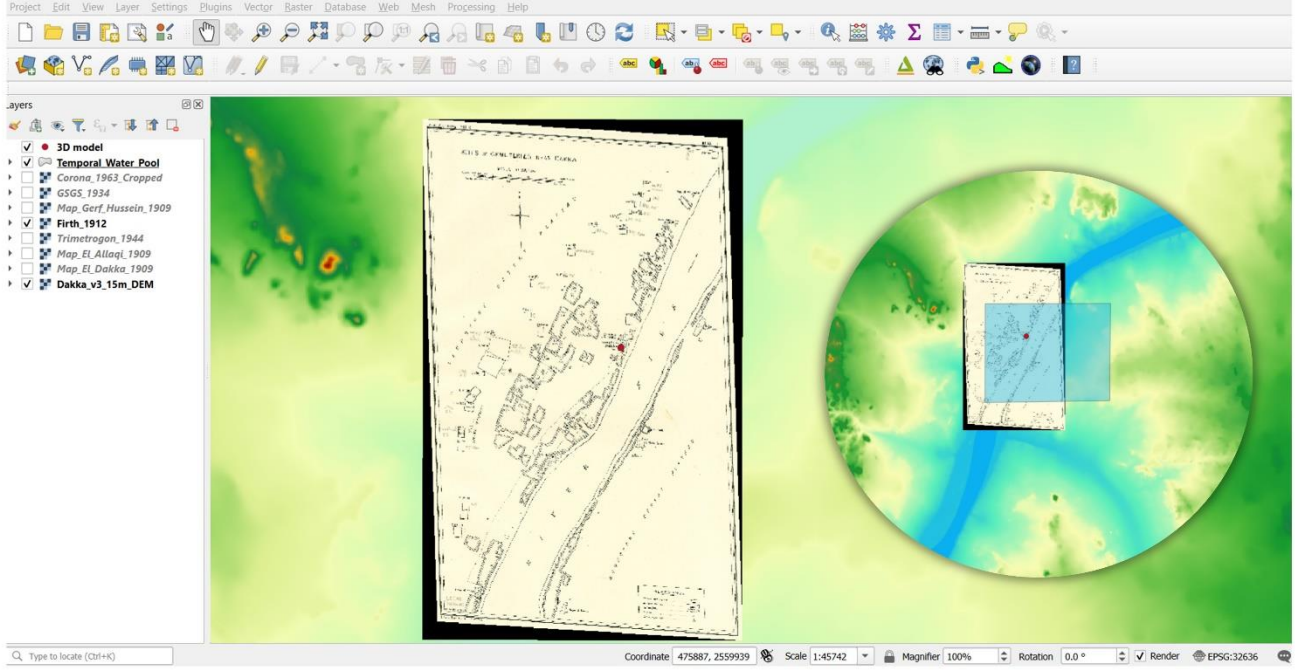

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal_Water_Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
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Rotation 0.0 °
Render
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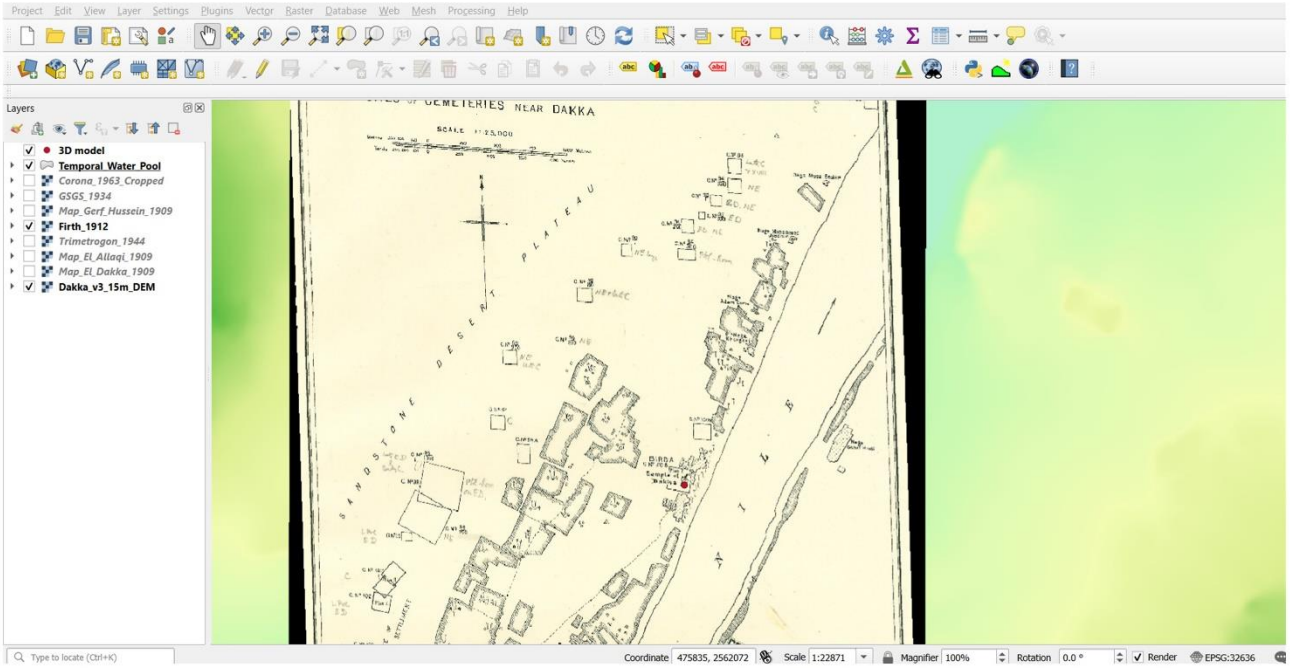

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal_Water_Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
G. HEYATI
Naga Kuban
El Dakka
Naga
el Birba
Dakka
Temple
NILE
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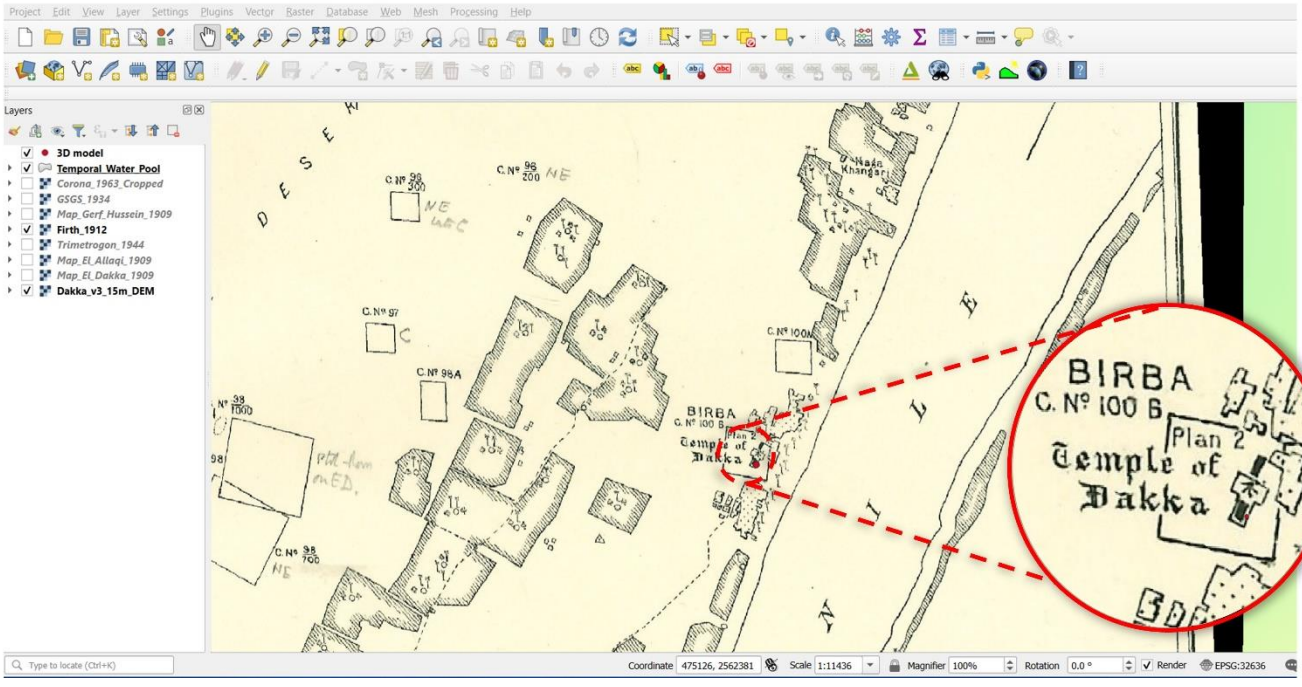
Phase 3: 1912 Firth Survey Map Baseline

