To Petra via Jabal Haroun

Nabataean-Roman road remains in the Finnish Jabal Haroun Project survey area

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I BACKGROUND

1 Introduction and research questions

This paper focuses on an ancient road that passes Jabal Haroun (Mountain of Aaron) on its way to Petra in southern Jordan. Although the road remains have long been known and have been mentioned on several occasions (Brünnow and von Domaszewski 1904: 427-428; Jarvis 1940: 138-147; Zayadine 1985: 163 and 1992: 225; Lindner et al. 2000: 541-542), as well as discussed more in detail recently (ben David 2005: 31-47), a systematic and thorough study has been lacking so far.

The material for this road study derives from the Finnish Jabal Haroun Project (FJHP) initiated in 1997. The purpose of the twofold project is to excavate a Byzantine monastic complex located on the mountaintop and to survey the surroundings of the mountain. Eventually the project seeks to understand the development of the monastic complex and the human presence within its surroundings, as well as their interactions. (Frösén et al. 1999: 369; Frösén and Fiema 2002: 29.) My personal experience of the project derives from three seasons (2002-2003, 2005) as a member of the survey team.

The road remains were documented by the FJHP survey team during the 1999 and 2000 seasons (Hertell 2002: 234-239; Frösén et al. 2001b: 389-390). In addition, in the following years several sites were found directly next to the road, as well as further away. It has been suggested that they are road-related structures (Frösén et al. 2003: 312, 2004: 113). The road remains were further followed and documented during the 2005 season in order to locate the continuation of the road further east to Petra and west to Wadi Arabah. As an outcome of the season, several uniting and departing stretches of the road were found (Lavento et al. forthcoming a).

The research questions of this paper are as follows:

1. Why does the road remains locate in the FJHP survey area?
2. How did the road proceed there? In other words, how was the road placed in the terrain it crossed, what kind of natural and cultural features in the FJHP survey area
were favoured by the road and which features it avoided? Furthermore, is there a specific purpose for the constructed parts of the road?

3. What is the relationship between the road and the sites found around it? Are sites located in the vicinity of the road by chance or are they specifically placed there in regard to the road? What, in fact, is the function of these sites?

4. What is the significance of Petra in the existence of the road in the FJHP survey area?

5. What is the date of the road and the road-related sites? Furthermore, were there changes in their use which are identifiable to different time periods?

I believe that the sites discovered during the survey were built due to the presence of the road. Furthermore, it is more than likely that the development of Petra had a considerable role in the formation of the road. The intensive survey carried out by the FJHP provides a comprehensive record of archaeological evidence from a restricted area to study the questions and test the hypotheses. In the light of the FJHP survey material, I also review the interpretations given to this road so far. Contrary to the previous research, I use approaches deriving from landscape archaeology to evaluate the distribution of the road remains. Especially the new methods developed for environmental sciences and measure-precise modelling are used here to test their usability in this type of road study. Thus the goal of this work is also to add modern techniques to the traditional methods of analyzing structures. It is suggested in the previous research that the road date either to the Nabataean or Roman period, or to both periods. Therefore, this framework of time, from the 1st century B.C. to the late 3rd century A.D., is in the main focus – and another hypothesis – of this study. However, other time periods, if suggested by the find material, are also discussed.

Roads are important to study because they reveal much of the land use and the settlement pattern, as well as the economic base of the population that created them and kept them in operation. Thus, this work also contributes to the better understanding of the Nabataean-Roman period in southern Jordan. Also Petra can be properly understood only by taking its satellite towns and villages, surrounding roads and countryside into account. Furthermore, roads change in reaction to what happens in the society. For instance, trade network studies in the Near East have been able to demonstrate that changes within habitation patterns correlate well with the conditions
in long-distance trade (Potts et al. in Fiema 1991: 55). Therefore, alterations in the road network reveal changes in the socio-economic structures and trade conditions.

Roads tend to be long-lived features, especially within environments in which the suitability for human use is limited by natural factors. The most famous example of this in the context of the Near East is the north-south-oriented road running through southern Syria and Jordan. It was originally the Edomite King’s Highway which was reused by the Romans to form a part of Via Nova Traiana. Similar examples of a long continuum in road use are found e.g. in Egypt (Rothenberg 1970: 4) and Israel (Dorsey 1991: xvii). Also road-related structures were reused many times, with some fine alterations made due to new users and their needs. It is well known that many of the Roman road-associated structures originate from the Nabataean period and from the Iron Age (Parker 1986a: 248). Traditionally these structures are seen as serving for military operations and/or policing of the traffic on the roads. I believe that the sites were more widely used for various purposes. Also domestic activities and private buildings profited from the presence of the passing road.

Scholars argue that it is not enough to look at sites and categorize them into type, period and probable use, but that cultural and symbolic encodings of the sites should also be considered (see e.g. Children and Nash 1997: 2). Cultural projections in the remains are briefly discussed in connection with the attempt to distinguish between the Nabataean and Roman features of the road. Interpreting movement along the road as an act of taking part in a certain culture, as proposed by Witcher (1998: 64), is left outside of discussion here.

This work is divided into four main parts: background (I), road studies (II), the Jabal Haroun case study (III), and discussion and conclusions (IV). The background section presents the research methodology used in this paper (chapter 2), environmental parameters (chapter 3), sources (chapter 4) and the historical framework (chapter 5) for this study. The section on road studies presents theories and practices used in the study of ancient roads (chapter 6). The section on the Jabal Haroun case study contains the FJHP survey methods (chapter 7), the principles of dating the FJHP survey finds (chapter 8), and the data collected both inside the survey area proper (chapter 9) and in its vicinity (chapter 10). The final section consists of discussion and conclusions, in
which the road and road-associated structures are analysed (chapter 11) with the aid of what has been presented above. Final conclusions are presented at the end (chapter 12).
2 Methodology

Landscape archaeology highlights the spatial distribution of archaeological remains in the environment as an indicator of past land use. Archaeological record is continuous and there are no meaningless areas between sites (see Dunnell 1992: 26-36). In addition, sites used during different eras appear as one conglomeration in the present landscape. These sites influence current land use and have influenced past land uses. (See Ingold 1993: 152.)

My involvement in the FJHP field work has shown to me how important it is to read the environment with cultural emphasis, thus making it landscape. Human occupation prefers certain locations and avoids others. There are great differences in the FJHP survey area in regard to its usability for human occupation. This means that the sites are distributed unevenly. Therefore landscape archaeology, bridging natural and social sciences on the study of archaeological remains, offers the principles to carry out this study. The use of landscape archaeology in road studies is also recognized in other papers. According to Madry and Rakos (1996: 108), landscape archaeology is likely the best method to analyse the interaction of roads and their role in the cultures that created them. In fact, landscape archaeology may be the only form of archaeology that can aim to analyse the development of the earliest roads (Morriss 2005: 13).

The employment of landscape archaeology means that there should be three levels of interpretation in the study of archaeological record: historical reconstruction, taphonomic reconstruction and historic interactive interpretation. This means that temporal relationships between archaeological remains, geomorphologic processes and human activity after site abandonment, as well as the interactions between these natural, cultural and temporal processes, should be considered. (Zvelebil and Benes 1997: 25.) Knapp and Ashmore (1999: 2) have well summarised this by stating that “taking a holistic landscape perspective compels us to stress the interrelationships among people and such traces, places and features, in space and through time”.

Landscape archaeology also highlights human experience and human scale as the starting point for interpretation. Landscape is a value-laden concept. The perception of the environment is a critical factor in the deciphering of the past; without considering it
the archaeological record cannot be properly understood. However, it is questionable whether modern scholars are able to find meanings or values truly relevant to the ancient users when reconstructing past environments. (Finlayson and Dennis 2002: 221, 223-224; see also Thomas 2001: 180-181.)

Landscape archaeology offers very few methods that could be implemented. Papers on landscape archaeology concentrate on developing theoretical approaches, but tend to forget the development of methods. In fact, several of these approaches cannot be studied with any method or set under testing. Therefore, methods must be found elsewhere. Quoting Finlayson and Dennis (2002: 221): “landscape archaeology is not a single method; rather it is a commitment to a series of questions which all require a battery of techniques and methods as appropriate”. Also I have had to resort to various methods, both new and traditional.

Geographic Information Systems (GIS) is a group of computer hardware, software, and geographic data which enables capturing, managing, analyzing and displaying all forms of geographically referenced information. With a geographic information system, information (attributes) can be linked to location data. The information, which usually needs to be classified at first, can then be layered to reach a conclusion about the spatial layout and correlations of the various attributes. Set questions determine which attributes are treated together. Purposes influence on the classification scheme of the attributes and on the number of classes selected to represent the data. Maps are generally easy to make using GIS and they are often the most effective means of communicating the results of the GIS analyses. (ESRI 2006; USGS 2006.)

GIS is especially useful in archaeology as it enables quantitative modelling of interactions between humans and their natural living environments. Several factors and their correlations can be dealt with at once, and the analysis is repeatable and numerical. However, human experience and cultural conditions cannot be quantified. Furthermore, GIS applications are based more on technical possibilities than archaeological theory (Wheatley and Gillings 2000: 2).

I believe that some environmental parameters may explain the distribution of the road remains and the road-related sites in the Finnish Jabal Haroun Project survey area.
Thus, by looking at the distribution of sites within the environment, instead of concentrating only on individual sites, I hope to see explanatory patterns emerge. Altitude of the terrain, direction and degree of the slopes, catchment areas and main wadis in the survey area were selected as the most probable factors causing a possible site patterning. The analysis itself was carried out in ArcGIS 9.1-programme. Coordinates of the sites that were considered as parts of the road system were extracted from the FJHP database and dropped to a digital elevation model. The model was then subjected to environmental analyses based on computer calculations between individual cells of the model. In the outcome maps, the road and road-related sites are shown together with each of the selected, environmental parameters. The parameters were divided into 8-10 classes. The classification was selected through testing various scales and looking for best appearing scheme.

The quality of the material used in GIS applications can considerably affect the outcomes of the analysis and thus the interpretation deriving from it (see Madry and Rakos 1996: 118-120). The Digital Elevation Model, produced by the Helsinki University of Technology (HUT), used as the basis of the GIS applications of this work, presents the topography in cells with an accuracy of 10 m. However, raster grid models, which consist of rows of uniform cells coded according to data values, tend to even the highest and lowest altitudes of the terrain. They are never true reflections of the terrain (see Wheatley and Gillings 2000: 9). As analyses are based on site location within the terrain, the accuracy of locating sites further affects the results. An error margin of 5 to 10 m in the accuracy of site locations must be considered in the FJHP material. Furthermore, as GIS can integrate and relate any data with a spatial component, the data has to be unified into one co-ordinate system. This procedure, also done to the FJHP material, results in risks of growing inaccuracy. GIS analyses can therefore only be used as indicating trends related to site location, interpretation cannot solely be based on them.

The identification of the road remains and the road-related sites included in this study is based on the careful study of these remains. It is believed that certain structures have certain characteristics in their building technique, form, size, location, and related artefact evidence. Thus, the assessment of these features is the core of this study. Due to similar environmental settings, cultural conditions and functions, findings from
certain other studies can be used as reference material to understand this case study. The criterion to identify various features of the road and of the sites associated with it derives from these studies; the criterion is then tested with the FJHP material. However, care should certainly be taken, as conditions are never alike. Especially the topography may alter significantly even between short distances. Thus site-specific features must always have a paramount role in the forming of interpretations. Furthermore, site’s location close to other sites does not indicate that they are contemporaneous unless similar sites are frequently found in similar combinations (Haiman 1989: 177).

Maybe the only way to operate on a human scale, emphasised by landscape archaeology, is to consider the visibility between the sites and their surroundings in the study of individual sites. When describing and interpreting the sites included in this case study, I use notes of visibility deriving from the FJHP fieldwork as supportive evidence. However, visibility is not considered as the main factor determining the site interpretation.

Even if the visibility to and from sites within the landscape would reveal what was culturally enhanced to be seen by travellers along the road, I do not include viewshed analysis in this paper. The reason for this is that individuals perceive things that they see differently, not solely in a culturally preconditioned way (Thomas 2001: 176; contra Tilley 1994: 10-11). Also the GIS application itself used for visibility analysis is based on several problematic assumptions (e.g. Wheatley and Gillings 2000: 5-14 for discussion).

Furthermore, viewshed analysis has been carried out already in the FJHP on a selection of road-related sites and the road by Paula Kouki (2003). Her work clearly indicates that the road was seen from several of the associated sites and the visibility ranges of many of the sites overlapped (Kouki 2003: 5-7).

The most significant problem in the interpretation of the road remains concerned the existence of a road pavement. I decided to approach the problem through 3D-modelling a stretch of the road. The stretch ca. 25 meters long of the best preserved road segment
was modelled with PhotoModeller Pro 5.2.3-programme (Appendix 1). PhotoModeller is a 3D-software product that calculates measurements and constructs 3D-models from photographs. After the camera calibration, overlapping photographs which are taken from different angles and showing common points allow interpolating visible features. Through this process the features are accurately converted into spatially referenced 3D-entities. The entities can be exported to a virtual model that allows viewing, zooming, rotating etc. (See e.g. Gillings and Goodrick 1996.)

Photo modelling is used already in several archaeological projects in order to visualise, measure, document and model artefacts and sites (see e.g. Eos Systems 2006). Its photogrammetric qualities are used to study the remains off-site and the method itself is non-intrusive. In this paper the method was used to document the remains in detail as well as for visualisation in order to understand the purpose of the road structures (Fig. 1).

![Fig.1. Print screen of the 3D-model of the road segment.](image)

Datings are in the key position when evaluating the role of roads during the different periods. Often the only means to analyse the date of a road is to examine how it is located in relation to other structures. Nearby sites may contain material that may indicate a dating for the road as well (compare Stenqvist Millde 2002: 118; Morriss 2005: 25). Because organic deposits are rare in the FJHP survey area (see Tenhunen 2002: 177-178), dating methods of the natural sciences are not possible to use.
In optimal conditions, the site dating criterion is based on the study of building techniques of the road, as well as of the sites associated with the road, and their variation between time periods. Certain construction methods, materials and decoration forms were developed, commonly used and left out of use during certain time periods. In reality, dating based on architectural analysis is difficult. Erosion has often destroyed distinctive architectural marks. Earlier structures have served as a quarry for later structures. The same site could have been in use, prepared with same construction methods, over a long period of time. Small structures have been built in a similar manner over centuries. Thus distinguishing between a Nabataean and a Roman structure, for example, without proper excavation, can be very difficult (see Parker 1986b: 116-117 for discussion).

Some stylistic features are found in buildings from several periods. For example, very finely cut limestone blocks have been used in Nabataean, Roman, and Byzantine constructions (Oleson et al. 1999: 429). Furthermore, although scholars agree that the method of cutting stone in a diagonal herringbone pattern is distinctive for Nabataean architecture, they date its use differently. The use of this method peaked either during the early part of the so-called Middle Nabataean period (ca. 30 B.C. to A.D. 50/70) (Negev 1996: 74) or in the 1st and early 2nd century A.D. (Kloner 1996: 131). Most likely the practice was employed over a long period of time.

Dating in this work is mainly based on comparison of ceramic material deriving from the road-related sites with the known ceramic typology of the Near East. Dating on the basis of a ceramic typology has been successful, e.g. in the excavations of ez-Zantur in Petra where the Nabataean pottery has been intensively studied (see Schmid 2000: 39-42). However, almost the entire corpus of ceramic material from the FJHP survey derives from surface assemblages. Although surface pottery has been collected as thoroughly as possible, it has several problems in regard to reliable dating. Due to geomorphologic processes, material is always at least to some degree misplaced. The specialized forms and imported wares significant for a sound dating are usually scarce in survey pottery. Instead, survey finds tend to consist of kitchen ware with slowly altering forms. Therefore their dating remains inaccurate. However, if the surface
pottery at the road associated sites abundantly and repeatedly contains certain types, it can be taken to date the active use period of the road.

In addition, excavations do not always produce well stratified material either (e.g. Oleson et al. 1999: 417; Frösén et al. 2000: 410). Ancient clearances, the use of earlier material as parts of later structures, recent looting, as well as geomorphologic processes might explain why in some test excavations ceramics found in lower strata may be younger than those found above. Thus, soundings would not necessary solve all dating problems, although they would clearly ameliorate the situation. Furthermore, in order to be able to collect material with same detail from all of the sites, assembling surface pottery has been the only viable option in the FJHP survey.
3 Environmental parameters

3.1 Location and topography

The FJHP survey area is located some 5 kilometres west of Petra (Appendix 2). The intensive survey has covered an area of approximately 7 km$^2$ (Appendix 3). The area extends east of the slopes running down to the Wadi Arabah fault$^1$ (Fig. 2), southwest of the Naqb ar-Ruba’i ascent and west of Wadi al-Waqit. The survey area is characterized by the two major mountains that it borders, Jabal Haroun to the north and Jabal al-Farasha to the south. Wadi an-Naqb runs between these mountains.

Human occupation of the area has had to adapt into conditions of various altitudes, slope directions and slope inclination degrees (Appendices 4, 5, 6). In general, the elevation of the terrain in the survey area varies between 800 and 1000 metres above sea level. Jabal Haroun is the highest feature in the area: its top plateau reaches 1250 m ASL and its highest peak even 70 metres higher. The landscape in general is rugged and broken. The eastern part of the survey area is characterized by ridges and plateaus following the Wadi an-Naqb towards Petra. Sites concentrate on these ridges and plateaus, as well as on the mountain tops. The terrain in the western part is gentler with small hills and meandering wadi tributaries. There sites are more evenly distributed and they are most numerous there.

Fig. 2. The FJHP survey area seen from the Wadi Arabah. Photo: FJHP/Ynnilä

$^1$ wadi in general means a dry water course
During the 2005 season, the road survey was extended to the adjacent areas (Appendix 7). The topography of these areas is significantly different from the survey area proper which also results a different site distribution (Appendices 4, 5, 6). The slope between Wadi ad-Dulayah and Naqb ar-Ruba’i northeast of Jabal Haroun is steep in the middle and gentler in the upper and lower parts. The uppermost part is also very steep. There the road remains are the only marks of human presence. Towards Wadi Arabah the road remains were followed to a valley north of Wadi Arba’i and to Abu Khushayba. The valley is located halfway between the edge of the Jordanian highlands and the fault of the Wadi Arabah. Abu Khushayba is an ancient settlement along one of the large wadis between the highlands and the fault. There the road and road-related structures are most abundant in the area closest to the survey area proper.

The environment towards Petra is very different from the areas described above. Extensive valleys characterize the landscape (Fig. 3). Wadis are shallow at first, and then carve deeply into the hilly belt around Petra. The gentle terrain with sandy rolling hills also extends to the edges of Wadi al-Batahi, which runs to Wadi Sabra. There the sites studied by the FJHP survey are most evenly distributed.

The FJHP survey area is divided mainly into sandstone and limestone bedrock. Jabal Haroun and slopes to the northeast are sandstone, as well as the areas towards Petra and Sabra. The hills along the western edges of the survey area are limestone. (Fig. 4.) (GS
1992: lithological map.) The harder sandstone has been used for larger structures, while installations made of softer limestone are smaller. Generally the soil layer covering the bedrock is thin and consists of fines, sand, gravel and stones of various sizes. Sedimentation occurs only during the episodic winter rains between November and January. However, because the erosion and accumulation rates are high, sediment layers are scarce. Nevertheless, some of the sites documented during the FJHP survey are covered by later soil formations. As the environment is constantly shaped by powerful physical processes, it is likely that the appearance of the area in the Nabataean-Roman period has been different, at least to some extent, than it is today. Especially the courses of the wadis may have altered several times. This is indicated by some barrages now left beside the wadi bed.

Fig. 4. Dark sandstone and light limestone characterize the environs of Jabal Haroun. The mountain peak is located far away in the middle, the Wadi Arabah fault is on the left, and the Shara Mountain Range is on the far right.

Erosion caused by humans collecting dry bushes and shrubs, occasionally felling trees, camping and tilling, affects the area constantly. Herding is widespread and some areas are crossed by herds of goats daily. As the FJHP survey area is located at the fringe of several geographical entities, plants from various floral zones can thrive there. However, in nearby valleys at a lower altitude with more water available, the selection of species is even wider (see e.g. Künne in Lindner and Zeitler 1997/1998: 561-562). Nevertheless, it was probably possible to obtain high yields of cereals (compare Russell 1995: 696-698), vines, olives and fruits (compare Zayadine 1992: 223) in the FJHP survey area. Field systems similar to those in the FJHP survey area have recently been
used in Negev for cultivating wheat, barley and lentils. Plateaus between the field terraces have grown apples, pomegranates and olives. (Tenhunen 2002: 175.)

