

The Length of the Siege of Masada¹

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Introduction

The siege of Masada is generally considered a long and arduous one, lasting at least four to seven months,² with estimates of its length ranging as high as three years.³ Indeed, the siege has been held up as an example of inspired resistance on the part of the Jews, and of persistent tenacity on the part of the Romans.⁴

The truth is less grandiose. A careful analysis of the literary and archaeological evidence shows that although the arid locale and high cliffs of the fortress provided a logistical and engineering challenge for the Romans, overcoming them was well within the capability of a single legion and a few auxiliary units. Josephus' account and the topography of the battle site suggest that little or no resistance could have been put forth by the small Jewish garrison. Certainly there was none that could have significantly delayed the Roman operations. The length of the siege was determined entirely by the time necessary to build the siege works required to overcome Masada's natural defenses.

In the light of Roman siege technology, there are strong indications that the siege was considerably shorter than is presently thought. From the arrival of the Roman army at Masada until the fall of the fortress, the time elapsed was

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² A. Schulten, *Masada: Die Burg des Herodes und die Römischen Lager*, 1933, 17, I.A. Richmond, "The Roman Siege-works of Masada, Israel", *Journal of Roman Studies* 52, 1962, 144, Y. Yadin, *Masada: Herod's Fortress and the Zealots' Last Stand*, 1966, 11-12, W. Eck, "Die Eroberung von Masada und eine neue Inschrift des L. Flavius Silva Nonius Bassus", *ZNTW* 60, 1960, 282-289, D. Campbell, "Dating the Siege of Masada", *ZPE* 73, 1988, 156-158, H.M. Cotton and J. Geiger, *Masada II: The Yigael Yadin Excavations: 1963-65, Final Reports. The Latin and Greek Documents* (with a contribution by J.D. Thomas), 1989, 15.

³ E. Luttwack, *The Grand Strategy of the Roman Empire*, 1976, 4.

⁴ *Loc. cit.*

probably only one or two months. The siege of Masada most likely lasted under seven weeks.⁵

Only one account of the siege is extant, that in Book 7 of Josephus' *Jewish War*.⁶ In it, Josephus gives the date of the fall of Masada as Xanthicus 16.⁷ While he uses the names of Macedonian months in his works, it has long been recognized that Josephus is using them to represent the months of a different calendar.⁸ Scholarly opinion remains divided, however, on whether Josephus meant these Macedonian names to represent the Roman (i.e. Julian) calendar, in which Xanthicus 16 would be the equivalent of April 16,⁹ or the Jewish (i.e. Babylonian) calendar, in which Xanthicus 16 would be the 16th of Nisan, a month which falls between March and April.¹⁰

Josephus does not, however, indicate when the siege began, although he does in the case of most of the other sieges during the Jewish War.¹¹ The best indication of the siege's length comes from studying the well-preserved archaeological remains at the site. The first scholar to analyze the siege using the archaeological data was Alfred von Domaszewski, who visited the site in 1897.¹² While he did not speculate on the siege's length, Domaszewski did note the unusual orientation of Camp B, which was later used (by Schulten) as a basis for dating the siege's beginning. According to Roman military practice, the front

⁵ Whether Masada fell in 73 or 74 AD is a matter of controversy see Eck (n. 2), 282-9, W. Eck, *Senatoren von Vespasian bis Hadrian*, 1970, 93ff. (and its review by C.P. Jones, in *AJP* 95, 1974, 89-90), Campbell (n. 2), 156-8, H. Cotton, "The Date of the Fall of Masada: the Evidence of the Masada Papyri", *ZPE* 78 (1989), 157-62, Cotton and Geiger (n. 2), 21-24; G.W. Bowersock, "The Babatha Papyri, Masada and Rome", *JRA* 4 (1991), 344.

⁶ Jos. *BJ* 7.252-406.

⁷ According to Jos. *BJ* 7.401 the mass suicide of the defenders took place on the 15th, and the Romans entered Masada the next day.