- QGIS Elevation Input: **~115.00 m to 115.50 a.s.l**
- Peak Winter Pool: At this level, the reservoir completely inundates the domestic Nagas (villages) traced on Firth's map. **The water line climbs up the Pylon face**, submerging the **lintel of the main portal (7.32m high).** The **lower temple house is flooded near its roofline.**


Layer Properties - Temporal_Water_Pool — 3D View
Rule-based
Information
Source
Symbology
Labels
Masks
3D View
Label
Rule
1902 Low Dam Baseline
"Phase_ID" = 1
1944 Summer Drawdown
"Phase_ID" = 6
1944 Winter High Pool
"Phase_ID" = 5
1908 Barsanti Reconstruction
"Phase_ID" = 2
1912 Firth Field Season
"Phase_ID" = 3
1934 RAF Survey Flight
"Phase_ID" = 4
up
N
E
N
W
E
S


Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal Water Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
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Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636


Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal Water Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
CEMETERIES NEAR DAKKA
SCALE 1:22,000
SANDSTONE DESERT PLATEAU
BIRBA
Temple of Dakka
Type to locate (Ctrl+K)
Coordinate 475835, 2562072
Scale 1:22871
Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636


Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal Water Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
DESERT
C. Nº 96/200 NE
C. Nº 96/300 NE
C. Nº 97
C. Nº 98A
C. Nº 98/100 NE
C. Nº 100A
BIRBA
C. Nº 100 B
Plan 2
Temple of Dakka
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Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636

Phase 4: 1934 — The Royal Air Force Flight Parameter

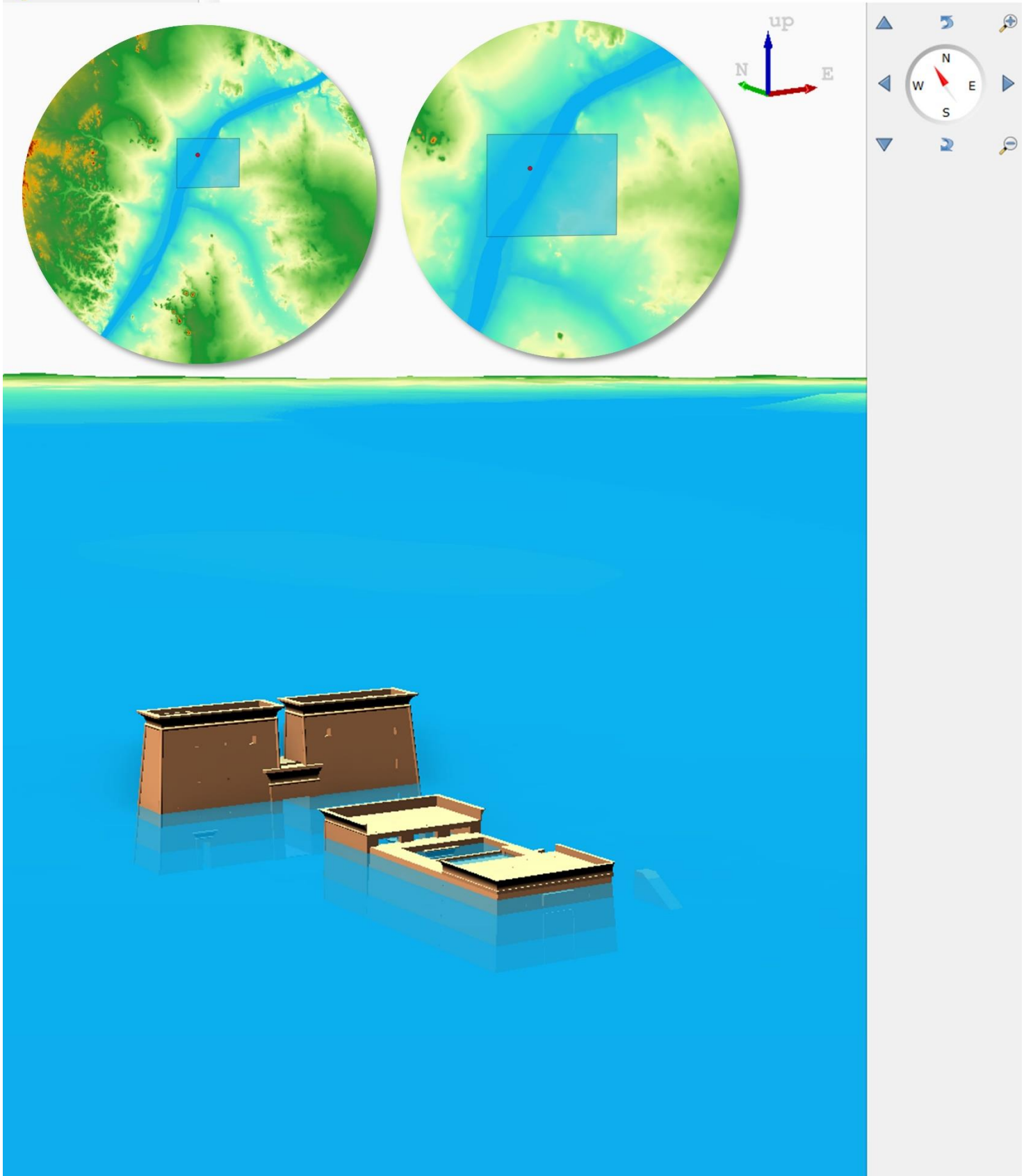
- QGIS Elevation Input: ~**116.50 m a.s.l.**
- The Architectural Visual: This elevation marks the completion of the second heightening of the Low Dam. **A height of ~116.50 m a.s.l. places the water line roughly 11.5meters above the temple base.** The water will now sit directly flush with the **topmost lips of the Pylon's cavetto cornice**, which has a maximum surveyed height of 11.62m. **The entire temple house is completely submerged**; only a tiny island of masonry from the pylon summits will break through the transparent blue polygon layer.

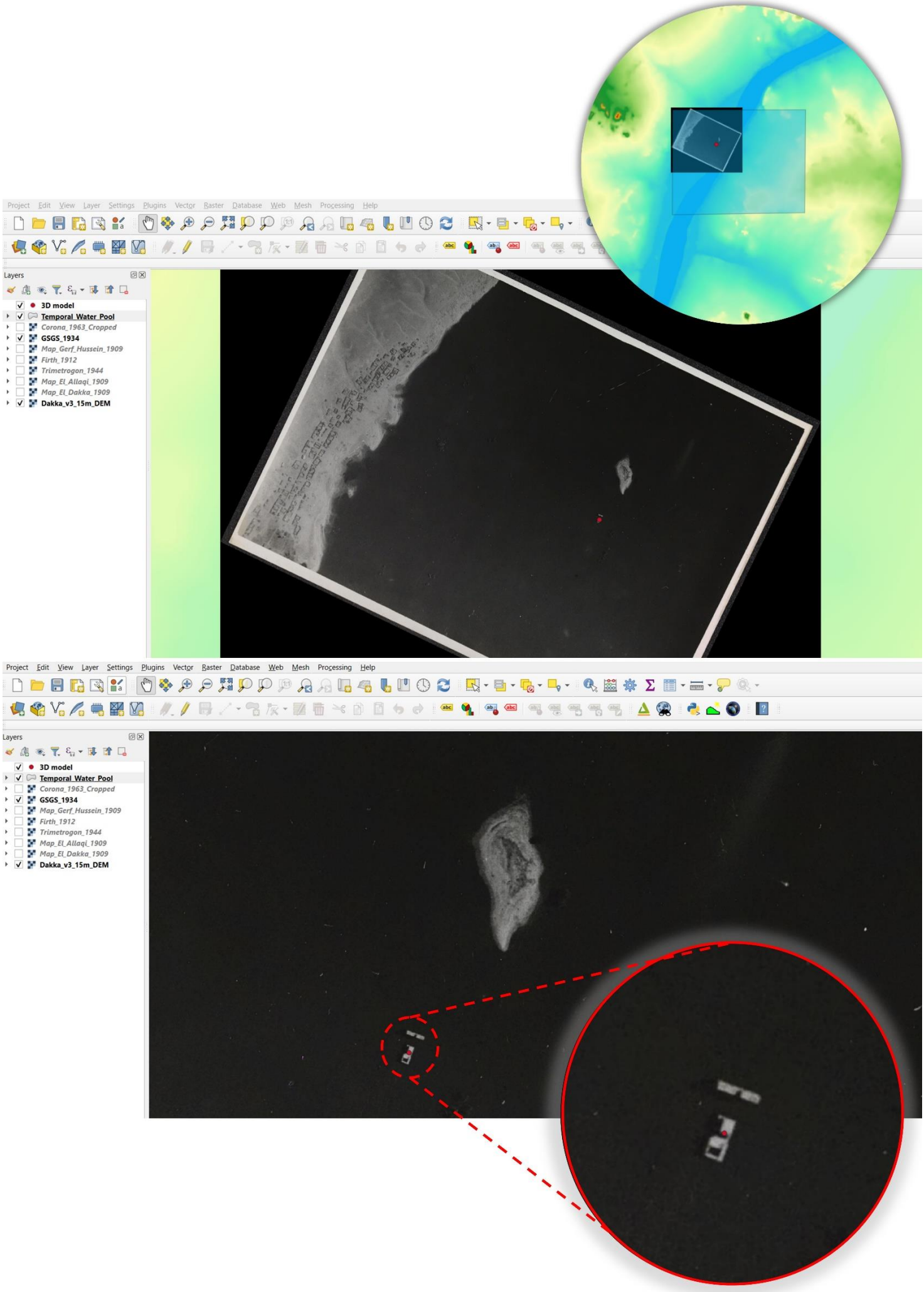
Layer Properties - Temporal_Water_Pool — 3D View