To better understand the FJHP survey area, other areas and places further away are also worth describing (Appendix 2). The Wadi Arabah fault is 190 kilometres long. It belongs to the Great Rift System stretching from Mozambique to northern Syria. Due to tectonics, the areas around the fault are subject to earthquakes. In general, the Wadi Arabah is dry and hot. After the winter rains, it receives additional waters that pour down from the slopes on its eastern and western side and thus becomes pitted with ponds. Travelling along the Wadi Arabah bottom, which is 10-30 km wide, has therefore not been favoured. Instead, proceeding along its edges was preferred. Furthermore, there are springs and mineral deposits on both sides of the Wadi Arabah, but especially on the eastern side. This further enhanced the establishment of roads there. (Raikes 1985: 95-97.)

The springs often result from the intersection of wadis with saturated zones of aquifers. The wadis instead are formed as a result of rifting and lowered base levels. (Macumber 2001: 19.) The edges of the fault are steep: the altitude can change from ca. -400 m ASL to 1000 m ASL within ten kilometres. Thus, the wadis are important for the east-west-directed communication, as they usually provide a less troublesome connection between the rift valley and the highlands surrounding it.

The area east of the Dead Sea is mostly rugged, wadi-cut mountainous landscape which changes into desert towards the east. In between runs the Shara Mountain Range. While southern Jordan is arid, in the north there are wooded rolling hills, perennial springs and extensive valleys. Understandably, population has concentrated on the northern parts during most of the history.

Petra’s position at the crossroads of natural routes has been crucial for its development. The city is located in a basin running from north to south – which was also the main communication axis of the city. There are springs in Petra (see Browning 1994: 49) and a wadi cuts through the city centre. Petra is surrounded by high mountains and thus profited from limited accessibility. One could reach the city either through the deep and
narrow gorge known as the Siq, along the deep ravine of Wadi es-Siq, or via the gentler but still hilly terrain between Petra and Sabra, Jabal Haroun, or Baydha (Appendix 8).

Modern Aqaba is located at the southern end of the Wadi Arabah. Its antique predecessor, Aila, was an important Nabataean nexus point for overland routes and also the shipping port for Petra (Dolinka 2003: xii). Routes in the Nabataean-Roman period usually ran from south to north along the sides of the Wadi Arabah or through the Jordanian highlands. There were also roads along the eastern Mediterranean coast and along the east and west sides of the Red Sea. Roads from east to west were equally numerous. Roads ran across the Wadi Arabah, the Negev in Palestine, the Hisma east of the Jordanian highlands, the Hejaz in the Arabian Peninsula (to reach the Persian Gulf), the Sinai Peninsula and the deserts between Syria and Mesopotamia. Wadi Sirhan was an important connection route from northern Jordan to the Persian Gulf. (Appendix 9.) (Zayadine 1985: 159-161, figs. 1, 2) These areas cut by roads mostly lacked water sources and were uninhabited, but they also contained oases and large agricultural settlements with water-conserving installations (see e.g. Glueck 1955: 19).

3.2 Hydrology

In arid and semiarid conditions, such as the environs of Jabal Haroun, human presence is synonymous with water. This roughly means that without water there is no human occupation. At present, the Jabal Haroun area receives some 150 mm of rainfall annually (SWC 1966: 53). The climate was more humid during part of the Nabataean-Roman period, between the 1st century B.C. and the 2nd century A.D. Throughout the Byzantine to the Early Islamic period, A.D. 300-850, the climate became increasingly arid. (Bruins 1994: 307-309.)

Regardless of land use and the effects of wind and sun, the most severe erosion is caused by rain. Sudden rainstorms result in severe erosion when the soil has weak permeability. The run-off farming practiced by the Nabataeans was particularly intended to increase the permeability by barraging wadis and terracing fields. Furthermore, when only a small amount of water was used for cultivation, the soils
were not endangered by salination, which is a common problem in heavily irrigated areas. At the same time, collected floodwaters increased the effective rainfall (see Lavento et al. forthcoming b). This was highly relevant, as the Jabal Haroun area does not belong to any major watershed that would bring additional water. Instead, the intensively surveyed area forms roughly one small local watershed, i.e., waters in the area flow to Wadi an-Naqb. There are two other local watersheds towards Petra, and two more towards Wadi Abu Khushayba. One local, rather large watershed is located north of Jabal Haroun, and the valley north of Wadi Arba’i forms its own entity. (Appendix 10.) The overall scarcity of water means that the area is very vulnerable even to small changes in climate.

There are no springs in the Jabal Haroun survey area proper. The closest spring is found slightly outside the eastern fringe of the area at Wadi al-Waqit. Furthermore, there are several other springs some 3 to 5 kilometres further away, such as those in ad-Dhaman, ad-Dhawi, Sabra, and es-Saqqara. Water could thus be fetched from springs, but this required some effort and time. The relevance of water is seen, for example, in some of the documents of the Petra papyri (see below), which handle water rights and the concern for water availability (Gagos and Frösén 1998: 479).

In comparison, the slopes of the Shara Mountain Range further east feature several springs, thus making field irrigation from springs possible and facilitating the water supply of the population. Furthermore, the rainfall has always been more abundant there. In addition, the region of Baydha is more even in topography than the Jabal Haroun surroundings. This made it more favourable for cultivation. These comparisons indicate that the Jabal Haroun environs truly were marginal lands for settled population, taken into use when no better lands were available anymore.

Except for the top of Jabal Haroun, cisterns have not been found in the FJHP survey area proper. After the survey was extended in 2005, several cisterns were located. They sometimes appear to be grouped, and often use sandstone formations jutting out of the otherwise rather gentle terrain. Similar sandstone massifs are scarce in the survey area proper. Furthermore, as the area of extended survey is much more intensively used today and the cisterns are, at least partly, still kept in operation, they are easier to
detect. The possible cisterns in the direct vicinity of Jabal Haroun are more likely to be silted and rubble-filled today and therefore hard to find.

It is likely that small sites collected their own water through roofs into tanks. The practice is evident e.g. in the Late Roman houses in Petra (Kolb and Stucky 1993: 422). Bigger buildings, such as forts, had cisterns dug into the courtyard (see e.g. Parker 1986b: 16, 54, 74; Graf 1995: 260, fig. 15). These installations fulfilled the site-specific water needs. Furthermore, when the water-storing barrage system within the wadis was in effective operation, it could hold considerable amounts of water. Lindner suggests that the cisterns around Petra were built to service caravans (Lindner in Gunsam 1997: 37).
4 Sources

4.1 Ancient sources and modern interpretations

The Nabataeans did not write their own history, nor are there any Nabataean depictions of the area they ruled. Thus the earliest descriptions and depictions relevant to this study derive from classical authors, such as Diodorus Siculus (Historical Library, books II, III, XIX), Strabo (The Geography, book XVI) and Flavius Josephus (The Jewish War, Jewish Antiquities). Their accounts record events beginning from 312 B.C. and extending up to A.D. 70 (Kennedy 2000: 22). The accounts are rather implicit, as the Nabataeans are not their primary interest, but are mentioned in writings about Hellenic kings, Jews, and Romans. Furthermore, the descriptions are coloured by the personal history and the background of the writers who also frequently refer to earlier sources, i.e., their writings are not always based on their own observations. Thus, Flavius Josephus who was an eye witness did not provide thorough details on the Nabataeans, Diodorus Siculus writing more abundantly on them apparently used Hieronymus of Cardia as a basis of his accounts. Strabo provides only occasional historic, economic and geographic mentions of the Nabataean kingdom.

As for later periods, Cassius Dio’s The Roman History provides some records on the following two centuries. Ammianus Marcellinus, in his Roman History, has some marks on the Roman annexation of the Nabataea. Christian authors are useful in tracing the history after the annexation. As for the caravan trade, the best literal evidence from the Hellenistic and Roman periods come from the Syrian city of Palmyra (see Maraqten 1996). The Byzantine state road system is reflected in the codes of Justinian and Theodosius which contain several orders related to roads (Bowersock et al. 1999: 672). The social, economic and administrative aspects of the life in Petra in the 6th century A.D. can be traced through the papyrus archive found in the 1993 and known as the Petra papyri (see e.g. Koenen 1996: 177-178). For the post-classical era, the surviving records of life in the Near East consist of accounts of Arab or Christian pilgrims making their way along ancient routes and describing their experiences during the journey. These types of documents, itineraries, can be very fruitful for road studies.
Nabataean sources are primarily inscriptions, papyri, and coins. The inscriptions are mainly dedications. Some of them are found related to roads, also in the vicinity of Petra (Zayadine 1992: 218-224). The Nabataean inscriptions found in the Jabal Haroun survey area seem not to be related directly to roads but to water structures and cultic places (see Frösén et al. 2004: 112; Lavento et al. forthcoming a). No Latin or Greek inscriptions have been found in the survey area. Short texts or pictures engraved along the paths leading to the mountaintop testify of pilgrimage visits, but do not enhance our understanding of the road.

It is surprising that there are no pilgrimage accounts of travels to the Mountain of Aaron (see Shahid 1998: 375-377; Frösén et al. 1999: 403) although the mountain is considered as holy, attributed as the burial site of the Prophet Aaron, by the Christian, Muslim and Jewish tradition. However, there are some Byzantine records, albeit ambiguous, besides the archaeological evidence, indicating that the mountain was frequented by monks. Furthermore, Crusader accounts mention religious buildings on the mountain. (Frösén and Fiema 2002: 25-27.) The only complete travel description derives from the 13th century. It describes the journey of Sultan Baibars from Cairo to Karak, north of Petra. It well records the way points of the travel but mentions Petra and Jabal Haroun briefly as they were both uninhabited during those days. (See Zayadine 1985: 162-167.)

Modern studies often aim to interpret ancient written material. For instance, Eusebius’ Onomasticon (dated to ca. A.D. 300) is a listing of biblical places in the Roman provinces of Palaestina and Arabia (Sipilä 2004: 324-325). Its usability to study e.g. Roman administration, placing of army or communication networks, has been greatly debated by several scholars (ibid., Isaac 1996). As Onomasticon is rather late in date for the time period discussed in this study and does not aim to present an exhaustive description on the communication network in the region, it does not have remarks on this case study road and is thus not a relevant source. Notitia Dignitatum, a description of military placement in the Late Roman-Byzantine Jordan (Fiema 1995: 263) is not relevant either, as it neither focuses on roads.

Besides itineraries and lists of place names, old maps can be very beneficial for road studies. It is still under dispute, how widely maps were used in the Classical world and
how detailed maps were produced (see e.g. Isaac 1996). As maps were usually made for specific purposes, they only display a selection of reality. Therefore they should not be the only basis for research and interpretations (contra e.g. Alt 1935: 55-59; Aharoni 1954: 9-16 and Negev 1976: 130). Furthermore, as modern conventions of depicting the real world were not in use, ancient maps can easily be misunderstood. Maps were tools for administration and warfare, locals were able to orientate themselves without maps.

The surviving ancient road maps only describe the main thoroughfares of the region in question. For instance, Tabula Peutingeriana, a medieval copy of a map depicting the Roman Empire before the 3rd century A.D. (Graf 1992: 256), displays only one road, Via Nova Traiana, oriented from north to south in Roman Arabia. Several studies have shown that this was not the case in reality. Another source in road studies could be Ptolemy, a cartographer who wrote his geographical guide (The Geography) with a list of place names with co-ordinates around A.D. 150 (Dolinka 2003: 16). The work does not include a map but he was aiming to give a “graphic presentation of the whole known part of the world, along with things occurring in it” (i/1.1). This notion would expect detailed accounts, but his listing of settlements connected by roads is unfortunately not all-encompassing. Finally, there is the 6th century Madaba map in the church of St. George. The mosaic map depicts the holy land from Syria to Egypt from a bird eye view. As it seems to be based on Onomasticon, roads are not marked in detail and there are no indications on the road in question.

4.2 Past fieldwork and research

Western scholars became interested in the Near East during the early 19th century as a legacy of the era’s political circumstances. Interest in the biblical landscape and growing awareness of the long history of the area further enhanced the burgeoning research. The first records were travel stories where most of the sites encountered were identified with ancient and biblical place names. The first systematic excavations were launched after the First World War along with the establishment of the first authorities
for the antiquities, under a British Mandate. (Miller 1991: 14-17; Banning 2001: 631-632.)

The first archaeologists studying roads in Jordan were Rudolf Brünnow and Alfred von Domaszewski. The results of their work were published in *Die Provincia Arabia* 1904-1909, which is a large illustrated compilation of information from their own research and quotations from other sources. Other pioneers in the antiquarian studies of the Near East studying roads were Alois Musil (between the years 1898-1902), Fritz Frank (1932-1934) and Nelson Glueck (1934-1959). Several sites documented by these scholars have now disappeared or are badly damaged. Unfortunately their accounts do not give precise locations for the sites described. The risk of confusion is high, which lowers the usability of these accounts (see Miller 1991: 16-18).

Recently David Graf has conducted extensive surveys along the *Via Nova Traiana* and thus drawn attention to road studies. However, he has not discussed unofficial minor roads. Thomas Parker and David Kennedy have focused on the character of the Roman border, *Limes Arabicus*, in the Near East and also frequently touched the issue of roads. Manfred Lindner and Fawzi Zayadine have studied the environs of Petra and came across several roads and road-associated structures. Haim ben David has recently been working on roads and has also discussed the road studied here. He has provided very useful material for comparison.

Comparing material from various projects is difficult due to large methodological variation (see Freeman 2001: 428, 438-439 for discussion). Some research lacks a clearly defined methodology and systematic documentation, and ignores discussion revealing the basis for interpretations. Many projects concentrate on only one or two periods or focus on one type of archaeological structures. Commonly studies concentrate on predefined areas where set questions are tackled. Even within one project, the methods may vary due to varying environments. Heterogeneity of research limits the interpretation of the available material and thus the understanding of the past. When some surveys extend over an area of hundreds of kilometres and the FJHP survey over some 7 km², a direct comparison is questionable. Furthermore, projects tend to postpone their final publications. Instead, they publish interim reports with ambiguous preliminary results which are questionable for reliable comparison.
Clearly defined location information is still missing from some recent fieldwork reports. Maps are often unfortunately inaccurate. Location is indicated in various ways and in different co-ordinate systems, which results in confusion. There is also great confusion with names. The official maps (especially English versions) display only a small number of place names. For the local inhabitants, place names are multiple, some interchangeable. Names also evolve within time. Scholars have used maps with varied degrees of detail as well as local informants to name their find locations. This makes comparisons extremely difficult. (Miller 1991: 18 for discussion.) Finally, scholars do not agree on the periods to which sites and artefacts are dated. For example, Early Roman and Late Roman are not uniform concepts, but the time span they refer to varies from writer to writer and from report to report.
5 Historical framework

5.1 General chronology of the Levant

The Hellenistic period in the Near East began with the arrival of Alexander the Great in Phoenicia in 332 B.C. Before this, the area had been under Persian influence (between the 6th and 4th centuries B.C.). Jordan was under the rule of the Hellenistic Ptolemies in Egypt ca. 301-198 B.C. and the Seleucids in Syria ca. 198-63 B.C. In this paper, the Nabataean period refers to the time of the Nabataean kingdom extending gradually from Petra. The Nabataean kings ruled from ca. 168 B.C. to A.D. 106. The Roman period in the Near East began from the first Roman conquest of Syria, i.e., the campaign of Pompey in 64 B.C. The period came to an end around A.D. 300, or at the latest it ended with the founding of Constantinople in A.D. 324. The period is further divided into the Early Roman period from 64 B.C. to A.D. 106 and the Late Roman period from A.D. 106 to ca. A.D. 300. The Roman period was followed by the Early Byzantine period to ca. A.D. 450. The Late Byzantine period lasted from A.D. 450 to the Muslim conquest of the Near East (A.D. 634-635) and the beginning of the Early Islam period, 7th-9th century A.D. (Table 1.)

<table>
<thead>
<tr>
<th>Chronological Chart</th>
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<tr>
<td>509-336 B.C.</td>
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<td>4th century B.C.</td>
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<td><strong>332-64 B.C.</strong></td>
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<td>312 B.C.</td>
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<tr>
<td>1st century B.C.</td>
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<tr>
<td><strong>64 B.C.- early 4th century A.D.</strong></td>
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<td>64/63 B.C.</td>
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<td>A.D. 106</td>
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<td>A.D. 114</td>
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<td><strong>early 4th century-early 7th century</strong></td>
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<td>ca. A.D. 295-400</td>
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<td>A.D. 363</td>
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<td>A.D. 537-593</td>
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<td>A.D. 603-628</td>
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<td><strong>A.D. 634-635</strong></td>
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<td>A.D. 638-750</td>
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<td>A.D. 750-1099</td>
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<td>A.D. 1099-1291</td>
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<td>A.D. 1291-1561</td>
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<td>A.D. 1517-1917</td>
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<tr>
<td>Persian domination over the Near East</td>
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<td>Nabataeans in southern Jordan</td>
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<tr>
<td><strong>Hellenistic period</strong></td>
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<tr>
<td>Expedition of the Macedonian troops to Petra</td>
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<td>Beginnings of urban Petra</td>
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<td><strong>Roman period</strong></td>
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<tr>
<td>Pompey in the East</td>
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<tr>
<td>Annexation of the Nabataean kingdom by Trajan</td>
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<tr>
<td>Petra Metropolis of Arabia (or earlier)</td>
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<tr>
<td><strong>Byzantine period</strong></td>
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<tr>
<td>Period of provincial reorganizations</td>
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<tr>
<td>Earthquake of May 19</td>
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<tr>
<td>The Petra papyri</td>
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<tr>
<td>Persian invasions and occupation of the Near East</td>
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<tr>
<td><strong>Muslim conquest of the Near East</strong></td>
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<tr>
<td>Umayyad period</td>
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<tr>
<td>Abbasid period</td>
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<td>Crusader/Ayyubid period</td>
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<td>Ayyubid/Mamluk period</td>
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<td>Ottoman period</td>
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The given chronology means that the Early Nabataean period coexisted with the Late Hellenistic period and the Late Nabataean period equals the Early Roman period. Thus the Nabataean period is an entity within larger time spans, distinguishable through its own characteristics in artefact evidence. Furthermore, the Nabataean style only appeared around 100 B.C. and did not end with the A.D. 106 conquest, but continued well into the Roman period. Thus, the term Nabataean-Roman is often used here in connection with features that cannot be dated clearly to before or after A.D. 106. A similar practice is used also e.g. in the preliminary reports of the South Arabah Archaeological Survey (Smith *et al.* 1997). The term Greco-Roman is also often used in surveys when continuity is evident. The term as a political order encompasses the Hellenistic and Roman as well as the Byzantine period – an enormous time span.

The first mention of the Nabataeans dates to 312 B.C. Diodorus Siculus (XIX/94.1, 95.1-97.6) writing in the 1st century B.C. describes the Nabataeans as a nomadic tribe defending themselves against the troops of Macedonian Antigonus. The tribe was involved in brigandage and trade.

The Nabataean society underwent a rapid and thorough change in the late 2nd-early 1st century B.C. The Ptolemies in Egypt had a strong position in the trading business and only well-organized competitors could challenge them. Nabataeans established a kingdom with cities, their own coinage, distinctive pottery and architecture, inspired by the Hellenistic examples. Ultimately the Nabataeans were able to rise in power as the Seleucid hegemony in the area was crumbling (Schmid 2001: 370).

Nabataean methods of rock cutting and water conservation enabled them to cultivate the desert. Cultivation of this type requires intensive labour, and therefore a great number of people were needed for maintaining the crops. However, it is highly likely that a part of the population always continued to live as transhumant pastoralists. (See LaBianca 1990: 37, 172.)
When the direct sea route from South Arabia to India was discovered by the Roman sailors in the first century B.C., the volumes of seaborne trade increased. Ships could transport large amounts of goods at a much lower cost (see Greene 1986: 40). However, shipping was not possible all year round and it always required investing a large amount of capital at once. Demand also peaked at the same time, due to the peaceful and prosperous Augustan period. Especially incense, a commodity of everyday life, was used in enormous quantities.