⁸ B. Niese, "Zur Chronologie des Josephus", *Hermes* 28, 1893, 204-5 argued that Josephus was using the Tyrian calendar, in which Xanthicus 16 would correspond to May 3rd, but this view is no longer tenable. His view that the Jews measured the civil year using the Tyrian calendar, and used their own calendar only for religious purposes was refuted by M. Herr, "The Calendar", *Compendia Rerum Iudaicarum ad Novum Testamentum*, edd. S. Safrai and M. Stern, Section One: The Jewish People in the First Century, vol. II, 1976, 845, who showed that the Jews used only a single calendar in the first century, their own. Niese's date is occasionally still used, e.g. by P. Sijpesteijn, "Flavius Josephus and the Praefect of Egypt in 73 AD", *Historia* 28/1, 1979, 118. For surveys of the problem of Josephus' dates, see J. Nicols, *Vespasian and the Partes Flaviana* 1978, 42-7, J. Price, *Jerusalem Under Siege*, 1992, 121-4.

⁹ Nicols (n. 8), 45, B. Jones, *The Emperor Titus*, 1984, 65 n. 17, Campbell (n. 2), 157 n. 1.

¹⁰ Price (n. 8), 210-1.

¹¹ Jos. *BJ* 3.317 (Jotapata), 4.84 (Gamla), 5.99, 6.408 (Jerusalem).

¹² R. Brünnow and A. Domaszewski, *Die Provincia Arabia*, vol. III, 1909, 221-244.

gate (*porta praetoria*) of Roman legionary camps should face the enemy.¹³ The Roman Camp B at Masada, however, faces southeast, away from the fortress. Domaszewski conjectured that the camp faced the sunrise for the purpose of taking auspices.¹⁴

In 1929, Christopher Hawkes used aerial photographs of the Roman siege camps to study the siege. In a discussion of the length of the siege, he argued that the internal stone walls in the camps were foundations for tents, and stated that "the Masada camps were obviously not built to winter in, and everything points to the use of regulation leather tents."¹⁵ The siege was, in Hawkes' view, a short one, taking place entirely within the spring of one year.¹⁶

Adolf Schulten, who visited the site for a month in 1932, wrote the most extensive and influential analysis of the Roman siege works to date. He maintained that the stone walls were the remains of barracks, which, in his opinion, proved that the siege lasted over a winter.¹⁷ Following Domaszewski's hypothesis on the orientation of camp B, Schulten attempted to date the siege more closely. By comparing the direction of the camp gates with the point of the rising sun in winter, Schulten calculated that the siege started sometime between September and December and therefore lasted from four and seven months.¹⁸ But, while ingenious, the argument from orientation is not a reliable clue to the siege's beginning. While, as noted above, it was normal for a camp to face the enemy, exceptions were made.¹⁹ Schulten himself admitted that Camp B might well have been oriented in order to face the supply road leading from the Dead Sea.²⁰

Ian Richmond studied the Roman camps carefully in the early 1960s and showed conclusively that the internal walls in the camps were originally no more than 1.2 meters high.²¹ Therefore, the remains of the walls could not have been those of winter barracks, but were rather tent foundations, intended to give the soldiers more room and to keep the tents cooler. The use of tents, rather than barracks, strongly suggests a short siege. The stone walls do lend an air of permanence to the Roman camps at Masada, particularly in their remarkable state of preservation, but the use of stone reflects only the desert environment. In the vicinity of Masada, stone was the only building material available. Elsewhere, such tent foundations, as well as the camp walls and circumvallation would have been built of turf or timber and would long have deteriorated.

There is nothing at all in the archaeological record to indicate a campaign over the winter and the lack of storage facilities or drainage ditches in the camps

¹³ [Hyg.] *De mun. castr.* 56: *porta praetoria semper hostem spectare debet.*

¹⁴ Brünnow and Domaszewski (n. 12), 225.

¹⁵ C. Hawkes, "The Roman Siege of Masada", *Antiquity* 3, 1929, 204.

¹⁶ Hawkes (n. 15), 197, 200.

¹⁷ Schulten (n. 2), 97.

¹⁸ *Ibid.*, 17-8, 97, 102.

¹⁹ Veg. *Epit.* 1.23 notes that when camps are not facing the enemy, they might point towards the east or in the direction the army is traveling.

²⁰ Schulten (n. 2), 102-3.