Information
Source
Symbology
Labels
Masks
3D View

Rule-based

Label	Rule
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☐ 1944 Summer Drawdown	"Phase_ID" = 6
☐ 1944 Winter High Pool	"Phase_ID" = 5
☐ 1908 Barsanti Reconstruction	"Phase_ID" = 2
☐ 1912 Firth Field Season	"Phase_ID" = 3
☑ 1934 RAF Survey Flight	"Phase_ID" = 4




Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal_Water_Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM

Phase 5: 1944 Winter High Pool — Peak Low Dam Storage Cycle

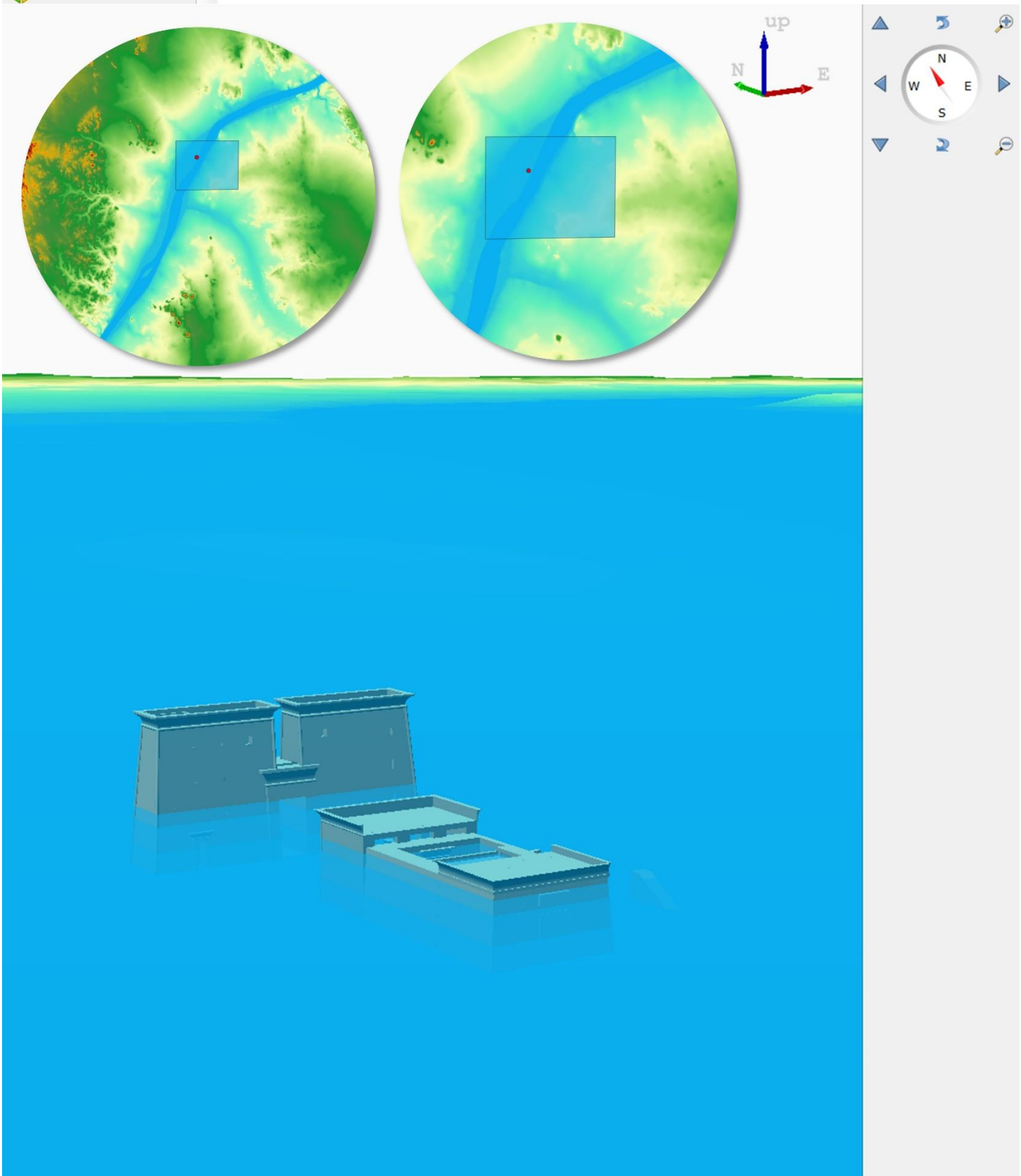
- QGIS Elevation Input: ~121.00 m to 125.00 m a.s.l.
- The Architectural Visual: The temple is completely drowned under several meters of water. The entire Revit model will sit beneath the transparent blue sheet in the 3D view, visually representing the total winter submersion of Lower Nubian heritage.