Instead of concentrating the caravan travels to the most favourable spring months, the Nabataeans’ land borne trade was made more intensive. In the first century B.C., it became year-round activity and thus more profitable (Johnson 1987: 30). Furthermore, as the Nabataeans traded directly with the suppliers and the market, they needed no profit cutting middlemen. Trading colonies and strongholds were established far beyond the kingdom proper. Petra became an important centre of the processing industry, especially of perfume oils and unguents, but also of amethyst beads. Processing of goods entailed better gains than the mere transportation of raw materials (ibid. 36).

Petra was, around the beginning of the Common Era, an important distribution centre of Arabian incense and myrrh, as well as Chinese silk. It monopolised the export of Indian timber. Furthermore, the Nabataeans likely had some role in the trading of other Far East products, such as cinnamon, cassia, costus, spikenard, betel, pepper, cardamom, rice, cotton, pearls, valuable stones, ivory, animal skins, parrots, tigers and snakes. (Thorley 1969: 216-222.) The Nabataeans were also involved in the trade between the near by regions. For instance, asphalt from the Dead Sea was taken to Egypt which in turn exported beverages and dried foods (see Sperber in LaBianca 1990: 165).

In addition, the Nabataeans collected high taxes on merchandise passing through their territory. A tariff board found in Palmyra, dated to A.D. 137, may indicate something of these practises. It shows that goods, such as olive oil, animal fat, salt fish, and livestock, were counted as luxury and taxed. Products intended for local consumption, such as wheat, fodder, and wine, were duty-free. (Elton 1996: 94-95.)
The Nabataean kingdom was considerable in size. It extended far south to Saudi Arabia along the Red Sea as well as to the deserts and oases inland. It covered much of the Sinai Peninsula, the Negev in Israel, and the Hauran in southern Syria. (Appendix 9.) Furthermore, Nabataean inscriptions have been found in e.g. Cos, Delos, and Miletus (Elton 1996: 24), and pottery e.g. in Yemen and Oman, possibly even in Sri Lanka (Schmid 2000: 127-129).

Cities sprang up in places where connections were good. Road networks were developed to face the needs of effective trade. Kloner (1996: 131) suggests that Nabataean road-making was planned and organized by the government. However, only during the Roman era are there detailed descriptions of the army being in charge of road-making as troops had the required workforce and engineering and administration skills for the project. After the initial construction, local communities were either responsible for maintaining the roads themselves or contracted the army to care for it. For instance, a mention of this kind of practice in the 2nd century A.D. Syria has been preserved. (Elton 1996: 72-73.)

Military forces were much involved in the administration. General security was maintained with regular patrols and outspread watch post. Furthermore, the army was made responsible for safeguarding caravan trade, as does evidence from Palmyra on Palmyrene and Roman troops indicate (Maraqten 1996: 231).

After the Roman influence grew in the Near East, the Nabataeans had new competitors in the long-distance trade. According to Bowersock (1983: 64), ever increasing seaborne trade caused the decline of the commercial activities of the Nabataeans. Internal trade routes remained in use, especially the Wadi Sirhan route, but e.g. the significance of the main road between Petra and Gaza begun to fade in the mid-1st century A.D.

It seems that during the reign of the last Nabataean king, Rabbel II (A.D. 70-106), agricultural activities were enhanced. Investments in agriculture were perhaps aiming to compensate for the decline in trade profits (Schmid 2001: 401), or cultivation was encouraged by the even more intensified caravan trade, which was sustained also
against harder competition (Fiema 2003: 41). Thus, the process and dating of the Nabataean fall as a trading power of the Near East is far from being agreed upon.

The *Provincia Arabia* included Jordan, southern Syria, the Negev, and the Sinai. It existed from A.D. 106 and underwent several modifications, especially during the fourth century A.D. (Sipilä 2004: 344-346). Whether the Roman annexation was hostile or not is still under dispute. Literary sources as well as archaeological evidence on destruction layers within the Nabataean cities point to a military confrontation (Schmid 2001: 401). Perhaps the death of Rabbel II launched the annexation and advanced the large-scale plans of the Romans in the Near East (*ibid.*; Parker 1986b: 123).

After the annexation, the *Via Nova Traiana* was built between Bostra and Aila, to serve both military and trade purposes. From Bostra it ran to Philadelphia (modern Amman). From there it continued across the large wadis of el-Mujib and el-Hasa towards Petra. From Petra, the *Via Nova Traiana* continued along the escarpment of the Shera Mountain Range and crossed the Hisma desert to Aila. However, Freeman (2001: 433-434) has proposed that the road should perhaps be viewed rather as a group of roads linking settlements than as a one single thoroughfare. Scholars also associate the construction of military structures along the desert borders with the Trajanic conquest (Gichon 1991: 318-319). However, these installations might have served primarily for administrative and taxation forces rather than for the defence of the province (Wells 1991: 478).

The Romans mostly kept the previous defensive systems in operation. For instance, the Nabataean posts on the southeastern border served as the basis of their southern *limes* (Graf 1979: 126). The zone was more fiercely fortified only during the third-fourth century A.D. (Parker 1995: 260) when a new system of defensive works was established.

The settlement pattern seems to have altered slowly after the Roman conquest. In general the population increased and the settlements grew. This pattern is most clear in northern Jordan, while in the middle and south the situation was more complex. Nevertheless, the trend likely was also the same. (Freeman 2001: 440-445; Watson
In any case, the period after the annexation appears in most sources as peaceful and prosperous.

Due to the growing political instability in the *Provincia Arabia*, Aila become the base of one of the Roman legions, *Legio X Fretensis*, in the late 3rd century or at the turn of the 4th century A.D. A large, also possibly legionary, fortress was established in Udruh, some 12 kilometres east of Petra. A similar, twin structure to the one in Udruh, is found in Lejun, east of the Dead Sea. (Sipilä 2004: 327, 329.) Furthermore, a fortress, which launching point is equally dated to the very end of the 3rd century A.D, is found in Yotvata in the southern Wadi Arabah (Fiema 1995: table 2. on p. 266).

In the late 4th century A.D., *Provincia Arabia* extended to cover northern Jordan and parts of southern Syria. Three new provinces were established out of the original *Arabia: Palaestina Prima, Palaestina Secundo* and *Palaestina Salutaris* (or *Tertia*) (Fiema 2003: 52; Sipilä 2004: 346). The Petra region was included in the last one. In the new political situation, interregional trade and agriculture had an important role. According to several scholars, the long-distance land borne trade and Petra’s role as a production and distribution centre had ceased by that time. Routes from the Arabian Peninsula and the Persian Gulf for long-distance transport of exotic goods were now sifted to run farther north to northern Syria or farther south to the Red Sea. (See e.g. Fiema 2003: 50). On the other hand, according Watson (2001: 486) this cessation only took place by the 6th century A.D.

The occupation pattern in the very Late Roman and Byzantine period clearly indicates the centralization of population into a few places (LaBianca 1990: 173, 178; Freeman 2001: 444). In many of these places the population also peaked. Most of the Byzantine sites are found east and south of Petra, where cultivation needed no irrigation (Fiema 2002a: 207).

During the fourth and fifth century A.D., the army was roughly divided into two types of troops. There were the mobile field army as well as the regional garrisons both of which were administrated differently. The Late Byzantine defence of the frontier abandoned the system of defensive works. The defence was given to the allied Arab
federates. At the end, an unified Arab invasion from the south was not expected (Watson 2001: 487, 489, 491).

5.2 Petra and its surroundings during the Classical and Byzantine periods

Monumental, Nabataean distinctive architecture appeared at the end of the 1st century B.C. and increased during the 1st century A.D. Temples and tomb façades were built to dominate the cityscape and the surroundings of Petra. Private houses varied in size and in internal arrangements. Some houses were decorated with elaborate mosaics and paintings owing their inspiration to the Hellenistic and Roman examples, while others were more modest. The paving of the Siq as well as its water channels and barrages are all dated to the first century B.C. (Schmid 2001: 374, 390.)

As Petra thrived, the city centre as well as several suburban settlements around it were inhabited by some 30,000 citizens (Browning 1994: 49). Furthermore, a considerable number of visitors travelled to the capital city of the Nabataeans. The city surroundings were devoted to large-scale farming to feed the population.

Roman influence had increased in Petra already well before the Roman annexation. For instance, Strabo (XVI/4.21) points that the city had several Romans among other foreigners as inhabitants. There are inscriptions mentioning Romans of high rank dating to as late as the 5th-6th centuries A.D. around Petra (Zayadine 1992: 222). In Petra itself, such inscriptions date up to the 4th century A.D. (Browning 1994: 56). In comparison, the latest Nabataean inscriptions are also dated to the fourth century A.D. (Fiema 2002b: 62). Nevertheless, Roman Arabia was culturally, socially, and economically more Hellenistic and Nabataean than Roman. A similar material culture displays a clear continuation also during the following Byzantine period. (Freeman 2001: 427.)

The capital was probably shifted to Bostra, either after the Roman annexation or before it, during the Late Nabataean era. At least, the main military forces and the governance were stationed there. (Freeman 2001: 434.) Petra was given an honorific status of
metropolis. The city experienced its second epoch of further monumentalisation. During the late first century and the second century A.D. the city was equipped with a theatre and several more temples (ibid. 441), as well as with the pavement of the cardo (Parr 1960: 130). However, these datings are not entirely accepted, e.g. McKenzie (1990: 33-38) proposes a Nabataean date for these structures. Nevertheless, studies by the Roman Street in Petra Project indicate that the main street of the city was at least remodelled after the annexation to contain shops, taverns, a monumental stairway with an arch, colonnades, and a flagstone pavement (Fiema 2003: 48; see also Browning 1994: 56). Furthermore, a former Nabataean royal complex was possibly remodelled into a city council hall (Fiema 2002b: 65). Fiema (2003: 49) has proposed that much of the early 2nd century A.D. works were done in relation to the new status of metropolis.

Public building activity declined in Roman Jordan from the third century onwards, which coincidences with the decline of Petra’s role in trade (Freeman 2001: 448; Fiema 2003: 50; also Browning 1994: 56 for discussion). The city was severely damaged in the earthquake of A.D. 363, after which it was only partially rebuilt. In fact, several of the Nabataean-Roman monumental structures were not restored. Furthermore, the social and economic structures of the city changed. Nevertheless, the urban life continued and both secular and ecclesial structures of the city life were kept in function. Byzantine Petra based its economy on land ownership and profits deriving from it (Koenen 1996: 187).

As late as in the 6th century A.D. Petra’s official documents included a large sequence of honorifics. The city was granted the name of Augustocolonia, Antoniana, Metrocolonia, Hardiana, Petra Metropolis. However, Petra was more likely a provincial town than a major centre as the honorifics claim. (Fiema 2002b: 61, 70.) The monastery on the Mountain of Aaron flourished between the late 5th and early 8th century A.D. (Fiema and Holmgren 2002: 99) which also could have enlivened the economy of the settlements adjoining it.

Copper is found on both sides of the Wadi Arabah. The eastern outcrop is some 40 kilometres north of the Gulf of Aqaba and extends to the north side of Wadi Fidan. According to Johnson (1987: 87), the Nabataeans were involved in copper production and exchanged the copper for incense. Copper production on a grand scale requires an
extensive support system of transport roads, workforce and agriculture to sustain it, as well as plenty of charcoal. To face these needs, a vast area around the mines is affected.

Three copper mining sites are located at a distance of some 8-18 kilometres from Petra: Wadi Abu Khushayba, Abu Qurdiyah and Sabra. The richest copper deposits of the eastern Wadi Arabah are found in Wadi Fidan, some 40 kilometres north of Petra. Recent surveys have revealed over 200 mining shafts and several smelting places (Hauptman 1986: 33). They were exploited already from the seventh millennium B.C. onwards (Freeman 2001: 452). Nabataean presence is attested through pottery finds (Glueck 1951: 35). The city of Faynan on the Wadi Fidan was prospering during the Late Roman-Byzantine period, from the 4th to the 7th century A.D. The remains contain both sacral and profane constructions, water installation etc. (Hauptman 1986: 33.) Extensive field systems dated to the same period are found within the environs (ibid.; Barker et al. 1997: 27-32, 1998: 9-17, 1999: 269-281, 2000: 42-44). The sites of Wadi Abu Khushayba, Abu Qurdiyah and Sabra bear much resemblance to Wadi Fidan in a smaller scale.

Seven roads departed from Petra to the Arabian Peninsula, Syria or the Sinai (Zayadine 1992: 217). From Petra they descended to Wadi Arabah via Sabra, Abu Khushayba or Naqb ar-Ruba’i (thus Jabal Haroun) (Appendix 8). Abu Khushayba was a settlement servicing caravans especially within the copper trade. It connected Naqb ar-Ruba’i, Umm Ratam, Sabra and ad-Dhawi with the Wadi Arabah. Bir Mahdkur in the Wadi Arabah was also reached along it. The remains in Abu Khushayba contain indications of both cultic and private buildings, water structures etc. (Lindner 1992a: 264-266.) They are dated to the Nabataean and Late Roman period on the basis of excavations (ibid.) and surface pottery (Zayadine 1992: 226). Sabra was reached from Petra by three routes; between the Wadi Arabah and Sabra there was only one road (ibid.). Besides cupriferous sandstone, veins of iron ore are also found in Sabra, indicating that iron was also smelted there. Sabra thrived along with Petra. It was a city of its own with an acropolis, theatre, sanctuaries and water structures supporting extensive cultivation. (Lindner 1992b: 202-203.)

A description of the road via Naqb ar-Ruba’i is provided by General Jarvis (1940: 141-144) who governed the area during the British mandate. He lists sites along the road
approaching Petra from the Sinai: first there is Kuntilla on the western side of the Wadi Arabah, then Abu Khushayba on the eastern fringe, and finally Petra (Fig. 5). Fiema (1991: 153-154) agrees with Jarvis and adds the settlement of Nahkl in the Sinai to the list of sites, thus picturing the road as running from Egypt through the Sinai to Nahkl, Kuntilla, Wadi Arabah, Wadi Heiani, Abu Khushayba, and finally to Petra. Zayadine (1992: 225) further adds Gharandal to the list.

On the other hand, ben David (2005: 47-48) argues that the road’s destination was Aila. According to him, a Nabataean road ran via the settlement of Abu Khushayba and when approaching Jabal Haroun, it most likely turned towards Wadi es-Saqqara (a wadi running southwest of Jabal al-Farasha and changing into Wadi Abu Khushayba further to the west) and never went up to Naqb ar-Ruba’i. However, according to him, the remains of the road that are visible today, attest to a road from Petra via Wadi Abu Khushayba (not the settlement of Abu Khushayba) and the Wadi Arabah to Aila. It was a paved main road rebuilt under Diocletian along the route of its Nabataean predecessor to facilitate the movements of the *Legio X* in Aila towards Petra. Also Jarvis (1940: 147) dates the road to the Nabataean-Roman period, first constructed by the Nabataeans and further enhanced by the Romans. Instead, Zayadine (1992: 229) favours a Nabataean date: “Un segment pave de la route de Naqb er-Ruba’i -- était sans
doute antérieur à la création de la Province d’Arabie”. Zayadine (1985: 163) also believes this road to be the track from Babylon to Egypt via Petra, described by Strabo.

The Sinai could also be reached along the routes leading south from Petra. The road setting out from the modern village of Wadi Mousa runs to a settlement in Ain Dahaha. There, according to Zayadine (1992: 225), a tower and a Byzantine church can be recognized among the remains. Further on lay Gharandal, one of the greatest settlements in the Wadi Arabah. One more caravan station was located between these two.

Kloner (1996: 127-128) describes a road leading from Petra to Gaza through “Little Petra”, i.e. Baydha, some 4 km north of Petra. Extensive Nabataean ruins with reservoirs, tombs, houses, and campsites are found there. Baydha has been mentioned on many occasions as a possible marketplace for the further distribution of caravan goods (ibid.; Zayadine and Farajat 1991: 281; Zayadine 1992: 217). Zayadine (ibid.) emphasises that at every terminus of the long-distance roads within the Petra region, there were water reservoirs with forts or caravanserais, as well as agricultural installations. The caravans thus did not enter Petra itself in order to avoid heavy tolls.

The Wadi es-Siq running northwest of Petra provided a connection, mostly well-built, between Petra, Baydha, and the Wadi Arabah via Wadi Musa. The rocky peak of Ras Slaysil along the road is located some 3 km west of Baydha. At the foot of the peak there was a rural settlement among cultivable fields (Lindner and Gunsam 1995a: 227) to service caravan traffic and possibly to house military forces collecting duties (Zayadine 1992: 223). The peak itself contains the remains of a sanctuary (Lindner and Gunsam 1995b: 269-273; contra Zayadine).

At the mouth of Wadi Musa there are gardens, and the settlement of Umm Ratam is located slightly further east (Lindner 1992a: 266; Lindner et al. 2000: 545). The existence of Umm Ratam is related to the caravan traffic and to the nearby copper production sites. The complex of ruins displays the remains of a fort and of water canalisations (Zayadine 1992: 222). The site was possibly initiated in the Nabataean period but mostly inhabited during the 3rd and 4th centuries A.D. Umm Ratam was a place of local administration where Roman soldiers organized and controlled mining.
transportation of metals, tax collection, government of the local population, and trade passing by. (Lindner et al. 2000: 562-563.)

The occupation of Gharandal, Umm Ratam, and Bir Mahdkur, which mainly serviced the east-west-oriented roads, declined after the early Byzantine period. However, routes between Aila and Wadi Fidan were most likely kept in operation, as the copper production in the Faynan area continued and Aila’s role as a significant centre of trade was maintained. (Watson 2001: 470.) Furthermore, the caravanserais and forts along the via Nova Traiana running on the Shara Mountain Range were abandoned only by the late 6th century A.D. (ibid. 487).
II ROAD STUDIES

6 Principles and practice in studies on ancient roads

6.1 Road definition and terminology

The definition of a road is connected to visible physical structures and to functions. For instance, Dowdle (1987: 268) sees roads as physical connections between places that allow material objects and information to move. Meshel (2000: 101) emphasises the long-distance function of a road: “A path may be designated a road when it begins to serve mostly people who are not originally desert dwellers but who wish to cross the region from a definite starting point to a definite destination”. Stenqvist Millde (2000: 66) has proposed that roads are basically cognitive. If a route is generally known to exist and it is frequently used, it can be said to be a road.

As the research of archaeology is based on structural remains, the archaeological definition is also based on structures. E.g. in 1990, English Heritage defined a road as “an artificial way having a constructed bearing surface, providing a means of communication suitable for wheeled traffic, between places and features” (Morriss 2005: 11). In this paper, a road is considered as a built feature within the physical world. A route or road line is the principle of how the road is placed into the environment.

Generally, connections that are well marked with paving, side borders, and associated structures to help travellers and guide the way are considered as main roads. The structures make them all-weather roads, i.e., usable more or less all year round and thus servicing the needs of regular communication. These roads are considered to be under the influence of the state authority. Political goals are reflected in these roads, and they are therefore called “official”, “royal” or “imperial”.

Secondary roads or tracks display only some of the above-mentioned features or have unbuilt gaps in between. Due to this, they were more seasonally and regionally used communication lines. It was not the primary interest of the authorities to interfere in the
use of these roads. Paths have only some markers, such as stone heaps, to guide the way, but mostly have no built features. This classifies them as only locally significant lines of movement that were used irregularly. Tracks, secondary roads, and paths are commonly used for long periods, as their use is undisturbed by changes in ruling powers. As we are bound to the modern concepts of roads, it may be very hard to understand that modest-looking paths can be important parts of the communication network. As such they are well suited to the existing needs.

Despite classifications, in reality the final appearance of the thoroughfares resulted from several factors. This means that they vary greatly and distinctions between them are far from clear. For instance, milestones were set along roads without paving, and paving existed without milestones (Graf 1997a: 273). Also secondary roads occasionally had paving (Eadie 1984: 216). Thus, e.g. Fischer et al. (1996: 67) consider only the presence of milestones as an indicator of a public Roman highway. The road under discussion in this study would be classified, according to what is presented above, as a secondary road. It was not an official road, as there are no milestones or official mentions in written sources. However, it has features that indicate careful construction that would not have been carried out for minor connections.