Layer Properties - Temporal_Water_Pool — 3D View

Information
Source
Symbology
Labels
Masks
3D View

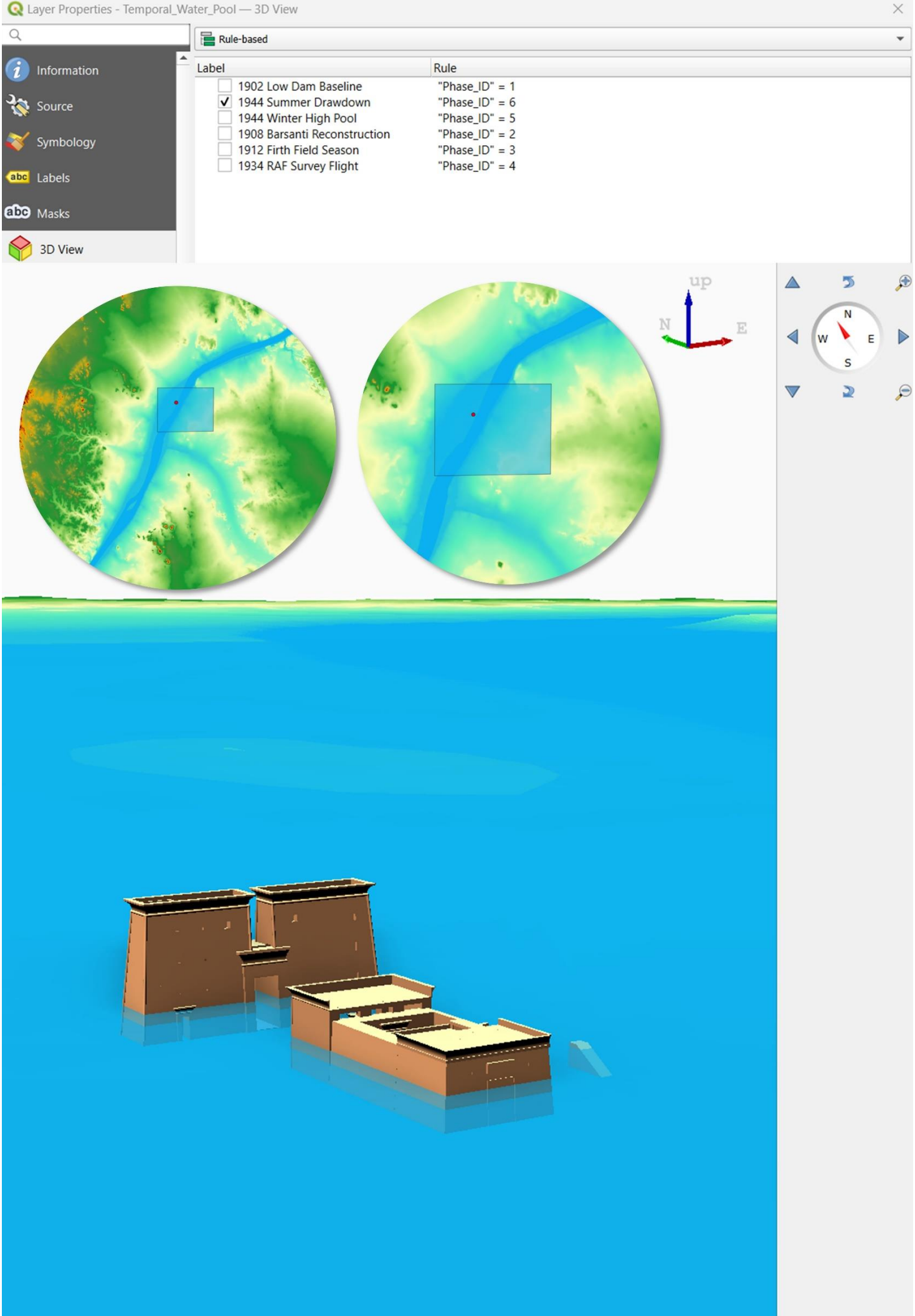
Rule-based

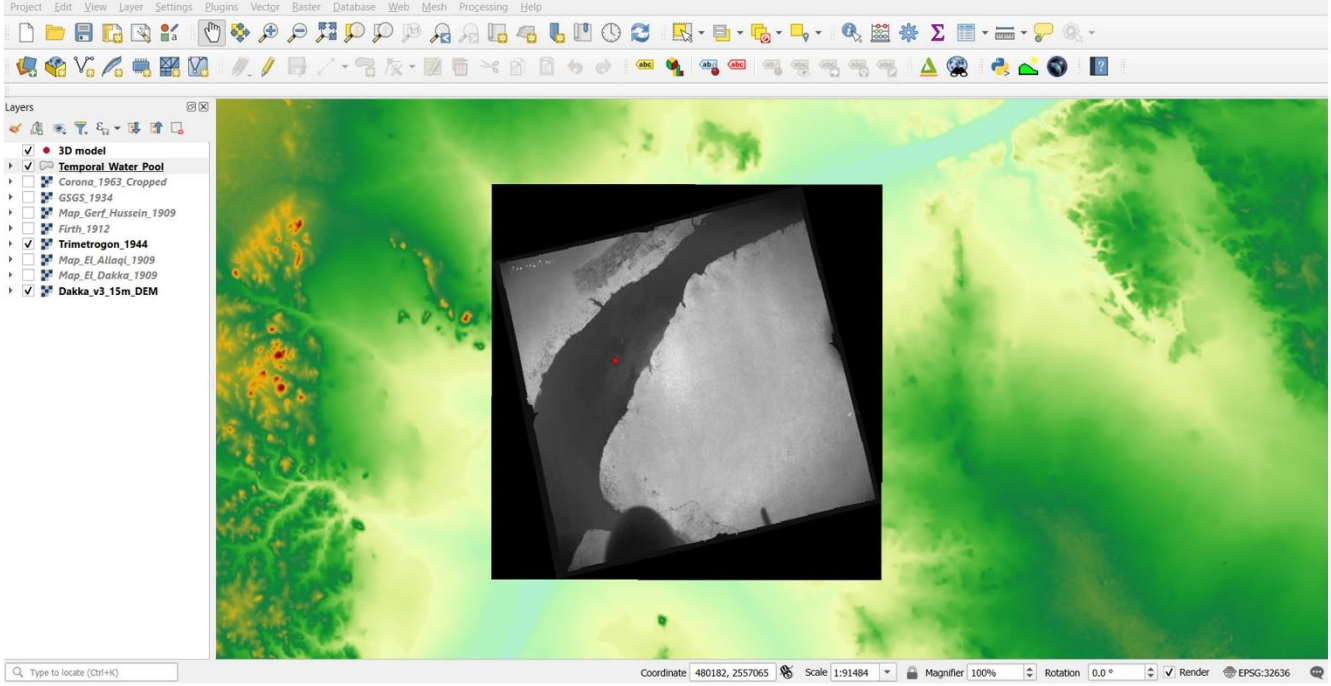
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1944 Summer Drawdown	"Phase_ID" = 6
✓ 1944 Winter High Pool	"Phase_ID" = 5
1908 Barsanti Reconstruction	"Phase_ID" = 2
1912 Firth Field Season	"Phase_ID" = 3
1934 RAF Survey Flight	"Phase_ID" = 4

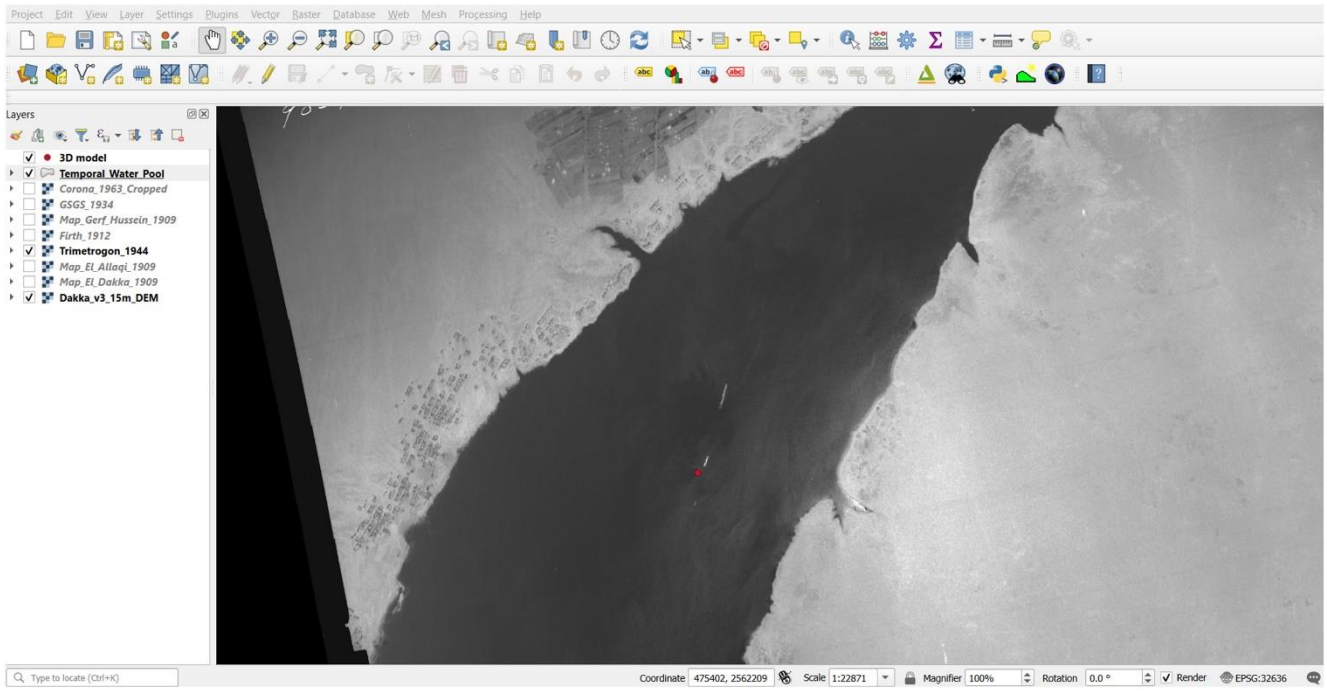


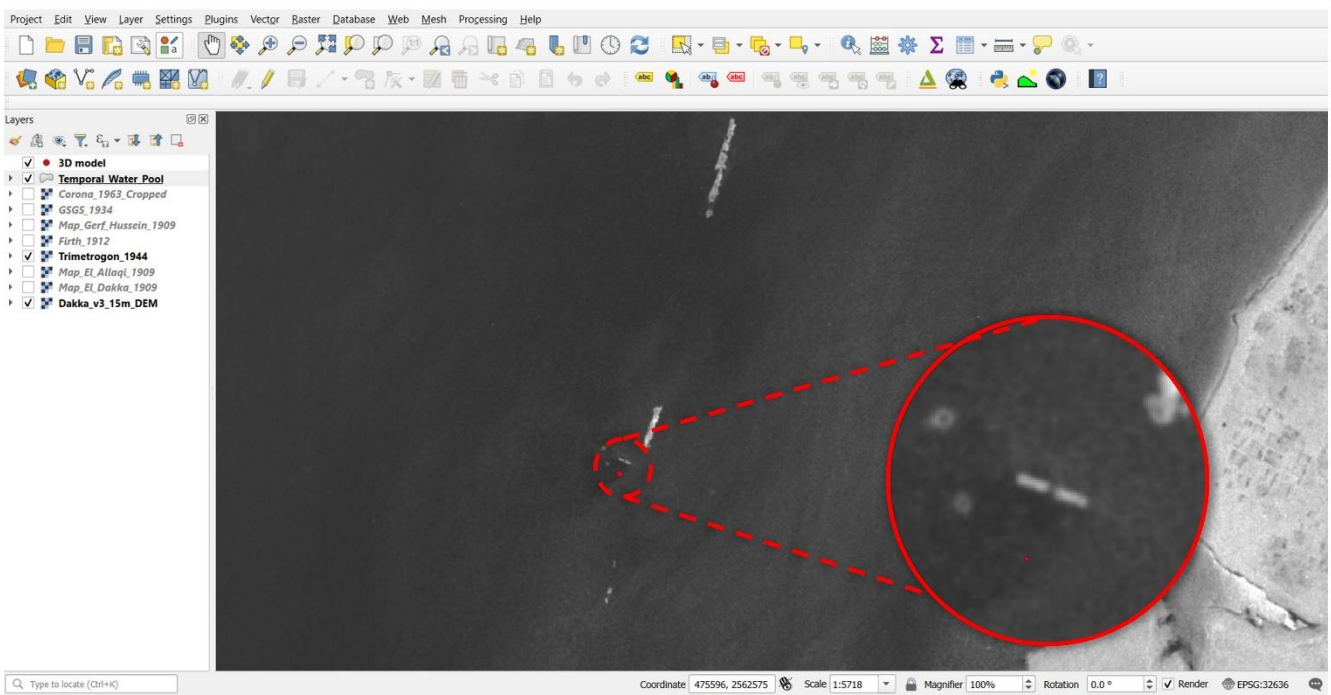
Phase 6: 1944 Summer Drawdown — Peak Low Dam Storage Cycle

- QGIS Elevation Input: **~114.50 m a.s.l.**
- The Architectural Visual: This QGIS elevation input matches **the July 5, 1944 aerial photograph. The water drops just enough to expose the upper 2.5 to 3 meters of the Pylon towers,** while keeping the lower roof of **the Pronaos (6.43m high) completely hidden beneath the waves.**


Layer Properties - Temporal_Water_Pool — 3D View
Rule-based
Information
Source
Symbology
Labels
Masks
3D View
Label
Rule
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1944 Summer Drawdown
"Phase_ID" = 6
1944 Winter High Pool
"Phase_ID" = 5
1908 Barsanti Reconstruction
"Phase_ID" = 2
1912 Firth Field Season
"Phase_ID" = 3
1934 RAF Survey Flight
"Phase_ID" = 4
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E
N
W
E
S

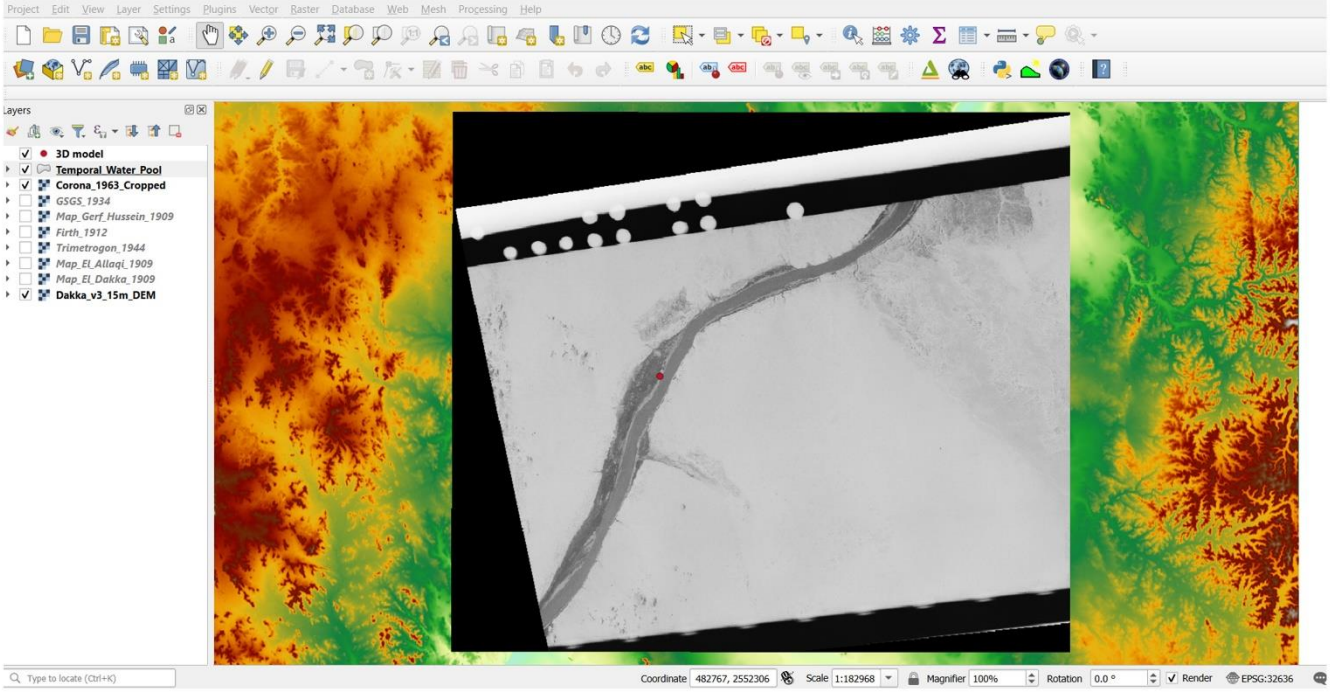

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal Water Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
Type to locate (Ctrl+K)
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Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636