How different communication lines were called by their users remains uncertain. Several ancient terms seem to have a different meaning depending on the context, which makes research difficult (see e.g. Dorsey 1996: 211-243). Interestingly, while discussing the origins of the English terms, Morriss (2005: 10-11) notes that road terminology derives from words meaning movement, travel, riding, or carrying. The vocabulary thus seems not to derive from the physical characteristics of a road but from its functions. On the contrary, the Persian term for road (ratha) originates from the word for a chariot. Therefore it can be assumed that the term referred primarily to official roads passable by carts. (Graf 1993: 150.) The Latin terms via or strata are also mainly used in relation to state-controlled lines of movement. Furthermore, they were often renamed for the personal prestige of the Emperor, as an indicator of a new era in rule (Witcher 1998: 61). The word limes, later known as a border zone between “us” and “them”, originally meant a path or a road (Parker 1986b: 1).
Local inhabitants saw long-distance roads in their own home environment. For them, the roads were mostly important as inter-regional communication lines. For instance, the term Silk Road was first used only during the late 19th century, in the time of Romanticism (Foltz 1999:1). It indicates that the entire length of a long-distance road, or interlinked roads constituting a long-distance connection, was not named as a single entity earlier. However, the wide reach of these roads connected the local economy to bigger markets and therefore these roads as a whole were not to be completely ignored.

6.2 Road functions

Roads are formed due to the rising needs to communicate between two places or within a chain of several places. States of the ancient world built roads primarily for military reasons (thus they were called via militaris) and control over roads was often a matter of conflict (Maraqten 1996: 217-218). Roads served the administration and cursus publicus (i.e. state courier); trade goods were transported along roads to meet economical interests (see Graf 1993: 150; Roll 1999: 109; Bowersock et al. 1999: 671). Herders do not need roads, nor do people moving with light baggage. Short distances are travelled without any facilitating infrastructure. Locals usually knew their surroundings well enough to be able to choose the best route to proceed without requiring the help of roads. However, if roads were available, locals adapted to use them (Haiman 1989: 187). Travellers from far away in unfamiliar environments were most in need of well-established roads. Demands for a fast or safeguarded journey highlighted the need for built roads. As the sedentary way of life became dominant, the products of livelihood required more carrying, storing, and organised infrastructure.

Soldiers, messengers, traders, and state officials were the main users of roads. Furthermore, taxpayers to submit their duties, peasants and buyers to meet in markets, missionaries or other distributors of religions and ideologies, mobile craftsmen in search of work, travellers exploring the world, robbers to prey on travellers, banditry, fleeing criminals etc. took advantage of the existing roads (see Dorsey 1991: 3-4 for discussion). Especially when the Levant became the Holy Land of Christianity, its religious centres attracted pilgrims who made heavy use of the roads.
Caravans were a company of travellers who were bound together for mutual protection (Maraqten 1996: 213). However, according to Kloner (1996: 135), caravans on difficult routes could not exceed more than twenty camels in order to enable co-ordination during long ascents. Thus the caravans on the Jabal Haroun route were probably small and their movement had to be controlled.

Usually travellers had a very concrete objective for their travel. However, at the same time they unconsciously transmitted ideas, cultures and languages. Major religions have spread along roads, such as Christianity to Europe, Buddhism to China, and Islam to the Far East (Foltz 1999: 8-9). Bodies of water have also been very important in linking places and peoples. Until the 19th century, news and novelties were spread only as fast as one could move. Therefore, the practical and symbolic aspects of roads should not be considered as contradictory; they are simultaneous and intertwined. As Witcher (1998: 60) states, the physical space contains social meanings of ideology, power and identity. What appears purely utilitarian also possesses commonly shared values. Another question is how widely people agreed on same values and aspects and how well known they were among the travellers with various backgrounds.

6.3 Location of ancient roads

Roads are formed in locations that are found to be attractive to travel or that happen to be situated between territories that have a need to interact. This means that the reasons behind the placement of a road can rise from inside the area or can be given from the outside. New technologies allow new route options and make new road lines more favoured than the ones in use earlier. Sources powering movement changed over time and varied from traveller to traveller. Moving on foot or by horse, horse and cart, donkey, or camel was directly reflected in speed and favoured routes.

Natural factors promote continuity over centuries, whereas changing political, social, demographic, military, and economic circumstances cause roads to thrive, diminish, and change place. The qualities outweighing other possible route options are ease of
travel, shortness of travel time, and safety of travel. The safest and least risky options seem to have been the most favoured, even if more time was needed for travel (Madry and Rakos 1996: 105). This was the case especially when the cargo was heavy and valuable but kept well, as were most of the long-distance trade goods. When time was a more relevant factor, the same option was possibly still preferred, as a short but difficult stretch of terrain may not reduce the time needed.

The availability of fresh water sources, grazing land for animals, and local food products were important for caravan travel (see e.g. Koucky 1987: 74). More profit was gained when the full capacity of trade goods was transported. The importance of populated routes offering supplies to maintain the travellers was thus emphasised. Unrest, hard climatic conditions and difficult terrain, lack of natural shelter, water sources, or population caused detours around certain areas.

Mountains were avoided, as crossing them always required extra effort. Instead, valleys and plains were preferred, as roads could run in a straight line (e.g. Dorsey 1991: 40). However, there may also have been difficulties in crossing even terrains, such as swamps, damp soils, or sand dunes. Foothills at a raised altitude were even more favoured than plains (ibid. 41-42; Fischer et al. 1996: 65).

If roads had to cross mountains, the chosen route tends to be defined by minimum changes in altitude, i.e. as little descending and ascending as possible (e.g. Dorsey 1991: 41; Mitford 1989: 329). In the case of a Celtic passageway in French Burgundy, routes via the tops of mountain ridges and with a maximum visibility to nearby hillforts were preferred (Madry and Rakos 1996: 123). Roads in Taurus in Turkey (Mitford 1989: 329) also ran along high courses with good visibility. However, in rugged landscapes this strategy was impossible. Instead, moving along lower slopes and following watersheds was common (e.g. Meshel and Tsafrir 1974: 112). Keeping some distance from the wadi lowered the risk of floods and allowed as much visibility as possible. However, courses along slopes above meandering wadi bottoms inevitably had to cross to the other side in places. This meant sharp curves and a risk of floods.

In some cases, roads followed wadi bottoms. However, wadi bottoms cannot be passed during heavy rains. Therefore they were only in periodic use. Visibility in wadi
bottoms is often limited, vegetation may be abundant, and rain and erosion may transport boulders there (Kloner 1996: 128; Fischer et al. 1996: 66). Guiding or facilitating road-related structures cannot be placed on wadi bottoms or even in the vicinity, as they would be washed away with floods. In the western mountains of Judea, wadi bottoms were avoided as much as possible during the Roman period. If not avoidable, the stretches there were as short as possible. (ibid.) On the other hand, the Siq of Petra shows that narrow canyons were used as important thoroughfares if water conduction systems were abundantly built around them to keep them dry.

The survey of the Roman roads between Jaffa and Jerusalem by Fischer et al. (1996: 65-66), suggests a pattern for road distribution: in wide valleys the preferred route was along the valley, usually near the surrounding foothills. In rugged escarpments, the roads ran either via mountain spurs up to high grounds or through gorges to the inner watersheds of the escarpment ridge. However, all rules explaining the placement of roads are, of course, sheer generalisations. A road hardly ever rigidly follows a certain principle, but is adapted and adjusted to best suit local conditions and set priorities. Interestingly, Fischer et al. (ibid. 107-109) also discuss a case where the easiest route possibility was neglected, apparently due to political decisions. Instead of an easy access, another road lining became the main thoroughfare, although it displayed all the disadvantages of roads running along wadi bottoms.

6.4 Road construction

Road widths tend to vary greatly even within a single example. Dorsey’s (1991: 18-19) comparison of ancient road widths, compiled from several road studies, displays this versatility: in Minoan and Mycenaean Greece, roads were on average some 3.5-4 metres wide, and in the Old Kingdom of Egypt they measured some 5 metres. The Roman Via Appia measures 3.6 metres at its narrowest, Via Flaminia extends between 4.2 and 5.2 metres, and Via Salaria measures 6 metres in width. The Roman road in Syria between Antioch and Chalcis was some 5-6 metres wide and the gravel roads in Europe ca. 6 metres. Some roads have always had one lane, others two lanes. Emperor August was much in favour of standardisation and set the width of the city decumanos
as 12 metres, *cardo* as 6 metres, side roads as 3.6 metres and single-lane roads as 2.4 metres. As ancient wheeled vehicles were some 1.5-2 metres wide (*ibid.* 23), narrower roads must have been intended for walking and riding only. A so-called Nabataean road between Petra and Gaza, studied by Meshel and Tsafrir (1974: 105-118) on the Israeli side, had an average width of 5 metres. However, in some places the road narrowed down to 1 metre or widened up to 12 metres.

Road beddings, kerbs and pavements have been widely documented around the Roman Empire (see e.g. illustrations in Sitwell 1981: 26; Morriss 2005: 113; Fischer *et al.* 1996: 75). A classical Roman road was well built with embankment, bedding layers and pavement. For drainage purposes the level of the road was raised slightly above the surrounding ground. However, not all Roman roads were built in the same manner. For instance, drainage is not a common problem in the Near East and embankments were therefore not needed there. Kloner (1996: 127) emphasises that the constructed parts of the roads in the Near East have served to prevent erosion.

Earlier road structures were integrated and transformed into the Roman model. They are mostly untraceable today, as they are located below the later structures. (Graf 1993: 152, 157 and 1995: 264 for discussion.) However, in his studies on the early roads in the Near East, Casson (1974: 50) has concluded that the encountered surface pavings almost match the later Roman examples in technique. On the contrary, Meshel and Tsafrir (1974: 106) for instance, argue that road beddings or surface pavements were not built by the Nabataeans.

All in all, the roads in the Near East were mostly unpaved. According to Kennedy (1982: 138) and Graf (1997b: 125), traditional paved Roman roads were not built in difficult terrains, provincial peripheries or desert frontiers. Furthermore, it is noteworthy that the definition of a paving is not always clear. While Meshel (2000: 99) states that a beaten earth road is paved, the authors cited above connect the term to a stone covering. The presence of pavements is commonly considered to indicate the use of carts for which a smooth surface was needed. However, unpaved roads were also used for wheeled traffic (Dorsey 1991: 25-28 for discussion). Furthermore, several roads were paved to enable the infantry to move as quickly as possible (Morriss 2005: 31).
Road lines in gentle terrains are often cleared of loose stones and equipped with side kerbs. The kerbs of the Nabataean road on the Israeli side of the Wadi Arabah, investigated by Meshel and Tsafrir (1974: 110), are made of undressed stones. It means that the shape of the kerbs depends on the size of the natural stones found in the road surroundings. Similar, Roman roads bordered by stones cleared from the course were common in deserts and steppes (Kennedy 2000: 115), as well as on basalt plains (Kennedy 1982: 138). In some Palestinian examples, the kerbs become wall-like shoulders between 0.5 and 1.5 metres wide (Kloner 1996: 124). The “shoulders” have a structure of double walls filled with rubble. Also central spines to separate the lanes are rather common, e.g. the *Via Nova Traiana* featured a spine along with a kerbing wall (Kennedy 2000: 88).

In steeper environments, retaining walls towards the slope are often needed to reinforce the road against rains. Stones are bigger and more carefully laid than in kerbs for better durability (Fischer *et al.* 1996: 76). Some of the retaining walls can extend up to four metres in height (Kloner 1996: 129). Single rows of stones support the roadways at the edges facing the slope when the inclination is more modest. The structure allows maintaining a horizontal surface (Meshel and Tsafrir 1974: 112).

The demanding physical characteristics of the Near East landscape forced builders to develop special solutions for the most difficult stages of roads. When the slope is very steep, the road zigzags or contains rock-hewn steps (Harel 1959: 177; Dorsey 1991: 40-41; Fischer *et al.* 1996: 77, 79). Kloner (1996: 115-116) has studied the stepped roads in Roman Palestine and presents figures such as a width of 3 metres, a depth of 0.6 metres, and a height of 0.07 metres, although there is considerable variation depending on the terrain.

Roads have been marked in various ways. Marking becomes more important when the risk of getting lost grows. The Romans standardized the usage of milestones at set intervals. Besides marking the way, the stones contained information on the territory within which the road was located. However, Roman milestones are less common in southern Jordan than in the north (Graf 1995: 241). The use of milestones thus varied between regions in the Roman east (Graf 1997b: 125 for discussion). Furthermore, the
milestones were not as commonly used by the Nabataeans as they were by the Romans and Nabataean milestones lack inscriptions (Meshel and Tsafrir 1975: 4-6). Pole holes are also found along roads. However, they are given no explanation (e.g. Zayadine 1992: 225) or they are identified as holes for torches or for poles marking the way (Lindner et al. 2000: 542).

Tombs were commonly placed along roads. Witcher (1998: 65) maintains that the presence of tombs and cemeteries along roads gives depth and meaning to them. Nabataean sanctuaries are often found along roads. However, the close association of the Nabataean holy places and water structures is even more distinctive (Lindner and Gunsam 1995a: 207; Schmid 2001: 377).

Bridges were needed for crossing large masses of water. Already late Accadian texts indicate that they were used. However, floats etc. for crossing water were more common than bridges prior to the Romans (Dorsey 1991: 34) and even after them (Morriss 2005: 130). In the Jabal Haroun area, there are no constantly flowing watercourses. However, some bridging might be helpful for crossing steep and narrow gorges. Indications of this type of use are found in the surroundings of Petra (Kloner 1996: 130) and along the Via Nova Traiana (Eadie 1984: 216). Furthermore, Nabataean bridge remains on both sides of a wadi have been identified in the village of Wadi Mousa (Amr et al. 2000: 238) and there are several Nabataean bridges in Petra.

6.5 Structures associated with ancient roads

6.5.1 Definition and terminology

Various structures are commonly found along roads and interpreted as related to the roads. For example, studies in the Negev have revealed that Nabataean sites clustered along the Petra-Gaza highway (Haiman 1989: 187). In the Heshban area north of Madaba and the Dead Sea, the Late Roman settlement pattern followed the alignment of the Via Nova Traiana (LaBianca 1990: 173).
Road-related sites are called by various terms. Abundant terminology is also seen in ancient languages, e.g. in Assyrian cuneiform texts, Persian (Graf 1993: 150-151), Greek and Latin (Parker 1995: 252). Modern scholars tend to link naming and dating. For instance, remains are seen as either caravanserais and thus non-Roman or as forts and Roman (see e.g. Eadie 1984: 219). This means that the interpretation is determined by predefined concepts rather than detailed studies.

The categorization of road-related structures is complex, as the relationship is not always evident. The associated sites may be attached to the road or situated very close to it and thus directly interact with the passing road. These sites were probably built solely due to the road. However, associated sites can also be located further away, which means that they did not always interact directly with the road. Their direct contact with the road occurred only if needed. Structures located further away could also have stronger local meaning, i.e., they operated partly for the road, partly for local needs. In the case of physical distance between a site and a road, a good reason is required for assuming a relationship. Such a reason can be e.g. visibility. If the locations of sites and the passing road correlate with intervisibility, it can be argued that they are connected (Madry and Rakos 1996: 104).

Parker and his colleagues studying *Limes Arabicus* have considered several factors when classifying encountered structures and analyzing changes over time. Surface pottery, construction methods, size and inner division, as well as site location within the environment and in relation to other archaeological remains have been taken into consideration. (Koucky 1987: 52-71.) On the other hand, Parker’s typology of Roman and Byzantine forts in Jordan is based solely on the structure itself, not on site location. He focused on the overall plan, size, location and type of towers, gates and internal arrangement of sites (Parker 1995: 251).

The identification of smaller structures with fewer features to observe and classify varies between authors and is often neglected completely. However, these small and usually very modest ruins form the main material for this paper, and they are not rare in other studies either. For instance, Meshel and Tsafrir (1974: 111, 113) have described building remains close to Avdat in Israel that measure only 2 x 2 metres or even less in size. In this study, the classification of road-associated structures is revised. The
parallels referred below date from the Nabataean to the Islam period and they often display marks of use from several periods. They come from northern Jordan, Israel and the Wadi Arabah. Even as the parallels derive from projects carried out in environments differing from the FJHP survey area, they are seen as suitable to show the variation in interpretations. A classification criterion deriving from them is then reflected to the FJHP material.

However, it is impossible to determine the function of some structures. Even finds may not be of help. For example, the excavations of the legionary fort of 2000 men at Lejun revealed only some pieces of weaponry. Most of the finds consisted of common ware pottery used for cooking and storing, which is similar in both military and civilian contexts. (Parker 1990: 374.) The situation is similar in caravan overnight stops, as no distinctive artefacts are left by caravans on their transit. Although Petra was a famous producer of perfume unguentaria, it is highly unlikely to find these vessels on caravan halts close to the city. The products were targeted for export. Furthermore, the Nabataean fine ware was long believed to be produced only for cultic purposes (Schmitt-Korte 1997: 228). However, as the commonness of fine ware in the FJHP survey also indicates, this was not the case. Unpainted fine ware was used as household ceramics, while painted vessels most likely served for both secular and cultic purposes (Schmid 2000: 154-156).

6.5.2 Watchtowers and toll houses

The identification of small one-room buildings that are abundantly found along roads is particularly important for this study. In many studies they are interpreted as constructions intended for observing traffic on the road. They are thus called checkpoints, watchtowers, guard posts, and signalising stations. However, there is no clear-cut evidence that all the sites were manned by (military) guards or all of them transmitted signals even in the frontier area (see Clark and Parker 1987: 179-181), although Diodorus Siculus (XIX/97.1-2) mentions the Nabataeans using signalisation for warning about the arrival of enemies. Thus the term watchtower is preferred in this paper, as it is a more open concept that can refer to observation for various reasons.
The identification of watchtowers is often based on location. Towers tend to be located on high grounds intervisible with other similar sites (Parker 1997: 117). Single watchtowers are identified in dangerous locations along roads (e.g. Meshel and Tsafrir 1975: 8), such as in places where visibility is reduced and the terrain is difficult to cross. However, investigations have also suggested that towers were used for guarding surrounding fields (e.g. Fischer et al. 1996: 100) or water sources (e.g. King et al. 1989: 208-209).

It is considered as a particularly Nabataean practice to build towers in major road intersections (Koucky 1987: 64) and overlooking wadis in the desert fringe (Parker 1986a: 250). However, also Late Roman and Early Byzantine towers were located near tributary banks, e.g. of Wadi Mujib (Graf 1997a: 276). Parker (1997: 117) explains their location at the border zones, both during the Nabataean and Roman periods, as resulting from the need to control nomads moving along wadis between the desert and the settled land. In the fringes of Wadi Arabah, towers are seen as structures for monitoring the road traffic leaving and entering wadis (e.g. MacDonald et al. 1986: 409).

According to Koucky (1987: 59), “Single rectangular structures still standing several courses high have been designated as towers”. Also Gunsam and Lindner consider the massiveness of remains as an indication of function as a watchtower (Gunsam 1997: 36). On the other hand, if the general size of a site along a road is small, regardless of the shape and inner division, this is often considered as a sufficient reason to identify the structure as a watchtower (see e.g. Graf 1995: 243, 252). However, structures as large as 21.5 x 16.5 metres have also been given the same identification (Parker 1986b: 44-45).

The size of a structure has also been used for dating. According to Koucky (1987: 64), Nabataean towers east of the Dead Sea are remarkably small. They measure from 3 x 3 to 6 x 6 metres in size and have dry-laid walls ca. 1 m thick. Building stones are small but well fitted together and often trimmed; the towers were not high. Late Roman and Early Byzantine towers, on the other hand, measured over 10 x 10 metres. They were high and had thick walls of cut stone blocks bound with mortar and covered with plaster. (ibid. 66, 71.) However, not all scholars agree on this definition. For instance,
according to Graf (1997a: 274), a small structure which is located in Madaba plains, sized 7 x 5.5 metres and made of ashlars is a typical Roman road post.

All things considered, location is the most important factor for classifying watchtowers. The location of a watchtower allowed observation of the surrounding terrain and the man made structures within it. Although some studies emphasise that the rectangular form and the prominence of remains indicate the function, Johnson (1983: 270-279), in a discussion of watchtowers in Europe, has shown how versatile towers were in shape and construction method even when they were built for the same purpose and around the same time. The situation apparently was similar in the Near East: the final shape and size of the structure was an outcome of the local conditions.

Posts for tax collecting were necessarily situated directly along the road. To avoid letting anyone pass untaxed or uncontrolled, the toll keeper had to be on call all the time. Thus the house had to include both kitchen and overnight premises, which were most likely incorporated into a single room (Morriss 2005: 207). The description overlaps with watchtower identifications. However, not all watchtowers were necessarily located directly along roads. This would be the only aspect to distinguish the two types of structures from each other.

6.5.3 Forts

There are very few known Nabataean forts. Thus, the amount of forts clearly increased after the Roman annexation. During the Roman period, when a system of forts and fortlets was built, a large legionary fort (castrum) housed hundreds or thousands of men, while a fort or fortlet (castellum) served for some tens of men or had an even smaller crew. These structures could contain several separate features, such as baths, chapels, stables, etc. Today they are called qasr in Arabic. However, it should be noted that this term is also used rather freely in connection with almost any kind of larger structures.

Kennedy (1982: 128-132) hesitates between a Roman fortlet and a well-built farm house, also occupied during the Ottoman period, when discussing a structure in Azrak
area east of Amman. The remains contain several rooms and measure 17-18 m per side. The variation in terminology may, at least partly, reflect an economic change in the character of the military. While the Nabataean army was mostly based in cities (see e.g. Negev 1996: 68) and had only small military attachments on watchtowers (Koucky 1987: 64-66), during the Byzantine period the regional garrisons evolved into agriculturally dependent militia (Parker 1983: 229, 1997: 118). This means that they received land as their salary and their livelihood based on livestock raising and cultivation.

The classification criteria for a small courtyard type of fort and a caravanserai also overlap. Both structures are described as having strong outer walls, inner courtyards, and a row of small rooms for accommodation (e.g. Parker 1986b: 42-43). Considering the value of caravan cargo, it is not surprising that not only forts but also caravanserasi had massive structures. In addition, also their functions might have overlapped. Extant, Roman-Byzantine sources indicate that garrisons, at least in the desert fringe of Judea, also serviced travellers (Gichon 1990: 205-206). Pliny the Elder (XII/32.63) mentions the double function of buildings associated with roads as fortress-caravanserasi. Encountered forts, if located in important transit areas, are thus seen as multipurpose structures combining watchtowers, road (water) stations for travellers, and garrisons. For instance, Parker (1986b: 24-26) describes a *castellum* of this type. It is located some 20 km southwest of Bostra and displays marks of use from the 2nd or 3rd century to the early 8th century A.D.

In the Wadi Arabah region, Roman forts served for the military control and administration of the area, as well as the administration of copper mining and trade (Lindner et al. 2000: 563). Studies in the Wadi Arabah have shown that the so-called forts of Nabataean-Roman date have considerable variation in their construction. Their wall thickness varies from 0.6 up to 1.15 metres. The structures are made of both trimmed and coarse blocks. (Smith et al. 1997: 60-64.)

On the whole, forts are often identified by their larger size. However, the smallest forts can overlap in distinction with several other features of similar size and composition. Thus, flexibility and discussion of several probable functions is needed in the interpretation of these types of structures. However, location may again reveal the
function. Forts are placed in advantageous places as regards a large area while caravanserais and farms are placed specifically in regard to a passing road and surrounding fields.

6.5.4 Caravanserais and posting stations

Studies indicate that inns were places supplying food and drink, and caravanserais (mansio) were also night stops with small hostel rooms (e.g. Meshel and Tsafrir 1975: 13-14). Road stations were more multifunctional. They controlled difficult parts of the course and collected taxes or fees in addition to providing supplies and serving as night stops (Kloner 1996: 131). Posting stations were reserved for the high-speed postal system to exchange tired beasts of burden for rested animals for the purpose of carrying the state mail (Graf 1993: 151; Morriss 2005: 187).

Caravanserais seem to have had a rather standardized and long-lived form. Structures with a similar inner arrangement have been built over millennia in the eastern part of the Mediterranean. Finally they developed into Muslim khans. (Casson 1974: 203.) According to Meshel (2000: 44), caravanserais of the 1st-3rd centuries A.D. in the Negev are characterized by a square shape, a size of up to 40 m per side, a plan with rooms surrounding a central courtyard, and a lack of towers. Adding corner towers indicates a Roman/Byzantine phase of reuse as a fort. Dolinka (2002: 432-433) emphasises that a typical Nabataean caravanserai, built during the 1st century A.D. and kept in operation after the Roman annexation, had an internal staircase tower, which was a distinctively Nabataean feature. It contained rooms of some 3-5 m² in size around a central courtyard. The Nabataean caravanserais are, according to him and on the basis of examples in the Negev and Wadi Arabah, recognizable due to their location on even terrain and by their size, which varies between 16 and 42 m². Graf (1997a: 278) instead describes a caravanserai as large as 40 x 85 meters. He dates the main use of this structure, which is located close to Shobak and along a caravan route from Petra to Amman, to the Late Roman-Byzantine period, on the basis of surface finds. Thus the size of a caravanserai possibly increased with time even while it retained the same form.
In the preliminary survey reports of the Finnish Jabal Haroun Project, the possible function of a building as a caravanserai is proposed on the basis of site location and the largish size of the remains: The size of the building and its topographical location near the junction of two routes suggests that it might have functioned as a small road station rather than a watchtower (Frösén et al. 2001b: 390). Indeed, the strong connection between caravanserais and roads should be stressed when separating caravanserais from farms and forts. Their location is advantageous in regard to roads, not the area in general or to fields in the first place.

6.5.5 Agricultural sites

Sites that are small in size and contain only poorly preserved wall lines a few metres long, or no clearly discernible structures at all, are considered mostly as related to agriculture. The interpretation is reinforced if water sources, such as wadis or cisterns, are located close by (e.g. Gunsam 1997: 40). These sites are naturally found more often in connection with fields than with roads. However, they were more easily built, used and maintained if roads were in the vicinity.

Large Greco-Roman farmsteads in Heshban in northern Transjordan contained round or square agricultural towers some 11 m in diameter. Separate agricultural towers were located along plateau ridges and hills. Agricultural products could also have been stored in silos, parts of houses, caves, tombs, natural shelters, or public granaries. (LaBianca 1990: 172, 184, 194.) The Petra papyri scroll number 10 mentions several “dung depositories” (Kaimio and Koenen 1997: 460). Although nothing is known of the physical appearance of these structures, building remains related to agriculture could thus also have been used for storing and drying dung for fuel. In the Negev, elliptical sites some 1-2 x 3-5 m in size are found on slopes above farms and fields. They are dated to the Early Islamic period and are interpreted as watchtowers for field harvest. (Haiman 1989: 190.)

According to the survey of the Heshban area, farmsteads of the Greco-Roman period were placed on natural hills or on the slopes above wadis, close to fields.
1990: 184). Most farmstead contained outer perimeter walls and had several buildings inside. Thus there is a great risk of confusion with forts or caravanserais. In cases only the site location in relation to roads can be a factor differentiating them from each other. In the Petra area the distinction appears to be easy: the 19 Nabataean rural villages found in the Petra region are unfortified and they do not locate directly along roads (Fiema 2002a: 206).

As more agricultural structures have now been excavated, more attention is paid to them and they are understood better. All in all, agricultural structures seem to have been versatile and to have lacked distinctive or standardised forms. They are probably more commonly found along roads than it has been believed or understood so far. Thus sites along roads should be studied both in relation to the roads as well as in relation to other forms of land use in the area.

6.5.6 Houses and tents

Private houses could have offered accommodation and local products for travellers even when their primary function was to house locals and to serve as storage and animal sheds. For instance, in the northern Sinai a building complex identified as Nabataean was located along one of the main access roads from south to the Mediterranean coast. It belonged to a Nabataean village that thrived on the fringe of a hilly plain by collecting occasional floodwaters into cisterns. The building contained two central courtyards, measured some 25 x 25 metres in size, and was built of local stone coarsely hewn into blocks of 35-40 cm in size. The site was dated between the 1st century B.C. and the 1st century A.D. (Meshel 2000: 3-4.)

The most prominent domestic structures found in Petra have no counterparts in the FJHP survey area. Nevertheless, excavations at the foot of Jabal el-Khubta in the eastern part of the city have revealed small rooms containing the remains of an oven and measuring some 2.5 x 2.5 metres in size. The walls were made of undressed, medium-sized wadi stones without using mortar. There were no indications of stucco or plaster. The remains, later replaced by bigger constructions, date from the late 1st century B.C. to the early 1st century A.D. (Zeitler 1990: 42-43, 45.)
Buildings with pisé walls on stone foundations have been in use e.g. in the city of Pella in northern Jordan until the 20th century (Watson 2001: 485). In addition to erosion, the use of organic construction materials could also explain why some road-related sites have only very few building stones remaining. The use of tents to house people should also not be forgotten. During the Southeast Arabah Archaeological Survey, two areas cleared of stones (11 x 3 and 7 x 1 metres in size) were found, with stones placed at the sides of the clearings. These areas were located between two wadis. The clearings also had an associated stone ring and a stone mound. The site yielded Nabataean-Roman pottery and was interpreted as campsite. (Smith et al. 1997: 57.) Also in the western Negev survey, the painted Nabataean sherds encountered were mainly found at campsites (Haiman 1989: 187). Furthermore, post holes found carved in bedrock at distinctively Nabataean sites, such as as-Sela, indicate habitation mixing tents and houses (Schmid 2001: 371, fig. 11.2 on p. 370).

To sum, various forms of housing have been in use at the same time in the Near East. As a result of this, remains found today can be significantly different from each other. If there are no clearly identifiable house remains it does not necessarily mean that the area was uninhabited. Thus the possibility of continuous tent living of the former nomads should be emphasised. On the other hand, large scale farmsteads and tents could equally have existed side by side.
7 FJHP survey methods

As the fieldwork methods used affect the material available for this study, a brief summary of the survey principles is needed. Every survey method has its own preconditions and problems. These aspects within the FJHP survey, as well as comparisons between various methods, have already been discussed widely (Lavento et al. forthcoming c; Lavento et al. forthcoming d; Miller 1991; Banning 2001). Thus they are left outside of this study.

The FJHP survey employs a principle of total coverage, meaning that the entire area is studied and all marks of human presence are documented. Also environmental parameters, such as erosion and geomorphology, are documented. Furthermore, a strategy of off-site archaeology is used. This means that the continuity and spatial distribution of archaeological material is recorded, not only discrete sites (Foley 1981: 10-11). Off-site archaeology facilitates the study of diffuse human remains, such as roads (Knapp and Ashmore 1999: 2). Continuity is studied by walking tracts covering the survey area and placed according to the local topography. All surface finds are collected, and tracts and sites are documented into their own forms. Architectonic elements are drawn, measured by total station and photographed. If a distinct concentration of artefacts, structures, or both is noted within the continuity, it is separated as a site. Occasionally additional soundings have been made to clarify the character of some of the structures. The survey strategy results in a thorough investigation of a given area.

The survey covered some 7 km² within six field seasons. The tracts measured ca. 50 x 150 metres in size and they were walked with 5-8 surveyors some 5-10 metres apart. As a result, 190 sites have been documented. The Finnish Jabal Haroun Project survey area is, of course, an artificial entity. Large-scale features, such as field systems, habitation layout patterns, or roads extend beyond its borders. To compare findings within the survey area in relation to the areas surrounding it, the survey was extended and the strategy changed during the 2005 season. The new strategy focused on locating
only distinctive sites in an extended area instead of examining the continuity of archaeological material. Beforehand, on the basis of experience gathered during several years of field work, aerial photographs in scale 1:15 000 (from the 1980s) and 1:30 000 (from the 1990s) were studied in order to locate areas with potential sites. An area slightly bigger than the one studied intensively was covered with the new methods. The locations of the sites found were defined by using a hand-held GPS. The sites were documented by means of short written descriptions and digital photography. Small samples of diagnostic pottery were collected. Altogether 167 sites, including both new and previously documented sites, were recorded. (Lavento et al. forthcoming a.)
8 Dating of the FJHP survey material

The FJHP survey has produced a wealth of ceramic material, that is, thousands and thousand of sherds. The pottery scattered around the survey area without a direct connection to structural remains is considered to be related to the practice of fertilizing fields with manure and household waste (see Lavento et al. b). Therefore, in this paper I will only consider the pottery collected on sites. In most cases the pottery is more abundant around structural remains and therefore a connection can be assumed. Furthermore, soundings mostly have produced similar material as the surface collection (see Frösén et al. 2001b: 389). Besides find location, the reliability of dating based on the FJHP pottery finds depends on the quality of material. For instance, quality of firing affects how well the sherds have survived to the present day, and how well they are recognized. Possibly, part of the diagnostic but unidentified FJHP ceramics could “fill” the supposed gaps in the settlement history, if they only were recognised with the aid of more complete and detailed typologies.

In general, the pottery chronology in southern Jordan is based on few site settlement profiles and regional surveys and thus may not be fully reliable (Fiema 1991: 58-59). Nabataean painted fine ware, on the contrary, is well dated (see Schmid 1996 and 2000). However, its stylistic alterations occur at relatively short intervals in a rather short time period, from ca. the 1st century B.C. to the 1st century A.D. Nevertheless, Nabataean decorations and forms were produced until the 4th century A.D. (Schmid 2001: 404), or even up to the 6th century A.D. (Zayadine 1986: 189) without clearly classifiable later changes. Byzantine pottery is not as clearly distinguishable from Late Roman pottery in southern Jordan as it is in the northern part (Watson 2001: 473). As most of the pottery is produced locally, comparative material should derive from close by locations.

The dating of individual sites proposed here is largely based on the study of Nabataean painted fine ware by Sarianna Silvonen (2003), according to Schmid’s typology. As for the other ceramic evidence, I have either used the preliminary reports of the project or looked at the material with the kind assistance of Virpi Holmqvist, who has been working on the ceramic material deriving from the excavations at the monastery.
9 Remains in the FJHP survey area

The remains of the road and the structures associated with it in the Finnish Jabal Haroun Project survey area (Appendix 11, see also Appendices 3 and 7) are presented below as they appear to the traveller approaching Jabal Haroun from the west. After the mountain’s southwestern shoulder, the road continuation is described first towards the north and then towards the east. (Fig. 6.) Also, to complete the picture, remains on top of Jabal al-Farasha and Jabal Haroun are included in the data. Presenting the material in this way and this order was selected due to the reason that travelling is an experience where the landscape is constantly evolving (Wheatley and Gillings 2000: 4). Sites appear in conglomerations or within an overlapping sequence, not one by one or readily categorized. The road as an entity is better reached in this manner.

Fig. 6. The road remains in the Jabal Haroun survey area: the road remains in the western part are marked in red, the northern continuation is marked in green. The alternatives to proceed towards east are marked in blue: a modern car track towards Petra is in dark blue and a modern path along the Jabal al-Farasha foothills is in light blue. Photo: FJHP/Bewley

9.1 The western part

The ascent of the eastern side of the Wadi Arabah finishes in the southwestern corner of the Jabal Haroun survey area. There the intensively studied section of the road begins: a path cleared of stones is lined with a stone wall. Road-related sites are also found nearby. (Frösén et al. 2000: 418.) A description of the area by Jarvis (1940: 145)
coincides with these observations: “On two occasions before we reached the shoulders of Gebel Haroun, I noticed the orderly line of kerb-stones marking on the old made track, and there were three if not more ruined block houses of cut stone”.

A pile of stones along the way (site 56) marks the starting point of the road structures (Frösén et al. 2001b: 389). The heap does not seem to be building remains. However, it can be related to the pilgrims’ habit of placing a stone on the spot where the destination of the journey is first sighted (compare Lindner 1997: 305). In this case, the mountaintop of Jabal Haroun is visible for the first time, while the visibility is otherwise limited. The mountain is still visited by pilgrims and the practice of piling stones is possibly ongoing. The site also features three other smallish stone structures which yielded some 1300 pottery sherds. They included only five painted 1st century A.D. examples. (Silvonen 2003: 49-50.) The material in general was homogenous 1st-2nd century A.D. ware.

Continuing further on, the road enters a small sheltered valley. The slopes surrounding the valley are gentle, and Wadi al-Mahattah cuts the valley bottom. The road follows the orientation of the wadi and travelling is easy. West of the roughly south-north-oriented road are the extensive ruins of a building (site 54) (Frösén et al. 2000: 418). These remains are frequently mentioned by other explorers (e.g. Gunsam 1997: 37; Zayadine 1992: 225-226, fig.1 in p. 235; Lindner et al. 2000: 541-542). Even today the stone tumble of the quadrangular building still measures several metres in height and some 40 x 30 m in size.

The building itself had a size of ca. 7.5 x 7.5 metres (corresponding to 24 Roman feet) (Fig. 7). Large, well-cut blocks of ca. 30 x 50 cm and walls with a thickness of ca. 1.25 metres, as well as the considerable size of the stone tumble spread around the building, indicate that it was most likely a building of significant height. Also the gentle terrain would have allowed a sturdy structure. The site is located on the top of a ridge, at the second highest peak on the valley’s western edge and above the road. The site provides unobstructed visibility towards the Wadi Arabah and the slopes descending towards it (Fig. 8). Also Jabal Haroun is highly visible, as well as the valley below the site, the outskirts of the Petra city walls, the top of Jabal al-Farasha, and the distant Shara
Mountain Range. Most of the modern car track between Jabal Haroun and Petra can also be seen, which is not possible from the highest peak of the valley.

The majority of the ca. 1200 sherds collected at the site consists of Roman-Byzantine pottery. It is the only road-related site, or any site in the FJHP survey area for that matter, which has a considerable amount of Early Byzantine material. In fact, only one piece of painted Nabataean pottery from the early 2nd century A.D. was found (Silvonen 2003: 48). However, stones bossed in the Nabataean/Roman style could indicate the initial construction period of the building (Söderlund: personal
communication 17.3.2005; see also Lavento et al. 2004: 232). Thus the site appears to have been used for an extended period of time.

Only about 200 metres further, on a lower level of the same ridge and directly on denuded bedrock, lie the remains of another building along the route (site 49) (Frösén et al. 2000: 418; compare ben David 2005: 41). The remains are ca. 20 x 30 metres in size. While the centre of the structure contains no indications of partitioning walls, partitions towards the framing outer walls can be barely traced. They form a row of rooms along the eastern and western walls. Furthermore, an attached quadrangular structure ca. 4 x 4 meters in size is found in the southeastern corner. The entire valley is visible from the building. Visibility towards the west and the east is also good; site 54 is partly seen. Approximately 40 metres northeast of the site, at a distance of some 20 metres from the road, are poorly preserved walls that probably also indicate a minor building. The pottery finds within the remains were exceptionally abundant. Some 4700 sherds were collected, 830 of which were diagnostic. They are very homogenous Nabataean-Roman sherds from cooking and storage vessels. The painted Nabataean fine ware dates to the first century A.D. (Silvonen 2003: 48).

Between the sites described above and inside the walls bordering the road, there is clear evidence of pavement within a stretch of ca. 400 metres (Frösén et al. 2001b: 389; see also ben David 2005: 41). This section was recorded as a separate entity, site 51. Even though the pavement is relatively well preserved (Fig. 9), it is missing in some parts, and therefore it is uncertain how long a stretch of road it actually covered. It also remains unclear whether the road had a central ridge to mark two lanes and whether the pavement covered the whole road or extended only along the side kerbs. The remains of the pavement seen today cover only some 0.8 m along the bordering kerbs. An excavation trench set to cut the road remains revealed a cobblestone bedding with a thickness of ca. 15 cm below the pavement. No further courses of bedding were found, even though they are commonly used in Roman roads. The total width of the road between the kerbstone bordering walls measures 4.2 metres. The inner and outer faces of the kerbs are made of stones varying in size and in degree of shaping. The interior is filled with cobbles and silt. The walls extend up to 1.5 m in height and some 1 m in width. Several of the surrounding field terrace walls have also been constructed in a similar manner.
From site 49 onwards the paved road changes into an unpaved path with some kerbing structures still remaining. This section was documented separately as site 95. Interestingly, the kerbs often join the northern ends of field terrace walls (site 94) located between the road and Wadi al-Mahattah on its southeastern side. Field walls are found in close relation to road sides also elsewhere, e.g. in the Judean mountains, where the road determines the form of the terraces (Fischer et al. 1996: 76).