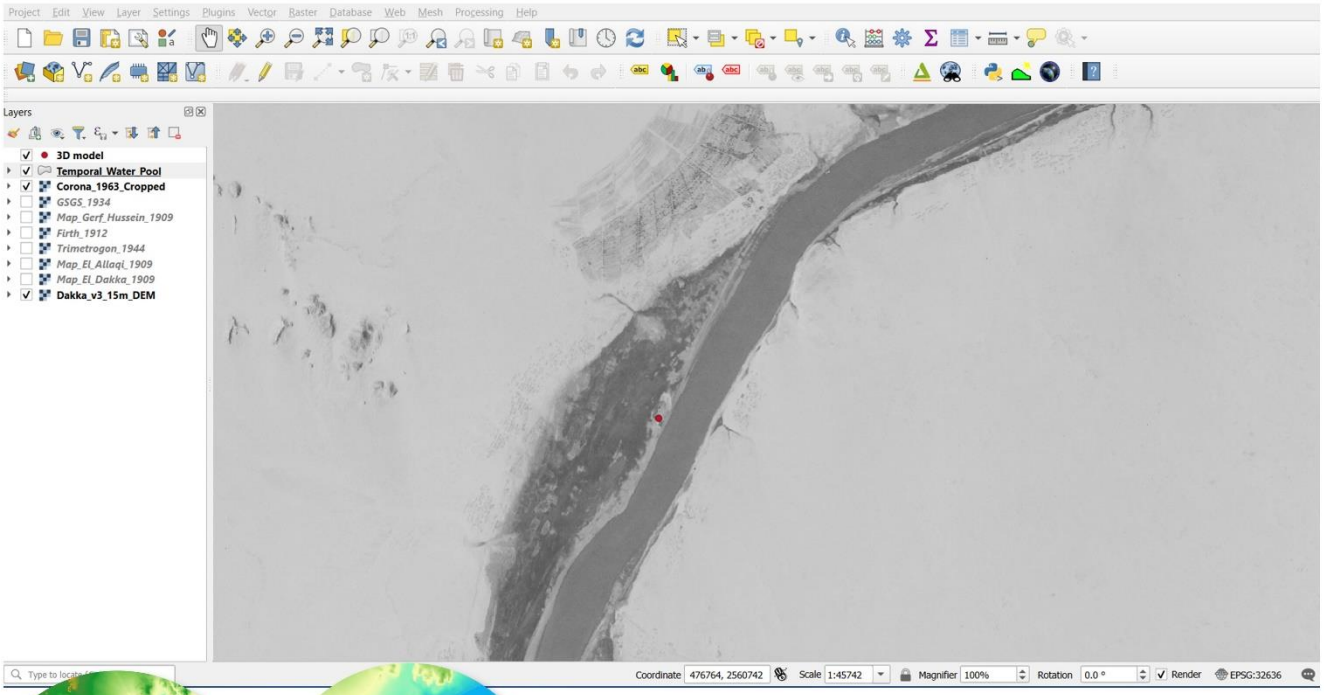

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal Water Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
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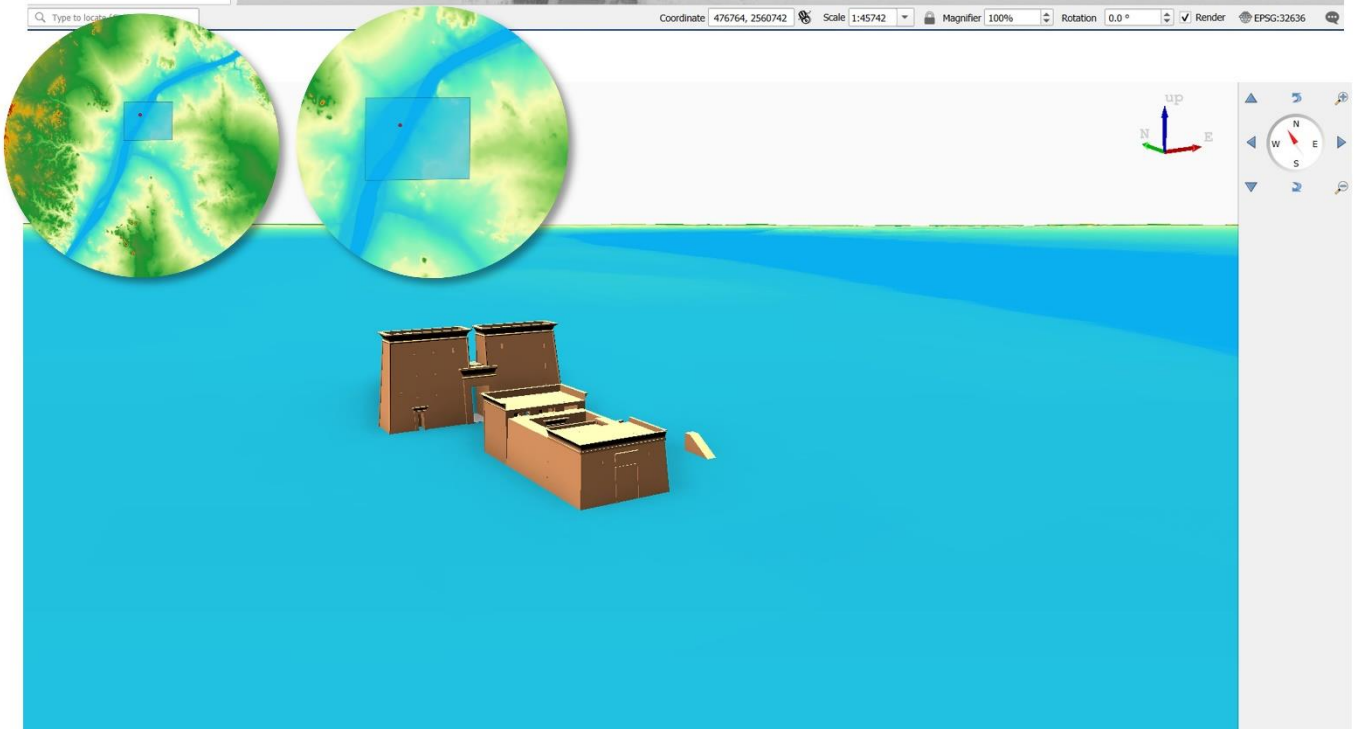

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal Water Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
Type to locate (Ctrl+K)
Coordinate 475596, 2562575
Scale 1:5718
Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636

Phase 7: 1963 – Corona Spy Satellite Imagery

The July 1963 Corona imagery Caught **the river at an exceptionally low drawdown phase before the final filling of Lake Nasser** to its projected maximum level of +182 meters making it possible to clearly observe the former banks, floodplains, and shallow channels of the Nile in Lower Nubia.


Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal_Water_Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
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Type to locate (Ctrl+K)
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Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636


Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Layers
3D model
Temporal_Water_Pool
Corona_1963_Cropped
GSGS_1934
Map_Gerf_Hussein_1909
Firth_1912
Trimetrogon_1944
Map_El_Allaqi_1909
Map_El_Dakka_1909
Dakka_v3_15m_DEM
Coordinate 476764, 2560742
Scale 1:45742
Magnifier 100%
Rotation 0.0 °
Render
EPSG:32636


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Chapter 6:

Discussion and Critical Evaluation

Chapter 6: Discussion and Critical Evaluation

6.1 The Epistemological Leap: From Flat Paper Archives to 3D Spatial Reality

6.1.1 Evaluating the Precision, Ambiguities, and Limitations of Günther Roeder's and C.M. Firth's Documentation

The essential foundation of this reconstruction project is the documentation provided by Günther Roeder and C.M. Firth. However, to read these archives critically, one must understand the roles of these scholars not only as objective recorders but also as individuals working under the extreme pressure of the "rescue mentality" that characterized early 20th-century archaeology.

The site they uncovered was already a ruined place, so Roeder's *Der Tempel von Dakke (1930)* does not provide us with a blueprint of a functioning temple, but rather a "snapshot of a ruin". This archive is not a representative sample of the monument in its glory days, it is important to remember, but a metric record of a site already on its course to decay.

In this digital reconstruction process, we recognize these expected gaps in the archives and approach them as fundamental features of the monument's historical record. I have chosen to stay with these limits and lacks rather than cover them up by an aesthetic over-correction. For the parametric software engine, the two-dimensional drawings of Roeder, conceived for the human eye, had to be converted into a three-dimensional logic, which was a considerable challenge.

Both obstacles of surveying technology in the early 20th century and the physical movement from seismic or hydrological instability, along with gaps in archives where structures were either buried in sand or lost entirely, lead to the dimensional error. Moreover, when direct physical access was impossible, Roeder's dependence on the observations of previous colleagues, eventually resulted in transferred errors into the record[2] . These are the "historiographic fingerprints" of the

[2] The Courtyard Well is an example for that: Roeder explicitly states that the well was uncovered by C.M. Firth during the Archaeological Survey excavations in the autumn of 1909, but it was completely backfilled with sand in January 1910 before Roeder arrived on site. Because it was buried under sand during his suryey and later sealed beneath Barsanti's modern concrete courtyard terrace beds, Roeder could not physically measure it or include it in his primary ground plan (Taf. 148). He relies directly on Firth's field data and historical accounts like Saint-Ferriol's (1842) to verify its structural coordinates. *Already explained on Chapter 5, Courtyard Well.*

technology and professional constraints of their time, and not necessarily failures of the researchers.

The current HBIM workflow is a “stress test” for these historical archives. The digital model displays the tension between 2D archival logic and 3D physical reality by trying to enforce analogue metrics within a fixed 3D space. Roeder and Firth were undeniably brilliant at recording the stone structure and stratigraphy of the site, but their documentation reflects the colonial blind spots of their time; the indigenous Nubian populations, who were the living guardians of the landscape, were downgraded to anonymous figures in the background of photographs. Thus, their scientific record was incomplete in its systematic exclusion of the human experience and the spiritual connection between the temple and the Nilotic landscape. This project acknowledges these limitations, but does not simply just reproduce the archive, instead critically investigating it, and providing a broader perspective that reclaims the human and environmental narratives that have historically been neglected.

6.1.2 Methodological Friction: The Challenges of Translating Historic Analogue Metrics into Parametric BIM Logic

There was continuing methodological struggle during a transition from analog archival records to a parametric BIM environment. Modern architectural engineering is a technical field, and software like Autodesk Revit is an advanced tool for it. However, the Cartesian logic that defines it, requests a symmetry and precision that is fundamentally in contrast with the irregular, battered masonry of the Ptolemaic and Roman eras. The term “perfect geometry,” as understood in contemporary design, suggests a conception of conformity and efficiency that are significantly different to the ancient built environment, in which spatial connections and structural forms were determined by ritual requirements, environmental constraints, and specific human interactions. Thus, the reconstruction is not a purely technical exercise; it is an analytical process, which often requires priority of the historical evidence over the ease of its software manipulation.