The road first follows the wadi, but then curves eastwards and heads slightly northeast to the point where the remains of yet another building (site 85) are found (Frösén et al. 2001b: 389). The terrain is rocky and thus a terrace has been built northeast of the site. The remains measure ca. 6 x 3 metres and are badly collapsed today. Visibility from the site is excellent to the previously described sites, to Jabal Haroun, and to Jabal al-Farasha, as well as to the modern settlement of Wadi Mousa east of Petra and to the outskirts of the Petra city walls. Pottery finds were poor at the site: it yielded only 7 sherds dating to the Nabataean/Roman period or possibly to a later era.

After passing the site, the path curves and heads north. Again another site with building remains (site 87) is located close to its course (Frösén et al. 2001b: 389). The site is situated on one of a series of southwest-northeast-oriented plateaus of denuded bedrock. The structure is circular and measures 2.5 to 3 metres in diameter. The impact of erosion is severe. A channel grooved into bedrock is situated close by, perhaps for the purpose of conducting water. All pottery falls into the Nabataean/Roman category.
Nearly 600 sherds were collected, among them two painted fine ware sherds datable to the later part of the first century A.D. (Silvonen 2003: 51).

From this point onwards, along the slope and towards the east, the road contains more built features. They were defined as site 82. There is a kerbstone wall and some pavement, as well as terrace walls situated around the site. About 150 metres further, two wadis coming from the northwest join and continue towards the east. Some 100 meters further ahead they unite with Wadi al-Mahattah. More building remains are found very close to the road at both wadi junctions. The first remains (site 83) are located on an extension of a small hill directly south of the road (Frösén et al. 2001b: 389). The walls of the structure are some 2 to 3 metres apart and indicate a round rather than a quadrangular structure, as there are no visible corners. Visibility to the road as well as to the wadis is good. Almost 200 sherds were collected at the site. Five of them were painted and dated from the early 1st century A.D. to the early 2nd century A.D. (Silvonen 2003: 51.) Some of the unpainted sherds could indicate an extended use to the Early Byzantine period.

The best-preserved section of the road runs up p to the next site with building remains. This section features bordering walls on both sides (Appendix 1) and a surface paving. The convergence of several wadis – Wadi as-Saddat, Wadi Umm Khuramah and Wadi al-Mahattah – forms the main water catchment inside the Jabal Haroun survey area, Wadi an-Naqb. The road leads to this point. Building remains (site 88) are located on a terraced small hill south of the converged wadis. The site has a limited visibility mostly to the nearby surroundings. The structure measures ca. 10 x 10 metres in size and is made of relatively large stone blocks of better quality than those used at the very small sites (Frösén et al. 2001b: 390). Inner partitioning walls can be traced to distinguish at least three separate rooms. Furthermore, some additional structures seem to have been built against the outer walls. The site yielded only 9 sherds. Three of them were painted and datable to the early 2nd century A.D. (Silvonen 2003: 51), while the others could be Byzantine. Even though the structure is relatively well preserved, the traces of erosion are heavy.

Northeast of the site runs a modern car track between Jabal Haroun and Petra. The ancient road remains can no longer be seen. The hypothetical continuation of its course
is presented below on the basis of possible road-related sites, as well as topographical considerations.

9.2 The northern part

In order to continue northwards the road had to cross the wadi bed. Remains of a stone wall (studied in connection with tract 133) are situated at the junction of the modern car track and Wadi an-Naqb just after the wadis have converged. The wall remains have most likely been altered when the new car track was built. Even the location of the wadi bed may have changed in the area where the flow of water can be very strong. The stone wall running from northwest to southeast is made of extremely massive stone blocks, carefully laid in courses. The part that has remained intact is 2.1 metres wide, 1.7 metres high and some 6 metres long. The wall has most likely continued to the northwest and crossed the wadi.

Jarvis (1940: 145-146) may refer to this structure when he describes a wall that was built at the wadi juncture for strategic purposes. It was the last stronghold for the defence before an easy access to Petra. “…The Gebel Haroun rose precipitously to the north barring all progress in that direction…. There remained a narrow neck on the shoulder of the mountain… and across this was built a solid wall of roughly-shaped stones… it was not exactly a wall but rather a solid barrage… a very efficient line of defence it constituted…” As an expert on military affairs, Jarvis may well be right. On the other hand, rather similar installations have been found in relation to water control (see Lindner and Zeitler 1997/1998: 550). The most massive barrages in the FHJP survey area are located near the wall, in Wadi as-Saddat, northwest of the wadi juncture (Frösén et al. 2001a: 371; Lindner et al. 2000: 541).

It seems that besides crossing the wadi, the road also forked. One branch continued east towards Petra (compare Zayadine 1985: 164). The other, the so-called Naqb Mustajli route, curved northwest along the Jabal Haroun mountainside (compare Lindner et al. 2000: 545).
The remains of a building (site 118) are situated above the crossroads, on a steep southwestern foothill of Jabal Haroun (Fig. 10) (Frösén et al. 2003: 312). The site is constantly affected by severe erosion. However, the location provides excellent views towards the alluvium of Wadi as-Saddat. The remains indicate a quadrangular structure that measured some 3-4 metre on each side and had a doorway on its western side. Only two pieces of Nabataean pottery were found nearby. The lack of finds cannot be explained only by the steepness of the slopes and by heavy erosion, because more sherds are usually found on even steeper terrain.

![Site 118 overlooking roads and fields. Photo: FJHP/Kouki](image)

Some 200 meters west of the previous site are the remains of another small quadrangular building (site 112) measuring ca. 4 x 4 meters in size. Three wall lines are still seen on top of a hillock with steep slopes on its western, southern and eastern sides. Towards the north, the hillock evens out into a ploughed field. Even though the hillock is not very high, it is the highest point in its surroundings and it provides good visibility towards the road and to site 118, as well as to several field terraces that are located around it. Again, the pottery collected indicates a Nabataean-Roman dating.

Currently the car track along the southwestern foothills of Jabal Haroun is bulldozed in order to cross the area that is littered with boulders eroded from the upper slopes. Only when it reaches the area west of the Jabal Haroun top plateau does the road pass into smooth terrain and meander along ancient field terrace walls. There are no marks of the ancient road.
A building ca. 4.5 m in diameter (northern part of site 25) made of sandstone slabs is located 600 metres northwest of site 112. It is located on top of a small hill, west of the foothills of Jabal Haroun, and some tens of metres west of the end of the modern car track. The location of the site provides extensive visibility towards the steep Naqb ar-Ruba’i ascent, which has to be descended in order to continue towards Wadi ad-Dulayah. A larger feature ca. 45 x 45 m in size is located on a small plateau below and west of the building remains. It is cleared of stones and contains an abundant collection of ceramics and lithics. The building and the clearing were regarded as belonging to the same site (i.e. site 25) due to their direct association, even though a water guide runs in between them. Local Bedouins use the clearing as a campsite. It is one of the few suitable locations for larger-scale camping in the vicinity of Jabal Haroun (compare Lindner et al. 2000: 539). The site yielded homogenous Nabataean-Roman ware with 6 painted Nabataean fine ware fragments datable to the later part of the first century A.D. (Silvonen 2003: 49).

Close to the probable course of the ancient road equalling the modern car track, several other structures are found between the point where the road branches at the beginning of Wadi an-Naqb and the northwestern end of the survey area. These structures are located from some tens up to a few hundred metres away from the present car track. They do not provide the extensive visibility that characterizes most of the sites described above. Instead, they are scattered in topographic locations suitable for human presence.

Sites 19, 22, 32, 36, 43, 44, 45, and 47 are all small building remains indicating active land use of the area. As the area displays the gentlest terrain within the FJHP intensive survey, it is not surprising that it is dotted with small remains that were most likely related to cultivation of the area and the tenders of the fields. No particular functions can be assigned to the sites without excavations.

Site 37 is located at the bottom of a tributary wadi in the northwestern foothills of Jabal Haroun (Frösén et al. 2000: 420). The modern car track runs west of the site. The structure, some 6 x 10 m in size, is a platform, the centre of which contains a rounded depression lined with stones. The structure is surrounded by a semicircular wall from which steps lead down to the centre. Related water channels indicate that the structure
had a function associated with water. In their description of a so-called Pond Temple, Lindner and Gunsam (1995a: 212) interpret a structure as cultic when it is connected to water and a passing road and when there is a sacred mountain nearby.

Four circular or rectangular stone constructions are found at the bottom of Wadi as-Saddat (site 35). Against expectations, test excavations yielded no indications of their use. Site 29, a stone enclosure, contained some Nabataean pottery but no other indicative features. Site 18 was also devoid of finds. Stone piles along roads are often considered as road markers (Morris 2005: 245) or stone collections for kerb building (Meshel and Tsafrir 1974: 116). However, these interpretations do not seem to fit here. The piles seem to attest to general occupation of the area rather than the passing road. In fact, these installations might be relatively recent storage constructions or animal enclosures. A large round structure measuring 5.2 x 3.5 m and containing a hearth as well as a limestone pile inside (site 24) also seems to indicate a late date. No artefacts were found in association with the structure. It appears to be a lime kiln, the last limestone firing of which was never carried out. (Frösén et al. 2000: 421.)

9.3 The eastern part

After the crossroads, the modern car track to Petra orients itself towards the east along the bottom of Wadi an-Naqb. The orientation of the road could have been the same also during the Nabataean-Roman times. However, the locations of building remains towards Petra do not seem to be bound to the proximity of the wadi bottom, but they are situated higher up along the slopes of Jabal al-Farasha and Jabal Haroun.

Today a path frequently used but featuring no built structures runs along the northern slopes of Jabal al-Farasha (Fig. 11). It starts behind site 88 and climbs up the slope until it reaches an upper plateau extending from Jabal al-Farasha towards the northeast. On a hillock above Wadi an-Naqb and in the foothills of Jabal al-Farasha, only slightly away from the path, there are two heaps of stones (site 119) (Frösén et al. 2003: 312). The location provides views both along the wadi below and to the slopes of Jabal Haroun and Jabal al-Farasha on both sides of it, as well as towards the road remains in
the western part of the survey area. The current condition of the site is poor. Bigger building blocks have tumbled down the slopes and thus hardly any interpretation of the size and the form of the original structure can be given. However, similarity to the sites described previously is evident. The pottery collected is again homogenously Nabataean-Roman.

Some 100 meters further east, on the north side of the wadi, there are two visible wall lines (site 149). The site is located only somewhat above the wadi bank and partly cut by the modern car track. The damaged wall remains measure only a few metres and bond in one corner. Erosion is heavy and the remains are partly buried under colluvial soil. Five ruined field terrace walls are located close to the site. The terraces contained Nabataean pottery similar to the find material from the site itself – which only yielded two sherds.

Before the present path enters into the plateau extending northeast of Jabal al-Farasha, there is a narrow pass. Slopes descend on both sides of it. A long wall on the southern side of the path runs parallel to the pass. This could be the only structural evidence, the supportive side wall, remaining from a road once located there. The wall measures several tens of metres in length and 1 metre in thickness, and it is built of two walls of stones filled in between with rubble.
Several sites are located on the plateau. They would have been easily reached from the passing road. However, the terrain on the plateau is very rocky and a road there would have required an extensive stone clearing operation and possibly also some artificial evening of the ground for safe travel. There is no evidence for such operations, although they were common activities in ancient road building.

Site 128 contains the remains of several buildings. It is located in the southwestern corner of the plateau, south of the present path and at the edge of Wadi al-Muqablayn, a tributary wadi flowing down to Wadi Aial Aid (Frösén et al. 2003: 309). The complex measures some 50 x 75 metres. Altogether 14 wall lines were located (Fig. 12). Some building stones bear marks of Nabataean stone working and the pottery collected is Nabataean. Two soundings revealed that the site was built on bedrock that was partly evened in order to accommodate the buildings. Also a rock-carved water channel was found. The visibility from the site is limited to nearby areas. In fact, the location of the site is rather sheltered. Similar sites, identified as villages, have been found in vicinity of Petra (Amr et al. 2000: 233; Lindner et al. 1988: 84).

Some 40 metres north of site 128 are the remains of a rectangular building (site 136) about 6 x 8 m in size (Fig. 13) (Frösén et al. 2003: 310). Visibility at the site is good because it is located on one of the highest points of the plateau (Fig. 14). In a few places the outer wall still stands a few courses high. The wall is some 0.8 m wide, constructed of double stone walls with a rubble infill. Some of the building stones are
dressed, others are irregular. There is also an inner wall, which is located some 1.25 meters inside the outer wall, in the southern and the southeastern part of the building. It is formed of a row of long sandstone slabs placed directly on the bedrock. The northwestern corner is rounded and separated. Furthermore, there is a protruding part on the eastern wall. Pottery on the site was generally scarce. The surface collection nevertheless yielded some Nabataean-Roman common ware.

Due to differences in construction, the walls are probably not contemporary. The technique of the outer walls, collected pottery, the vicinity of site 128, and the possible road continuation suggest a Nabataean dating. However, alterations in the shape of the structure and the addition of inner walls indicate later changes. Similar structures are found in the Negev, where they are interpreted as Late Byzantine to Early Islamic successors of the Nabataean and Byzantine cultic structures (Avni 1992: 179-180, plans in p. 74). They are identified as open-air mosques containing a mihrab that often faced east during the era of Islamization (Sharon et al. 1996: 112-113).
Some 250 meters northeast of site 136, on the plateau’s northern ledge above Wadi an-Naqb, there are poorly preserved building remains (site 141) (Frösén et al. 2003: 312). However, the tumble of stones is relatively massive and clearance would likely reveal some form to the structure. Visibility at the site is relatively good along the wadi below and towards the foothills of Jabal Haroun on the other side. The path crossing the plateau is located some tens of metres south of the site. The site is presently not seen from the path, as it runs slightly higher. However, when the building was at its original height and if the ancient road ran along the course of the modern path, the road could most likely be seen. Again, the ceramic finds from the site contained some typically Nabataean ware.

Some 300 meters northwest, in the low foothills of Jabal Haroun, are located the relatively well preserved remains of a building (site 151). Their good preservation may result from the site location on top of a rounded, gentle ridge with views towards the southeast (Sabra), southwest (Jabal al-Farasha) and northeast (along the lowermost foothills of Jabal Haroun and the modern car track towards Petra). Three wall lines are discernible, indicating a quadrangular building ca. 4 x 4 meters in size. Again several field terrace walls are located close by. Some sherds with Nabataean-Roman qualities but without distinctive forms were collected on the site.

The path crossing the plateau runs along a straight line as there are no significant obstacles requiring detouring. The plateau slopes gently towards east and the terrain.
changes from rocky to sandy. The path shifts to the northern side of the plateau and
unites with the modern car track as the track departs from Wadi an-Naqb before facing
the bedrock exposures on the western side of Wadi al-Waqit. At the junction there is a
rock-carved shaft grave. Further northeast, directly along Wadi an-Naqb (the name
Wadi Abu Ullayqa is also used for this part of the wadi), there are sites (166, 180, 184,
176) with Nabataean inscriptions, rock-carved niches containing *stelae*, water channels
and walls indicating building remains (Frösén *et al.* 2004: 112; compare Lindner and
Gunsam 1995b: 277). A site (164) with a lot of Nabataean painted fine ware pottery
and building remains, including column drums, was found on a plain north of the wadi.
Again all the sites in question feature material with Nabataean characteristics.

9.4 Jabal al-Farasha and Jabal Haroun

Remains of a large L-shaped building some 7 x 12 m in size (site 124) are located on
the top of Jabal al-Farasha (Frösén *et al.* 2003: 309). In Petra, Nabataean structures,
interpreted as cultic, are found on top of almost every rock (Schmid 2001: 377). Wall
lines are well preserved on the eastern side of the building, while the western side is
mainly collapsed. Nabataean diagonal stone dressing is evident on large boulders
forming the two faces of the walls. The walls are some 2 m thick and their interior is
filled with sandy rubble. Four soundings revealed mostly Nabataean-Roman pottery
with some probably more recent sherds. Also the surface scatter contained similar
material.

The site is isolated due to the difficult ascent to the mountaintop. However, visibility
from the site is remarkable. Towards the west, the Wadi Arabah and the road heading
southwest of the FJHP survey area are clearly seen. Towards the north, the Jabal
Haroun top summit is visible, although the remains on the Jabal Haroun top plateau
(see below) are not seen. Visibility is most extensive towards Petra and its outskirts.
For example, the so-called Snake Monument, a monumental stone carving of a snake,
can be seen. Visibility towards Sabra is also good.
In addition to the monastic complex (site 1) (Fig. 15), several other sites were also found on the Jabal Haroun top plateau (Frösén et al. 1998: 492-494 and 2004: 111-112). Rock-cut water channels (sites 182 and 10) and cisterns (sites 5 and 10), as well as a terrace wall system (site 181), enable extended human presence on the mountain. A rock-cut staircase (site 6) leads to the mountain’s northeastern summit. Presently the summit contains a Muslim shrine (the so-called *weli*) (Fig. 15). Remains now serving as its foundation (site 7) indicate also earlier structures at the same location.

The masonry work of the monastic complex, the cistern at site 5, and the wall lines below the Muslim shrine is Byzantine in style, and so is a wealth of surface pottery. However, several rock-cut sites, surface finds both at the *weli* and on the top plateau, as well as structures found incorporated into the Byzantine monastic complex, indicate active Nabataean presence on the mountain.

A podium or a platform is located on the northwestern wall of the monastery (Frösén et al. 2001a: 365). Originally it appears to have been a room which was later filled to form the podium. Also another room, originally two storeys high, was found to be attached and likely related to it (Frösén et al. 2002: 392-394). The masonry of the structure is characteristically Nabataean. Plaster remains on the walls as well as elaborate features, such as staircases, pavements and arch remains (Frösén et al. 2001a: 365-367) differentiate it from the other building remains found during the FJHP survey.
The road remains in the Jabal Haroun foothills are not located far away from the mountaintop. However, travelling from the foot of the mountain to the top takes half an hour even with light baggage. The present path on the western side of the mountain bears marks of ancient stoneworking before reaching the top plateau. The marks are characteristically Nabataean with herring-bone chiselling. On the southern and southeastern side of the top plateau runs another path. It follows natural bedrock ledges and displays only a few rock-cut places (Frösén et al. 2001a: 373). Several petroglyphs, mainly footprints, are carved in the bedrock along the route. It is a pilgrim’s habit to commemorate the journey by leaving footprints (Lindner 1997: 305), although footprints are also found in profane contexts (Nehmé 1995: 431). In the lower foothills, the path is also supported by retaining walls.
10 Remains in the extended survey area

The road continuations and related sites (Appendix 11, see also Appendix 7) outside the survey area proper are discussed below in order to see to what extent the remains change beyond the artificial limits set for the survey area. As the difference in survey methodology has a significant effect on the findings and interpretations derived from them, the descriptions of the sites encountered in 2005 are treated separately. This is done even though it may appear confusing as descriptions of road continuations in the extended survey area do not directly follow the material from the intensive survey. Sites surveyed during the 2005 season are again presented area by area: sites southwest of the survey area proper (towards the Wadi Arabah), sites northwest of the survey area proper (towards Wadi ad-Dulayah), sites south of the survey area proper (towards Sabra) and sites east of the survey area proper (towards Petra).

10.1 The area towards the Wadi Arabah

Within the area southwest of the survey area proper there are signs that the road has continued down towards the Wadi Arabah. Occasionally side kerbs along relatively gentle slopes are found. There are also other structures associated with the road. Two of them were preliminarily identified as building remains (sites ext071 and ext072). Another two could have served as lime kilns (sites ext069, ext070) of possibly post-Nabataean date, as they had many similarities with site 24 described above. The possible lime kilns are located off the road and yielded no finds, while the two building remains are found closely related to the passing road and both contained Nabataean-Roman common ware pottery. Also some sherds possibly deriving from vessels either imported or younger in date and thus different from the majority of FJHP survey finds were collected. The building remains feature considerable tumbles of stones, similar to that of site 54. The sites have excellent visibility among each other (Fig. 16) as well as to some sites further down towards the Wadi Arabah (see below). Unfortunately the remains are severely damaged due to looting. (Lavento et al. forthcoming a; compare ben David 2005: 41-42 and Lindner et al. 2000: 542.)
The road branches at the lowermost building remains (Lavento et al. forthcoming a; compare ben David 205: 41). One branch leads southwest to Wadi Abu Khushayba and the other turns further west towards Wadi Arba’i. Jarvis (1940: 145-146) had already remarked that the route between Abu Khushayba and the Jordanian highlands is mostly lacking in roads and road-related structures before it reaches the vicinity of Jabal Haroun. This observation was confirmed in the 2005 season: along the way down there are only some sporadic roadside supports, most of them appearing rather modern. A massive wall, supposedly a retaining wall for the road as proposed by ben David (2005: 42) is the only clear evidence of road building before the ruins of Abu Khushayba are reached.

Also the west-heading course declines into a path in places. Erosion is sometimes heavy, canyon-like narrow passages are the only options for proceeding. Interestingly, in one of these difficult parts, the remains of a wall built against the slope above the passage were noted. The wall is now mostly ruined. However, its careful construction and placement suggest a supporting structure for the passage. Retaining walls to support the soil uphill and to prevent flood damage are found also along Judean roads (Fischer et al. 1996: 76).

The road to the west soon reaches a more closed and sheltering environment differing from the open, bare slopes towards Abu Khushayba. In a small valley cut by a tributary
wadi there are two building remains (ext075). Some field terraces are located around them. Between the building remains is a paved section of the road (ext074) along a stretch of ca. 10 meters. (Lavento et al. forthcoming a; compare Lindner et al. 2000: 542-543.) The first site with building remains is located on a bedrock outcrop bordering the valley. Its location provides a limited visibility to the valley and the paved road below, as well as to the upper parts of the nearby slopes. Sites ext071 and ext072 above have better visibility to this site that it has towards them. Three possible post holes, a corner with bonding walls, and a separate wall line leave the original form of the structure open. Nabataean sherds were collected at the site.

The preserved stretch of road paving is located on a slope between the above-mentioned site and the tributary below. The paving is some 3 m wide and has been made of limestone flagstones up to 30 cm thick and 1 m in diameter. The stones are carefully fitted together (Fig. 17). (Lavento et al. forthcoming a.) Possible beddings cannot be seen without soundings. Further down, the road changes again into a path bordered with piles of stones cleared from the route. On the other side of the tributary wadi, on a small sandstone hillock, are the other building remains. Visibility from the site is restricted and covers mainly the surroundings. The site contains a wall line some 7 m long and a tumble of stones some 5 m in diameter on its eastern side.

Fig. 17. Road paving of site ext074, seen from site ext075 above. Photo: FJHP/Ynnilä

Further on, the path reaches volcanic terrain extending towards the Wadi Arabah. A site (ext073) is located on a ridge between a wadi and a gentle volcanic plateau which the path crosses. The tumble of building stones bearing Nabataean chiselling marks
measures some 20 m in diameter. This indicates that the complex has been relatively large. Looting has exposed two rooms, the walls of which are oriented in from northeast to southwest and from northwest to southeast. One room, measuring 4 x 4 m, is completely exposed, while another one is only partly revealed. However, the half-excavated room displays an intact plastered wall with inscribed leaves, a net, a possible goat and a fish. Fragments of household utensils, such as a limestone basin and a grinding stone, were found. Some pottery sherds, lamp fragments, a coin and coin fragment as well as bone were collected from the dirt piles next to the rooms.

The primary dating of the ceramic material seems to support both the Nabataean-Roman date as well as a somewhat later period of use in the 4th and 5th century A.D. Although the location of the site allows only fuzzy visibility, the site is well visible. It can be seen from the two buildings (ext071, ext072) far above and even from the fringes of the survey area proper. The surroundings of the site appear to be rugged and devoid of human activity. Also the path becomes too unclear to follow further on. (Lavento et al. forthcoming a.)

According to Lindner et al. (2000: 542) the Arba’i road can be further followed to reach Umm Ratam. It turns towards the north and runs some 300 metres below and parallel to Naqb ar-Ruba’i. The route is marked with stones and boulders; also a spring and a petroglyph are found along the way.

10.2 The area northwest of Jabal Haroun

Another road continuation outside the FJHP survey area proper is located to the northwest of Jabal Haroun (Lavento et al. forthcoming a; compare Lindner et al. 2000: 543). This course continues further from the end of the modern car track and descends down the Naqb ar-Ruba’i ascent. As the terrain is very challenging, a track or a path, rather than a road, could be used to conduct traffic there.

On the Naqb ar-Ruba’i ascent, flagstone steps lead to a path. The path (site 12) has a retaining side wall (Fig. 18) on erosion-sensitive terrain composed of sandstone and
volcanic rocks. Leaving the steep uppermost slope behind, the path crosses a tiny plateau with agricultural installations, such as a threshing floor, cairns, and field terrace walls. The course is well visible until the end of the plateau from the building remains of site 25 above. Visibility is lost as the path descends to a heavily eroded limestone slope where it zigzags to follow the easiest gradient. It mainly follows tributaries and displays roadway supporting structures in many places. The supportive retaining is carefully constructed with oblong stones some 30-50 x 30 x 15 cm in size and laid in 3-4 courses to reach a height of some 70 cm.

Fig. 18. Site 12 on Naqb ar-Ruba’i ascent has a retaining site wall. Wadi ad-Dulayah is located at the far back. Photo: FJHP/Ynnilä.

When the path reaches the banks of Wadi ad-Dulayah, the landscape changes into sheltered valley-like surroundings. Travelling is easy on the plated sandstone covering the valley. There are several tributaries with water-conducting barrages and an abundance of ruined field terraces. A spring should also have existed in the wadi. The route seems to divide here. One branch heads northwards, the other orients itself towards the southwest. The northern route supposedly finally led to Umm Ratam some five kilometres further ahead. The southwestern branch may have united with the Arba’i route. (Lavento et al. forthcoming a; compare Lindner et al. 2000: 543).
10.3 The area towards Sabra

The area between Jabal al-Farasha and Tulul Muthaylya has a strong agricultural character. It is used for cultivation even today. In general, the area is characterized by relatively gently sloping hills and ridges. The large wadi running through the valley from southwest to northeast is called Wadi Aial Aid. It is barraged, as well as several of its tributaries. The wadi has also been a route for movement from east to west between Wadi es-Saqqara and Petra. (Lavento et al. forthcoming a.)

Among several cisterns and water channels within the area (compare Gunsam 1997: 37-38), a cistern (ext156) ca. 4.5 x 5.5 metres in size is located southwest of Jabal al-Farasha and east of the Wadi es-Saqqara end. Further south, on a small ridge, are the remains of a building (ext158) (Fig. 19). The building is flanked by fields and overlooks the area between Wadi as-Saqqara and Wadi Aial Aid. The junction of three routes – one leading up from the eastern end of Wadi es-Saqqara, the second following Wadi Aial Aid towards Petra, and the third passing the western side of Jabal al-Farasha towards Jabal Haroun – is well visible from the site. Presently the stone tumble measures some 8 x 8 metres. A corner of walls made of roughly hewn blocks some 60 x 40 x 40 cm in size is still visible. Very few Nabataean sherds were found among the looted remains. (Lavento et al. forthcoming a; compare ben David 2005: 46-47.)

Fig. 19. Site ext158 on a small rocky ridge. Photo: FJHP/Ynnilä

The remains of another building (ext045) are located further southeast on fluvial plains. The site stands next to a route presently in use, in the middle of surrounding fields as well as in the vicinity of two cisterns. Visibility is very good due to the gentle
surroundings, even though the site itself is not located on an elevated point of the terrain. One can see the entire valley around the site, Jabal Haroun and the southern route leading to its top, Jabal al-Farasha, and the western end of the survey area proper. Presently the site is in a rather poor state. It contains walls running from northeast to southwest and from northwest to southeast. The walls are some 5 metres long and consist of a single line of coarsely hewn building blocks some 20 x 60 x 30 cm in size. Some pieces of Nabataean fine ware and few later sherds were collected at the site. (Lavento et al. forthcoming a.)

A small path marked by piles of stones (ext035) was located above Wadi al-Waqit, near Jabal al-Barra. It runs along the wadi bank towards Wadi Aial Aid. A more notable road construction, oriented from northeast to southwest, was noted on the southeastern side of Wadi al-Batahi (compare Lindner and Zeitler 1997/1998: 560; Lindner 1992b: 203; Zayadine 1992: 226). The road displays retaining structures facing the slope. Furthermore, a small zigzagging path was seen on the northwestern side of Wadi al-Batahi. (Lavento et al. forthcoming a.) These roads and paths are part of the connections between Petra and Sabra.

Several Nabataean rock-cut graves are located in sandstone outcrops peaking from the landscape, along the ridge southeast of Wadi Aial Aid, and on hilltops. One of the burial sites (ext120) also included large building blocks with column drums and capitals scattered around the site. It resembles sites 164 and 166 along Wadi an-Naqb. There are a number of sites with small stone piles, resembling the sites in the northern part of the survey area proper. Furthermore, petroglyphs and building remains are encountered rather frequently. Thus the area appears to have been used actively. (Lavento et al. forthcoming a.)

10.4 The area towards Petra

Sites east of the Jabal Haroun intensive survey area, important in this road study, are located either adjacent to the crossroads of Wadi al-Waqit and Wadi an-Naqb, or along the modern car track crossing Wadi al-Waqit on its way to Petra.
The bedrock exposures on the western side of Wadi al-Waqit are cut to accommodate the ancient road bed. The cuttings are still used by the modern car track. Extensions of the cuttings depend on the requirements of the terrain: in some places only one side of the road had to be cut, whereas other places required cuttings on both sides. There is also a rock-cut depression some 20 x 20 cm in size directly next to the road prior to the wadi crossing (compare Zayadine 1992: 225). (Fig. 20.) At the wadi bottom itself there are no ancient structures to indicate how it was crossed.

![Image](image.png)

Fig. 20. The cutting for the road and a pole hole at the Wadi al-Waqit crossing. Photo: FJHP/Ynnilä

On the west side of the wadi crossing are the remains of a structure (ext082), possibly a building. The remains are very poor, devoid of finds and most of the building stones. Presently they measure some 3-4 m in diameter. The location offers visibility both towards the southeastern slopes of Jabal Haroun and to the beginning of the route running up along its southern slopes. Also the site east of the Wadi al-Waqit crossing is clearly visible, as well as the extensive valley south of Jabal al-Barra (see below). The present car track leading west and the path on the plateau extending northeast of Jabal al-Farasha are also well visible. Also a rock-carved shaft grave (ext108) is located nearby.

On the eastern side of the wadi crossover there is a site (ext078) with building remains on top of a rocky outcrop. The western side of the outcrop towards Wadi al-Waqit is carved. It appears to be a tomb façade that was never completed. The carving is flanked by grooves to direct rainwater, made to protect either the façade or the building above.
The location of the site provides extensive views towards the areas from southwest to northwest: Jabal Haroun and the southern route leading to the top, the present-day car track crossing Wadi al-Waqt and continuing towards Petra via the foot of Jabal al-Barra, the top of Jabal al-Farasha, the ruins at Ras Suleiman (see below), and the southern part of Wadi Aial Aid are all seen. The wall remains indicate a building some 9 x 4 metres in size, made of squarish stone blocks. The rectangular shape most likely results from the narrowness of the outcrop on which it is located. Possibly also the northern and southern sides of the building were terraced to fit and support it towards the steep slopes. A few common ware sherds found at the site indicate a Nabataean-Roman dating.

Proceeding towards Petra, a site with water installations, Nabataean pottery and a wall with diagonal stone dressing was found on a wadi bank (ext164). It closely resembles and is located close to the sites found along the eastern part of Wadi an-Naqb. Structures such as threshing floors, stone pilings and dwelling remains were located in several places east of the survey area proper. Monumental rock-cut façades (ext027), some with doorways (ext030), are found in the area. These tomb façades and tombs become more numerous closer to Petra (compare Lindner and Zeitler 1997/1998: 560). Rock-carved shaft graves (ext025, ext032, ext055) are mainly situated close to the modern car track. In addition, there are graves that had been dug into the soil and marked with stone slabs above the ground (ext033, ext050). Structures for storing and conducting water are abundant in the area. Mostly they collect runoff waters, but some formations themselves also seem to contain water, as the vegetation around them is exceptionally abundant. (Lavento et al. forthcoming a.)

Ras Suleiman is a ridge which contains a complex of building remains (ext052) adjacent to the Snake Monument. It is located on the southern side of the present-day road (compare Zayadine 1992: 226). The largest conglomeration of rooms is situated on a gentle slope facing northwest. However, it is mostly not possible to distinguish between separate buildings. Only at the far end of the Ras Suleiman ridge, where visibility is good over the entire valley south of Jabal al-Barra, the remains of a separate building were distinguished (ext061). The abundant ceramic material represents Nabataean types.
One of the cisterns (ext051) within the area was found next to the present road, by the massif of al-Barra, very close to the Ras Suleiman remains. The car track passing the remains crosses ancient wall lines when it reaches the Snake Monument and curves northwards. Thus the orientation of the ancient road must have been at least to some extent different. (Lavento et al. forthcoming a.) However, the modern car track north of the Snake Monument clearly uses the ancient route. The bedrock is cut to form a road bed some 2.5 m wide (compare ben David 2005: illustration in p. 40). Five shallow rock-cut steps and Nabataean chiselling marks over some 20 m of the course are evident (Fig. 21).

At the end of the cut section, the present car track turns south and crosses terrain with sediments and loose sand below the Snake Monument. The ancient road apparently had another orientation (compare ben David 2005: illustration in p. 39). The bedrock exposures east of the Snake Monument are carved up to 2 meters deep over several tens of meters to accommodate the road and to level its course. The cutting for the road bed is some 3.1 m wide. It contains a few steps ca. 80 cm wide and 10 cm deep and displays a sharp curve.

Fig. 21. Five shallow steps on the road north of the Snake Monument.
Photo: FJHP/Ynnilä
Approaching the ancient city walls of Petra, the modern car track follows the course of a wadi that has carved its way deep into the bedrock. The track also displays modern supports towards the water course. No ancient road remains are seen, which indicates that they are most likely destroyed or below the modern constructions.
IV DISCUSSION AND CONCLUSIONS

11 Analysis of the road and structures associated with the road

11.1 The course of the road and its construction

The ancient road running through the Jabal Haroun survey area proceeded according to a principle which can be sketched from the maps of appendices 4, 5, 6 and 10. The road ran along the slopes above wadi bottoms at an altitude where the inclination of the slope is mainly under 30 % and there was no risk of waters in the wadi reaching it (Fig. 22). Of course, occasional exceptions had to be made. Furthermore, visibility ahead was kept as good as possible. Where the visibility was limited, a building is always found.

![Fig. 22. 3D-presentation of how the road proceeded in the western part of the FJHP survey area. Modified from the original by HUT/Junnifainen.](image)

The road through the western survey area shows evidence of the most prominent built parts. It also features more related structures than the stretches studied elsewhere during the FJHP survey. When comparing it to examples of paved roads found elsewhere in the Near East, e.g. to a road in the Wadi Arabah studied by Smith et al. (1997: 60), the road via Jabal Haroun seems to be less prominent. The paving is not nearly as extensive and the kerbs are more modest. However, the modern state may result largely from geomorphologic processes, which are more powerful in the Jabal...
Haroun area than in the Wadi Arabah. Also the 3D-model of the road clearly shows that not many kerbing stones remain in their original place. The destruction is evidently severe.

Flash floods were a true problem for road maintenance in FJHP survey area. Kerbstone walls are well suited for preventing roads from being flushed away with rains. Furthermore, the well-being of fields depended on the rainfall, but for roads the rain was only harmful. Thus it was only natural to build water-conducting kerbs to maximize the benefits and minimize the risks of rainfall. The paving is another means of supporting the road against destructive forces. It was never intended to cover the entire length of the road.

Paving on the Arba’i route is markedly different from the paving in the survey area proper. A site-specific strategy has again been employed to combat erosion. Perhaps the difference in paving also reflects a different construction date, as frequent repairs were probably needed. Also the massive stone wall towards Abu Khushayba and the wall built towards the slope on the Arba’i route were specific means to safeguard travel and the use of the course.

Furthermore, the road kerbstone walls possibly also served as boundary markers between the road and the surrounding properties; at least they were sufficient obstacles to prevent draft animals from moving off the road into the fields. Morriss (2005: 31) presents the possibility of legal boundaries between the road and the surrounding countryside in Roman Britain; in Roman Judea roads have functioned as boundaries between fields (Fischer et al. 1996: 100). It is worth noting that kerbs are found in the FJHP survey area only in places where there are also fields around the road.

In principle, the road could have continued from the juncture of Wadi al-Mahattah and Wadi as-Saddat towards Petra along Wadi an-Naqb. However, I believe that it did not. The sites located close to the bottom of Wadi an-Naqb are few and modest, not displaying characteristics of structures serving the road. The curving wadi bottom restricted visibility to some tens of metres further ahead. Instead, on a course along the Jabal al-Farasha foothills, the visibility was several hundreds of metres. Furthermore, the road needed no constant curving on the northern slopes of al-Farasha, while several
curves would have been needed on the Wadi an-Naqb bottom. Finally, as wadi bottoms were the most suitable terrains for cultivation without irrigation, they were more likely to have been reserved for agriculture than for a road passing by.

As the most massive barrages in the FHJP survey area are located around the initials of the Wadi an-Naqb, the water flows of the area where the road had to cross the wadi were well controlled. Thus there was probably no flooding, as barrage and terrace networks conducted rainfall on fields. Therefore the road could most likely cross the wadi without a bridge. However, as bridges are found in nearby areas, the wall previously interpreted as a defensive structure may also remain from a bridge.

Could the so-called pole holes on both sides of the Wadi al-Waqt crossing indicate controlled wadi passage by a wooden turnpike? Nowhere else pole holes were found in direct connection with the road. The difficult crossing must have been a task requiring care and control. Furthermore, the building remains (ext078) found in association with the wadi crossing may have housed the manpower needed for the control.

The road structures east of the survey area proper are located in a different type of environment, mostly in terrains with less inclination. The general gentleness of the terrain is well attested in the archaeological material: field terrace walls are mostly missing, because the slopes are cultivable also without any supportive structures. The means for the road to proceed are therefore also different. The roads between Petra and Sabra clearly needed less supports. However, occasional bedrock cuttings to accommodate the road demonstrate that efforts were sometimes needed.

Road structures west of the survey area proper are found mostly in slopes with an inclination of 30-40%; the strategy for proceeding is again different. The extended FJHP survey was able to confirm that there was a road down to the Naqb ar-Ruba’i ascent, as proposed by earlier studies. Curving and zigzagging is essential on routes southwest and especially northwest of the survey area proper. As the descent is constant in the northwestern route, frequent zigzags keep the gradient decent. Also retaining walls are needed to firm the course.
Previous research has viewed the road from Petra via Jabal Haroun to the west as descending through Abu Khushayba. However, the FJHP survey findings emphasise a different orientation. Presently the southwestern slopes towards Abu Khushayba are cut only by herders’ paths. Instead, the road continuation oriented more westwards displays a stretch of paved road, as well as related building remains. Thus the road seems to have primarily curved towards Arba’i. From there it must have proceeded to the Wadi Arabah. Also a connection to Umm Ratam was likely, although it was not verified in the FJHP extended survey. I admit that a connection between Jabal Haroun and Abu Khushayba must have existed as well. However, today it is less evident.

11.2 The road-related infrastructure

This study confirms the correlation between the road passing Jabal Haroun and the sites found in the FJHP survey area. In fact, most sites with remains of structures (excluding barrage and terrace systems), are found in the direct vicinity of known or supposed roads. The distance is at most some tens of meters. If the road towards Petra indeed continued along the northern slopes of Jabal al-Farasha, all major sites attesting human occupation of the area are located along it. Only the large structures on mountaintops are further off. Since they were more likely serving other purposes than directly associated with the road, this distance is not contradictory.

Structures associated with the road in the FJHP survey area proper are found mostly on slopes with a maximum inclination of 20%. In the extended survey area, these structures are found only on more even terrains – which are better available there. In general, no sites are found in environments steeper than the slopes of Jabal Haroun. The sites were not placed depending on slope direction, as there is no patterning to favour certain aspects. This is most likely due to the general ruggedness of the landscape, which allows human occupation in relatively few places.