In this workflow, I regularly faced an "ethical conflict": should the digital model be “fixed” to conform to software-native perfection, or should the irregularities of the archive be maintained at the cost of technical convenience? I have come to realize that the “friction” between two-dimensional documents and three-dimensional space is rarely just a documentation mistake; it is

rather an indicator of the spatial experience. The claustrophobia of narrow staircases, intentional asymmetry of sacred chambers, the subtle variations in wall thickness – these are details of the temple's lived history that static descriptions cannot fully describe. I have left these irregularities untouched, resisting the temptation to 'fix' the geometry to satisfy the algorithms of the software. I have treated the model as an instrument for historical truth, rather than an aesthetic rendering.

This approach has its limitations, obviously. These are digital similar characteristics. For example, "void sweeps" can be used to make battered walls but they do not truly reproduce the original process of setting the stones layer-by-layer just like the builders once did.

As an architect my job was not to redesign the temple, but to be a new "storyteller". I have consciously avoided from any hypothesized architectural insertions, and instead have incorporated archival documentation directly into the metadata of each structural element. This methodology allows the model to function as a "smart" archive, allowing the expert user to inspect the geometry, to access the original Roeder-Firth references, and to know exactly where historical certainty finishes and logical modeling begins. In this way, forcing the "act of remembering" to be carried out by rigid digital parameters provides a more honest, transparent, and accessible record of the Dakka Temple to the academic community than any idealized 3D model can offer.

6.1.3 Software Interoperability Boundaries: Managing Data Translation between Open-Source QGIS and Autodesk Revit

The exchange of data between Autodesk Revit and QGIS was not only a technical need, but also the main and unavoidable challenge of this methodology. This digital reconstruction consists of distinct architectural and geospatial dimensions, so the workflow required constant switching between software environments, each of them was a specialized tool for solving a different analytical puzzle. Contemporary digital technologies offer the possibility of switching between these perspectives but such shifts are not always unaffected. Transferring information through multiple import/export cycles, like translating a poem from one language into another, will inevitably alter the function and features of the data. Certain contexts are obviously harmed or faded when spatial data is transferred from a geographic coordinate system—where the earth's curvature and global positioning are crucial—to a local, Cartesian building coordinate system.

Revit and QGIS are fundamentally different digital frameworks: one is designed for the independent, parametric logic of architecture, and the other for the continuous, analytical logic of geography. They are not naturally share languages. But in order to reconstruct the Dakka Temple at its precise historical coordinates, I had to develop a pipeline; a "Heterogeneous Data Environment," that would allow these two data silos to have a forced, yet functional, dialogue.

The necessity for a dialogue between these tools inspired me to create a workflow that permits a level of integrated architectural and landscape analysis that was not previously possible within either environment alone.

Most importantly, my commitment to this interoperability is not just functional. It is an ethical position. I have taken a thoughtful path that breaks from locking this model into monopolistic, exclusive, and expensive subscription services. I think of interoperability as a kind of digital stewardship. I am actively working to "repatriate" the project by converting and sharing this data in open-source formats, so that it remains a functional, accessible tool for the communities that own this heritage. This commitment to interoperability is a continual, focused struggle with the boundaries of software; a process that is a vital reminder that the exposure of digital heritage is not an automatic process but a high-maintenance operation of human labor, critical judgment, and ongoing technical activism.

6.2 Reclaiming the *Genius Loci*: The Model as a Mnemonic Vessel

6.2.1 Recontextualizing the Displaced Monument within its Lost, Paradoxical Landscape

The Aswan Dams caused deep damage to the cultural landscape of Lower Nubia. The Dakka Temple had to be physically relocated to avoid being submerged forever by the rising waters. As discussed in the first chapters of this thesis, the international salvage campaigns organized under UNESCO did their best in relocating the monument to a new artificial home at Wadi es-Sebua. But in theory, it is obvious that this campaign preserved the physical shell of the structure at the cost of its vital environmental connectivity. This 'architectural taxidermy' saved the skin of the monument, while the surrounding landscape, its Nilotic axis and its historical geography were left

to be swallowed away by Lake Nasser. However, this was the unavoidable price of physical survival—a heavy cost that had to be paid.

Shifting our perspective from *"what has been permanently lost"* to *"what can still be preserved and reinterpreted"* offers a vital methodological turning point. The digital workflow developed in this work, which integrates the historical Digital Elevation Model (DEM) with the Revit HBIM model, is not a magical cure, but a restorative painkiller. While we cannot drain Lake Nasser to recover the original site, this synthesis of dual terrains allows the Dakka Temple virtually to "return home", in the process of restoring the visual and spatial relationship between the monument and its ancient riverbanks.

We are forced to accept the harsh reality of historical loss: what is lost cannot be physically brought back. Yet, the monument survives in historical records, collective memory and environmental evidence. This reality raises the question: why not use these remains in order to give the landscape a secondary, digital life? This inquiry is the central motivation behind this research based on the belief that memory and landscape are fundamentally connected. This project reproduces the lost spirit of place in a new, digital form which reclaims the historical landscape and demonstrates that even a displaced monument may discover a meaningful rebirth in its original living world.

6.2.2 *For Whom Does the Model Speak?* Questioning the HBIM Environment as a Conditional Anchor for Living Memory vs. Data Recreation

In the previous chapters the reconstruction of the temple and its geography has been discussed to ultimately leads the path to generate collective memory. But the architectural examination is not valid when it separates the monument from humanity: *Can memory truly exist without those who hold it?* The international rescue campaigns initiated by UNESCO were vital for the physical survival of the monuments and were appreciated by scholars, governments and local communities as well. However, these campaigns were managed from an essentially top-down perspective. The construction of the Aswan Dam and the bureaucratic rescue operations that subsequently followed, failed horribly to prevent the systematic displacement of the Nubian peoples. Roots in the Dakka environment, a close link to the Nile were the very basis of life for these people. The rising waters of Lake Nasser did not just drown stone structures, they swallowed up settlements, cutting off the natural veins of a living culture.

The Nubian people were displaced directly by state-mandated engineering projects and indirectly by geopolitical forces. They saw their homes, language, social networks, culture, and daily traditions sacrificed to decisions in which they had no involvement. They became unseen figures in the background of a government-run narrative. Given serious historical trauma, it is a fundamental right for these communities to have access to their heritage again. That raises an important question about our digital tools: *For whom does the model speak? Is an official museum showcase or a physical stone transferred elsewhere more historically "truthful" than a digital model that accurately re-creates the monument in the community context it lost?*

If digital heritage is reduced to the mere recreation of data, using the HBIM environment as a cold, technical playground for geometric precision, exclusive mistakes of the past will be repeated and history will be locked up within state-centralized or Western archives. To avoid this, the digital set-up created in this thesis intentionally places the HBIM and QGIS environment as a conditional anchor for living memory. It is a kind of "digital repatriation", returning the tools of engagement with history to those who wish to study, remember, and experience Dakka's landscape. In the end, this integrated model goes beyond from being just a geometry file, it becomes a container for community memory. It does not merely present walls and columns—it contains the data of a lost world, open and accessible for the diaspora and for future generations to query, occupy and remember.

6.3 Ethical Reflections: The Politics of Digital Reclamation and Stewardship

6.3.1 The Paradox of Virtual Authenticity: Navigating Subjective Reconstruction and Objective Metric Boundaries

Günther Roeder's extensive archive, which provided crucial metrical foundations such as exact measurements for wall thicknesses, widths of entrances, and structural layouts, provided the foundation for this reconstruction project. But many spatial relationships, exact placements and complicated carving details were either left out or described in a way that required direct, physical presence to fully understand. As a result, accomplishing this process required a dual role: that of

an architect but also of a multidisciplinary investigator responsible for creating complex spatial relationships comprehensible.

The significance of digital authenticity lay in the challenge of remaining faithful to historical archives but at the same time not allowing yourself to the temptation of considering Roeder's documentation as an unchangeable, absolute blueprint. The authentic virtual in this context is not to be evaluated based on the visual beauty or photorealistic finish of the model, but by the transparency of the methodology; clearly expressing to the user the point at which objective metric data ends and subjective architectural interpretation begins.

Fundamentally, the assumption that a 3D model alongside BIM data is the ultimate "truth machine" is a core distortion of the nature of digital reconstruction. No HBIM model, including the one developed in this study, can perfectly simulate historical buildings as they were. To resolve this foundational paradox, custom metadata parameters were embedded directly into the database including these uncertainties. This inclusion of signs of uncertainty in the model prevents the digital asset from misleading viewers regarding what is historically verified and what was reconstructed through comparative architectural logic and professional judgment. Deep ethical accountability was necessary to balance Roeder's rigid, sometimes contradictory numbers with the inescapable need for architectural interpolation.

Traditional institutions such as museums often present historical reconstructions as unquestionable facts. This HBIM model intentionally does the opposite; it invites critical investigation. When a model is an open, analytical and verifiable academic asset – not a false illusion – virtual authenticity emerges. In the end, a digital reconstruction is authentic not because it looks real but because it holds its historical sources strictly accountable.

6.3.2 Decolonizing the Virtual Space: Representation, Data Ownership, and the Prevention of Digital Colonialism

For more than a century, Nubia has been taken advantage of as an open mine for data extraction, either due to the historical dependency of the Egyptian governments on European elites, or the systemic lack of control over indigenous data. A place where photographs, metrics and artifacts were taken away from their context and stored in Western capitals and institutional archives. Regardless of the intentions of these previous efforts, if a modern researcher recreates a digital

project only to lock it behind expensive subscriptions and exclusive Western archives, then the cycle of colonialism continues to play out in digital form.

The digital reconstruction framework developed in this study does not simply use open-source methodologies as a technical choice, but as an explicit "colonial breaker" tool, to bring back legitimacy to the people who this heritage truly belongs, and to any individual committed to its study and preservation.

The decolonization of the virtual space begins with a fundamental question: *Who has the right to govern a displaced temple's digital twin—the state, the software corporation, or the diaspora community?* To answer this question, we need to actively break down digital neo-colonialism, not let models become the proprietary wealth of corporations or the toys of the elite academic to claim dominance over data.

Traditional institutions have held ownership of cultural property for ages, allowing access only to a selected, approved few of their choosing. By contrast, this project insists that those with some common connection or history to the monument, from local community members to independent researchers, should be provided with the opportunity to investigate, question, and engage with the model.

Although the physical temple will never return to its drowned valley, this autonomous digital space offers a sovereign virtual territory for cultural identity to be preserved, expressed and reclaimed free from institutional and colonial dominance.

Chapter 7:

Conclusion and Future Horizons

Chapter 7: Conclusion and Future Horizons

7.1 Summary of Research Achievements and Findings

7.1.1 Realizations in Architectural and Spatial Modeling: Materializing the 1913 Archive

The research concentrated on a basic spatial problem, that is, how to bridge distorted 2D historical archives with the 3D reality of a displaced monument. The pre-inundation structure was successfully recreated within a parametric environment by treating Günther Roeder's 1913 metric surveys (*Der Tempel von Dakke*) and C.M. Firth's archeological reports as precise geometric anchors rather than passive history documents. The complex non-vertical masonry profiles, battered pylon walls, and hidden interior switchback staircases were reconstructed in Autodesk Revit with high level of fidelity to the historical record. The workflow considered the historical anomalies of unfinished torus moldings and irregular masonry junctions, rather than forcing idealized, software-generated perfection on these ancient scales. This shows that parametric software can be adapted to act as an instrument of archeological truth through setting correct and functional metadata.

7.1.2 Realizations in Tangible-Intangible Heritage Synthesis: The Smart HBIM Repository

This study developed not only a geometric form but also a complete Historic Building Information Modeling (HBIM) database, successfully filling the gap between the tangible building material and the intangible heritage. In an effort to improve the digital model with epigraphic notes, Roeder volume citations, chronological phases and levels of certainty, a custom system of shared parameters was implemented. The digital asset extends beyond basic architectural visualization to integrate regional historical texts with micro-environmental adaptations, such as the sanctuary’s thermal-defensive light slits. It is a living, self-authenticating repository in which physical geometry and cultural memory are interconnected.

7.2 Contributions to the Fields of Digital Heritage and Diaspora Studies

7.2.1 Advancing HBIM Workflows for Relocated and Submerged Historical Monuments

This thesis introduces a new and reusable methodological framework for the digital documentation of monuments that have been tragically displaced and submerged. The research developed a productive "Heterogeneous Data Environment" by combining architectural BIM and regional geospatial analysis (QGIS).

This bidirectional pipeline successfully used the modern Digital Elevation Model (DEM) derived from the USGS (https://earthexplorer.usgs.gov/) as topography in QGIS and then as terrain in Autodesk Revit to show the temple's current situation. On the other hand, a photo-reconstructed historical Digital Elevation Model (DEM)—built from vintage aerial photography and historical lake-level data—is integrated with the Revit 3D model of the temple to show the original location of Dakka temple and simulates the progressive hydrological inundation of the Lower Nubian valley, particularly around the temple. The model of two-terrain structures demonstrates that digital preservation should consider the vertical Z-coordinate and the environmental context, and provides a strong model for the study of other submerged or relocated monuments around the world.

7.2.2 The Model as a Decentralized Vector for Reclaiming Collective Memory

Fundamentally, this research shows that heritage preservation cannot be limited to elite, closed-source institutional silos. The project discusses the ethics of digital repatriation through an open-source transition workflow, exporting the complex HBIM database to Industry Foundation Classes (IFC) and optimizing assets for lightweight WebGL browsers. The Dakka Temple digital model is transformed from a proprietary corporate file into a decentralized cultural property. It is an essential tool for the Nubian diaspora to connect with their ancestral home and rediscover their cultural identity on their own terms in a legitimate virtual space.

7.3 Future Horizons: Frameworks for Public Dissemination and Cultural Engagement

7.3.1 Synthesizing Structure and Landscape: The Core Principle of Relevant Cultural Heritage

The main point of the conclusion of this research, and what makes it different from others, is its refusal to separate architecture from the territory that surrounds it. The thesis clarifies that structure and landscape are inseparable elements of cultural heritage, while traditional heritage preservation often treats a monument as an isolated object, detached from its geography via museum placement or physical relocation.

As a conclusion of this discussion, it is the reciprocal relation of structure and landscape that makes digital reconstruction genuinely relevant for the cultural heritage. A historical monument does not exist in a Cartesian space; its spatial syntax, its cosmic orientation, and its ritual meaning are entirely depended upon its active dialog with the earth, the water, and the natural topography. It has been established that this place was annually flooded and the local people completely adapted their everyday life, their strategy of survival and their agricultural methods to this hydrological rhythm (Firth, 1915, p. 3-5; Fernea, 1980, p. 66-69). Culture represents the lived knowledge of a people and their consciousness of this dual connection to their environment (Fernea, 1980, pp. 66-69). This methodology shows that to preserve heritage is to preserve the entire ecosystem of place through linking the Revit HBIM structure directly to the QGIS historical terrain. By transferring the stone from the land you are making architecture into “taxidermy”. Thus, the most important outcome of this workflow is the ability to reclaim the lost geographical narrative. It demonstrates that it is only when the structural body and its environmental context are synthesized in a unique, unified format, that the cultural heritage regains its real life.

7.3.2 Democratizing the Spatial Archive: Open-Access Knowledge Sharing and Shared Research Methodologies

The conclusion of this thesis brings up important questions about the future access to digital heritage. True democratization of spatial knowledge becomes possible when we move beyond the raw data files or expensive exclusive software licenses that by mistake recreate barriers of technology. Future efforts should focus on developing user-friendly, online services that allow

members of the community, especially the younger generations of the Nubian diaspora who did not experience the original valley, to engage with the monument in a way that does not require high levels of education concerning technical skills.

7.3.3 Immersive Spatial Mediums: Alternative Futures for Virtual Heritage Representation

Since returning to the flooded Lower Nubia valley remains strictly not a possibility, interconnected cultural engagement can only take place by means of digital platforms. Further efforts must build collaborative networks between academic institutions, museums, and diaspora community centers in Kom Ombo, Cairo, and abroad, ensuring that the digital archive remains an evolving, community-driven display, rather than a static academic conclusion.

7.3.5 Recommendations for Future Interdisciplinary Digital Archaeology and Architectural Research

This thesis challenges us with critical remaining concerns for the greater academic community to encourage and provoke future investigators:

When an architectural monument is taken away of its original landscape, does its digital twin speak for the stone or for the earth it has lost, or is it capable to speak for both? Could a historical monument's digital twin become locked within future exclusive proprietary systems? How do we deal with the fidelity of objective assessments with the subjective, living memories of displaced populations? And how can future digital architectural frameworks continue to resist becoming tools of technological exclusion?

The study has shown that heritage is inherently collaborative, a multi-disciplinary synthesis of architecture, archeology, geography and human narrative. This integrated spatial data route opens up the way for future scholars to challenge, extend and interact with the digital environment, making sure that what was lost to the waters of Lake Nasser finds a permanent, living home within the collective memory of the future.

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