Good visibility is not the key for finding sites. For instance, a ridge north of Wadi Aial Aid and west of Wadi al-Waqit is devoid of building remains, although from there one could have mastered the entire surrounding landscape – visibility is unobstructed in all
directions. However, visibility can reveal something of the relationships between encountered sites. For instance, as the visibility between sites 54 and 49 is not completely unobstructed, the sites seem not to be related. They were both placed in connection with the road and had different functions. They were not, at least not clearly, servicing each other. Furthermore, visibility can be used as a criterion when balancing between several interpretation possibilities, as discussed below.

The stone material used in the structures of the FJHP survey area depended more on the purpose of the structure than on the time when it was built. Therefore, architectural changes used to date some of the comparative material are not evident in the Jabal Haroun case study. Furthermore, several road-related sites contained so few pottery sherds that dating based on them is not reliable. When a site yields hundreds of sherds, a dating based on them is better grounded. Also, the few later sherds among the majority of Nabataean-Roman ware leaves questionable how extensively the sites were used in the very Late Roman and Byzantine times. Most likely their use was more sporadic, minor in comparison to the use during the heyday.

The tiny building remains not far from the road (sites 85, 87, 83, northern part of 25, 141, 119 and ext082) indeed seem to be best identified as watchtowers, as the visibility from them is good. They are located in high places or places providing advantageous visibility in comparison to their surroundings. For instance, the placing of site 85 is optimal regarding visibility. Already the hill next to it would not allow visibility towards the west, where the road passed. Furthermore, these sites are found at frequent intervals along the road. It is common that several other sites are seen from each of them. Extended visibility studies would likely reveal that their view sheds cover the entire road section, as well as several of the cultivated plains and hills, within the FJHP survey area.

These sites were probably used only occasionally. Thus the structure could be simple: the few detached soldiers manning it when needed brought their own supplies with them. Only water collection tanks might have been built within the structure, or water could have been brought along with food. The watchtowers in the Jabal Haroun area are primarily meant for the internal security of the caravans: to guarantee their safe trip up and down the escarpment, to prevent caravans from meeting in the difficult parts of
the road, to inform the officials in Petra of arriving caravans and to secure that taxes were paid. Raiding was a smaller risk here, in the settled heartland of the Nabataean and Roman states. As the sites were occasionally used they tend to contain only little pottery.

Larger structures, such as sites 54, ext061, ext158, ext071, ext072 and ext078 were all placed in very strategic places with extended visibility, in association with crossroads or cisterns, at valley ends etc. They probably housed more men on duty for longer time. The remains of these watch posts have been preserved better than sites in the area in general: there are large stone tumbles from which well-built walls are traceable. The buildings were probably several storeys high. Unfortunately all ceramic finds from these sites are rather poor. They mostly indicate a purely Nabataean-Roman period (sites ext061, ext158, and ext078), and only site 54 (possibly also ext071, ext072) shows evidence of Byzantine use in addition to Nabataean-Roman. Thus site 54 (and ext071 and 072) may have been in operation during the Byzantine period in order to service the pilgrims travelling to the monastery or to facilitate the maintenance of the cultivated fields in the vicinity of the mountain.

It is not surprising that no forts or fortlets were found along the roads in the FJHP survey area. Petra and its suburban towns hosting troops were located very close by, and the Jabal Haroun area had no major economic resources, such as mines, which would have encouraged the constant existence of military forces. Even though the largest sites found in the FJHP survey area bear similarities to the sites discussed under forts, this is only a result of overlaps in terminology.

Location in a depression or in the middle of a plain, limited visibility, or association with fields and roads indicate that a site is most likely an agricultural storage building or tower. The site (ext045) on the fluvial plains towards Wadi Sabra and outside the survey area proper is located in the middle of fields and thus could well be a small agricultural building. However, it has extensive visibility. The travellers ascending Wadi al-Batahi from Sabra would have become visible just after they have reached the upper edge of the wadi. Furthermore, if the ancient road ran along the northeastern plateau extending from Jabal al-Farasha, it would also have been visible from the site. Thus visibility points towards interpreting the site as a watchtower. Proximity to a
cistern is important to all human activities, thus it does not help to solve the function. At the end, there might even have been a change in function or the site served both for road surveillance and for storing of agricultural products. Unfortunately, the dating of the site is left even less clear than the function.

Another interesting site with several possible interpretations is site 118. This site is located close to the crossroads and has a good visibility along different parts of the roads, so that it seem logical to assume that its function was related to road surveillance. However, visibility from the site is good in regard to the road, but it is also good in relation to the fields. Thus, rather than for surveying the road, it likely used to keep an eye on the fields. This interpretation is strengthened by the lack of Nabataean pottery at the site and parallels within Early Islamic agricultural towers. Maybe the need to safeguard the work out in the fields grew when the Greco-Roman political order was dismantled. Also the location of site 112 suggests either a relation to the road or to nearby fields. However, the date is more likely Nabataean than Early Islamic, on the basis of surface pottery.

Light half-pisé structures may have only a single row of stones as a foundation and thus their remains are easily ignored. Besides the lack of building stones, their visibility at sites is rather restricted to nearby terrain. This differentiates them from towers and indicates domestic use. As the city centre of Petra contained simply built houses from the turn of the 1st century B.C. to the 1st century A.D. it should not be surprising that light constructions are also found in its hinterland and that they were used also after the city centre was monumentalized. The few small remains located directly above the wadi banks, away from the known road remains (sites 149, 151) in the FJHP survey area should be categorized as this type of structures. Also the sites 19, 22, 32, 36, 43, 44, 45, and 47 on the northwestern part of the survey area mostly present these types of structures.

Most of the sites located during the FJHP survey seem to be non-residential. The sites are simply too small for permanent habitation. Thus the farmers probably lived in Petra and commuted from there to the fields. Furthermore, occupation mixing tents and houses built of stone (of which site ext075 apparently presents an example) up to the Late Nabataean-Roman period is very likely. However, at least sites 88, 128, 49,
ext073 and ext052 have been designed for permanent habitation. They are compounds of several rooms and yielded more variety and volume in finds, thus indicating more active use. However, without excavations this assumption cannot be verified.

Site 49 resembles a typical khan in its internal arrangement and thus might well have served as a caravanserai. It is located near an area of difficult terrain to pass, thus caravans might have preferred to halt there before passing on to a more challenging environment or to rest there after the hard ascent. The dating of the site is rather firmly Nabataean-Roman; it was in use during the heyday of the area.

Site 88 is located at a crossroads, a good place to do business. However, being rather small it most likely did not provide accommodation, but perhaps sold supplies. It might also have been a small farmhouse, as fields are located very close by. Furthermore, it could have had a double function as a farm and a caravan inn, especially when the pottery finds – although scant – indicate a period of use from the Nabataean period to the Byzantine.

Sites ext073 and 128 are most likely farmsteads, as they are located in rather sheltered environs where cultivable land is within reach. The complex at Ras Suleiman, ext 052, borders an extensive field plain and it only seems appropriate to relate the building remains to the cultivators of the fields. Of course, part of the complex could also have served travellers.

As the structures in the Jabal Haroun area are abundant and versatile, one could assume that the caravans were provided with all the facilities they needed and thus had no need to continue into Petra itself. The large clearing in site 25 is most likely, besides its modern function, also an ancient caravan camping area. However, it would be rather surprising if entering Petra’s suburban surroundings, but not the walled city itself, would free caravans of taxation, as Zayadine has suggested.

Religious sites tend to contain more elaborate structures than mundane sites. Therefore they seem to be easier to detect. In the Jabal Haroun area, features such as water installations without a clear practical purpose (site 37), bedrock carvings (sites 180, ext164) and niches along wadi banks (sites 166, 184, 176), as well as carefully worked
building stones (sites 166, 164) could be categorized as cultic. They are also found in places that are more difficult to reach than the sites directly associated with the road.

The Nabataean remains of site 1 overlooking the Wadi Arabah indicate a surveillance point or a cultic structure. The elaborate features suggest Nabataean sacral architecture. This interpretation is strengthened by the fact that the site does not have a visual connection to the towers of the FJHP survey area, e.g. of site 54.

Site 124 on top of Jabal al-Farasha, when judged only by its architectural arrangement, could have served as a Nabataean domestic house. However, its location relates its function to visibility for either surveillance or cultic purposes. The location is impractical for a dwelling site. The walls are exceptionally thick, thus indicating a high building. As site 1 is not seen, it cannot be a counterpart of the remains in the Jabal Haroun top plateau. Instead, several watchtowers are seen from it and hence grouping it together with them. After being established in the Nabataean period, the site was probably used to some extent also later on.

Site 136 seems to be religious due to the distinctive features resembling Islamic sacral constructions. However, before adding the niches and inner walls, it most likely had a mundane function initiated in the Nabataean era; either servicing the local population of site 128 or the road passing by.

Small industrial sites have a specific form and location differing from other structures. E.g. the lime kilns (sites 24, ext069, ext070) within the Jabal Haroun area are distinctively circular and hollow in the interior. They are located in relation to the sources of lime, close to but not along the roads.

Most of the cisterns found in the 2005 season are not clearly related to buildings that would have controlled their use. The only exception might be the tower (site ext158) at the eastern end of Wadi es-Saqqara. It might have controlled the traffic to the cistern (ext156) along with the traffic on roads. Thus, contrary to Lindner’s opinion, it is more likely that in the Jabal Haroun surroundings the use of cisterns was shared equally between locals and road users.
Tombs are not solely related to the passing road in the surroundings of Jabal Haroun. However, they are common along it. Furthermore, the connection between the road and the tombs becomes more pronounced in the area approaching Petra – which is likely a deliberate cultural sign. Stone heaps can mostly be connected to other purposes than guiding the road in the FJHP survey area. Only the stone heaps of site ext035 most likely served for showing the place of a path.
12 Conclusions

On the basis of the information concerning environmental parameters, historical framework, sources and types of research, as well as previous road studies, the road remains in the FJHP survey area can be explained. With the methods combining and separately looking at the cultural and the environmental factors behind the existence of the road, the questions set at the beginning can be answered. Human experience can be reached by examining site specific visibilities and visibility studies in general help to interprete the remains. Furthermore, new technological approaches can facilitate analyses and offer new view points to the material. The solutions based on numerical data effectively preserve the collected information and allow an easy access back in to the steps of treating the material.

This work is not basing its conclusions on generalizations deriving from sampling surveys. Instead, with the limitations of methodology, time, equipment and human resources, the FJHP survey has recorded all the relevant information related to the set questions in the restricted area. The interpretations thus have a solid ground to base on. Hopefully in the future, similar projects will be carried out to compare these results and to expand the detailed understanding of human life in the past.

(1) The first question of this work, on the reason of the road in the FJHP survey area, can be answered on the basis of the environmental studies and the known, past land use of the region. The road located in the Finnish Jabal Haroun Project survey area due to various reasons. The survey area has topographical advantages in comparison to nearby areas; it is located close to Petra, the copper mines of the Wadi Arabah, the sources of bitumen of the Dead Sea, as well as between the north-south oriented roads. The trade conditions of the Classical period incorporated the Jabal Haroun surroundings in the far distance travel network, resulted the golden days of Petra and the built parts of the case study road.

(2) As an answer to the second question on the means of the road to proceed, the ways were many. The road preferred as straight line as possible, mid-slopes and as modest inclination as possible. It took an advantage of zigzags, side kerbs, paving and stone cutting to enable this type of strategy. The final form and location of the road depended
on the type of the area it crossed. This is evident on the basis of combined environmental analysis and the use of parallels.

(3) The study of site specific attributes – such as location in relation to other sites and the road, visibility and assessment of the architectonic evidence – confirms the hypothesis of the question number three. The sites found around the road had a strong connection with it. Their function was mainly based on the existence of the road only; some sites however were primarily bound to other forms of land use and only profited from the presence of the road. This is seen when the attributes are compared to the classification criterion deriving from comparative studies.

(4) The work also supports the hypothesis of the question number four on Petra’s role in the existence of the road. The development of Petra into an important centre and a nexus of roads are reflected on the road remains of the Finnish Jabal Haroun Project survey area. The efflorescence of the Nabataean kingdom and the prosperity of the Roman Arabia after the annexation are well attested in the archaeological record, as well as the gradual change of trade conditions which turned Petra into a city with only regional importance. Unfortunate is that this study cannot exhaustively answer the much asked question on the date of Petra’s collapse as the central point of trade in the Near East. However, this study shows that after the 2nd century A.D. the identifiable find material related to the road via Jabal Haroun declines. This does not necessarily mean that Petra declined equally, but there were apparent changes in the use of the case study road.

(5) The question number five concerned the detailed dating of the road and road-associated sites, as well as the possibility to identify time-bound changes in their use. To answer this question, the road must be considered as a part of the land use forms and the settlement pattern around Petra. The most impressive structures remaining in the Finnish Jabal Haroun Project survey area are the massive and inter-related barrages and terraces used for storing and guiding water. It has been proposed that their construction was possible only through state intervention and controlled co-ordination (Frösén et al. 1998: 498). Due to the blooming and intensified trade in the 1st century A.D., risks related to agriculture in marginal areas were overweighed by the steady demand of supplies.
To further encourage trade, a network of permanent roads was needed. Thus, as the Nabataean rulers organized cultivation, they perhaps also took over the furnishing of routes with e.g. guarding towers and supporting road structures. The pottery finds strongly support this fast intensification of land use, as basically all sites yield sherds dating to this period. The paving may also date to the Nabataean era, because it did not serve to allow vehicle traffic, which was often the purpose of the Roman paving. The paving was laid to safeguard the traffic, as continuous as possible, to and from Petra. Perhaps also caravanserais besides surveillance structures were built and operated under governmental rule.

It is proposed in several studies that Romans paved pre-existing roads after their conquest. It is possible that the paving of the road in the FJHP survey area dates to the time after annexation. The Romans also wished to secure the ongoing, highly profitable, caravan traffic with all-weather roads. Thus the paving could be related to the post-annexation construction operations in Petra. Ultimately both the Nabataeans and the Romans wished to reinforce the infrastructure around Petra, and the paving can thus date to either era. As we have not been lucky enough to find artefacts giving a terminus post quem-date for the paving, only suggestions can be presented so far.

However, I cannot agree with ben David, according to whom the road was a Late Roman highway for soldiers positioned in Aila. One cannot ignore the homogeneity of collected pottery, which strongly emphasises the Late Nabataean-Early Roman period, 1st and 2nd centuries A.D., as the culmination period of activities within the survey area. In fact, the Nabataean dominance in finds is so significant that the few later sherds encountered, if total amounts are considered, have no role in the interpretation. Furthermore, if the road had been official and paved only during the late 3rd or the early 4th century A.D., one could expect that an ancient record, some kind, would remain from it. Likely it would have been included either in to the Notitia Dignitatum or Onomasticon.

The road passing Jabal Haroun had most likely existed well before the Nabataeans and the Romans. Possibly its earliest function was to serve as a route to reach the copper mines of the eastern Wadi Arabah. What is perhaps not highlighted enough in road
studies within the Petra area, is the importance of mining activities and the export of minerals, which requires good roads and an extensive road network. Scholars tend to concentrate on writing about the trade of incense, perfumes and spices. However, copper production in smaller scale does not need as substantial road structures as does the industrial scale of it. Therefore also the archaeological evidence is lacking from the pre-Nabataean use. Furthermore, copper production in the Wadi Arabah might have kept the roads in operation within a regional scale also after the long-distance trade had ceased. Again, the later use required less from the roads. Thus, the connection of the FJHP survey area into the long distance trade network can be seen as an anomaly within the more natural trade connections in the regional level.

The aridification of the climate in the Byzantine period most likely diminished the agricultural use of the Petra surroundings and its capability to maintain a large population of people and animals. The laborious cultivation of the Jabal Haroun slopes sifted to better lands with more rain. Equally, as the profits from the trade and related products decreased, there were no revenues for road maintenance. The road structures were left unprepared. The route via Jabal Haroun was kept in use, but on a more irregular basis.

On the other hand, as the monastery on the mountain flourished during the Byzantine period, it should also have influenced its surroundings. Curiously however, this is not well attested in the archaeological material in the FJHP survey area. Instead, there is a remarkable difference in the ceramic material between the Jabal Haroun environs and the plateau on the mountaintop where various Byzantine and Islamic types are found. The only exceptions are the few sites in the western part of the survey area, where significant amounts of Byzantine pottery are found. Thus the pilgrims must mostly have slept outdoors, brought their own food with them, and needed no services on their way to the monastery. Unlike several other examples in the Near East, they did not enhance the local economy with their travels.

The diminishing use of the road was distinctively a gradual process within the FJHP survey area. There are no marks of straightforward disturbance. Continuation rather than occupation breaks and destruction, subtle alterations and repeated rebuilding characterize the remains in the Finnish Jabal Haroun Project survey area. Pottery dating
from the Nabataean, Roman and Byzantine times is found mixed within sites. On the other hand, a wealth of sites can also be assigned to one period only.

In conclusion, the FJHP survey area became strongly manipulated, built environment during the Nabatean period. To serve the diversifying forms of land use, human made installations begun to fill the landscape. This drastically changed the way it was experienced. Cultural manifestations within the environment competed, for the first time, with the imposing natural features. The situation remained the same during the most of the Roman period. During the Byzantine period, the monastery was the most outstanding cultural manifestation in the area. Some of the previously built structures were kept in use and added the experience of occupied environment. However, several of the Nabataean-Roman structures decayed, paving the way to perceive the environment as deserted, dotted with remains – as it is seen today.
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Abbreviations

*AASOR*: Annual of the American Schools of Oriental Research
*ADAQ*: Annual of the Department of Antiquities of Jordan
*ARAM*: Periodical of the Society for Syros-Mesopotamian Studies
*BASOR*: Bulletin of the American Schools of Oriental Research
*BAR*: British Archaeological Reports
*ESRI*: Environmental Systems Research Institute
*IEJ*: Israel Exploration Journal
*JRA*: Journal of Roman Archaeology
*PEQ*: Palestine Exploration Quarterly
*SHAJ*: Studies in the History and Archaeology of Jordan
*USGS*: United States Geographic Survey
*ZDPV*: Zeitschrift für Deutsches Palästina Vereins

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3D-model of a road segment (site 82) ca. 25 metres long. The model is in WRLM-file. To be able to play the model, an access to the Internet is needed. Furthermore, the web browser must be capable of playing WRLM-files. Programmes enabling this are freely available at the Internet (see e.g. www.octaga.com for octaga player).
The main geographical features in Jordan and in the areas adjacent to it; as well as cities and settlements often mentioned in the text. Approximate scale 1: 3 000 000.
The FJHP survey area. The intensively surveyed area is marked in red; the area covered during the extended survey is marked in turquoise. The monastery (site 1) and *weli* are displayed separately; the main wadis, mountains, hills and ascents in the area as well as Petra and the Snake Monument are also shown. Approximate scale 1: 40 000.
The road remains and the road-related sites in the FJHP survey area in relation to the topography. Altitudes (m) are indicated with different shades of brown. The sites in the intensively surveyed area are marked in green; the sites in the extended survey area are in blue. The range of altitudes shows the variation in heights above sea level in the area between the Wadi Arabah and the Shara Mountain Range.
The road remains and the road-related sites in the FJHP survey area in relation to the slope direction. The slope orientation (°) is marked with different colours. The sites in the intensively surveyed area are marked in green; the sites in the extended survey area are in blue.
The road remains and the road-related sites in the FJHP survey area in relation to the slope inclination. The inclination degree (%) is marked with various colours. The sites in the intensively surveyed area are marked in green; the sites in the extended survey area are in blue.
The roads in the FJHP survey area. The best preserved road remains in the FJHP survey area are marked in red; the road continuations west of the survey area proper are marked in pink. The modern car track along the western side of Jabal Haroun is marked in green; the track towards Petra (along, at least partly, the ancient route) is marked in blue and the present day path along the northern foots of Jabal Farasha is marked in light blue. Approximate scale 1: 40 000.
The main Nabataean-Roman sites and the lines of communication surrounding Petra. The large wadis (in blue) were servicing as important connections between places. The main settlements are marked in red; the road from the FJHP survey area to Petra is marked in green. Approximate scale 1:125 000.
The road remains and the road-related sites in the FJHP survey area in relation to the water flow. The small local watersheds with their main wadis are marked with different shades of grey. The sites in the intensively surveyed area are marked in green; the sites in the extended survey area are in blue.
The road and the road-related sites discovered during the intensive and the extended survey. Map: HUT/Junnilainen after Ynnilä.