²¹ Richmond (n. 2), 146.

suggest a short stay in the area.²² In addition, Israel Shatzman has recently argued that the Romans could not have begun the siege before the winter rains filled the local springs in December or January.²³

The Roman Plan of Attack

Naturally, the strategy used by the Roman commander Flavius Silva would have affected the length of the siege. From a military perspective, there was every reason for the Romans to press for a quick victory and not to delay their assault.²⁴ In the first place, the logistical difficulties of besieging this isolated desert fortress were considerable: no local food or fodder was available and all provisions had to be transported from depots at Hebron and En Gedi.²⁵ The daily ration of the Roman soldier weighed some 1.4 kg., and even assuming the non-combatants and laborers needed a smaller ration, say 1 kg. per day, the army would have needed over 16 metric tons of provisions, the equivalent of 200 donkey-loads, per day.²⁶ Josephus notes that there were no local springs and water must have been carried from sources 12-16 km. away.²⁷ Assuming a ration of 2 liters per individual per day, the army, including non-combatants and civilian laborers would have needed over 26,000 liters of water, another 215 donkey-loads, each day.²⁸ The fortress of Masada, on the other hand, had ample stores of food and water. Thus, starving Masada into submission would have been difficult and expensive. Building a siege ramp immediately upon arrival and assaulting the walls as soon as possible was the obvious strategy for Silva.

The striking topography of Masada encourages the impression that building a siege ramp was a difficult and lengthy matter, and Josephus' own description

²² Schulten (n. 2), 91, 164 noted that magazines and ditches are present in the Roman camps at Numantia in Spain, where the siege lasted over the winter of 134/133 B.C.

²³ I. Shatzman, "The Roman Siege on Masada", *The Story of Masada*, ed. G. Hurvitz, 1993, 105-120 (Hebrew).

²⁴ Richmond (n. 2), 144.

²⁵ Schulten identifies Hebron as the main Roman supply depot, but the Romans may well have established another depot at En Gedi. There are remains of roads connecting Camp B to En Gedi (via En Anerva) and Hebron to Camp F, Schulten (n. 2), 87-90. The *phourai* mentioned in Jos. BJ 7.275 may have been intermediary depots on these supply routes.

²⁶ J. Roth, *The Logistics of the Roman Army in the Jewish War*, dissertation: Columbia University, 1991, 211, 345.

²⁷ Jos. BJ 7.277-8. The Wadi Sebba might have contained some water, there is a spring at En Aneva about 5 kilometers away and a reservoir was discovered by Zvi Ilan in 1983 near camp F, but even all these sources together would have been insufficient to supply an army of 13,000. There are suitable springs at Ein Boqeq, 12 kilometers to the south, and at En Gedi, 16 kilometers to the north.

²⁸ Roth (n. 26), 159.

emphasizes the fortress' strong natural position.²⁹ To be sure, from the Dead Sea side the fortress is virtually impregnable, with steep cliffs rising 360 meters above the plain. The weak point of Masada is apparent, however, even to the casual observer. From the west, the distance from the plateau to the summit is only 75 meters and there is a gently ascending earthen slope which rises nearly to the top of Masada.

In antiquity a wagon road was built up this slope, now covered by the remains of the Roman siege ramp. Indeed, the upper part of the road was still visible (and usable) until destroyed by a severe earthquake in 1927.³⁰ Building a siege ramp up this western slopes was an obvious strategy and one need not assume that the Romans waited until they were on the site to decide to implement it.³¹ The building of a ramp from this direction was not a particularly difficult task from the point of view of Roman military engineering.

The Attackers and Defenders at Masada

The number of defenders and their strength relative to the Roman force would have affected Silva's decision whether to launch an immediate assault, or to try to starve out the fortress. The likelihood of stubborn resistance might have given the Roman commander pause, but it is clear from both literary and archaeological evidence that the Romans enjoyed overwhelming superiority in numbers, equipment and training.

The size of the Roman forces besieging Masada can be estimated fairly accurately. Josephus gives the garrison of Judaea after the end of the Jewish War as the "Tenth Legion, along with some *alae* of cavalry and cohorts of [auxiliary] infantry."³² An imperial Roman legion of this period had a paper strength of 4800 soldiers,³³ and the remains of camp B and F are consistent with a full-strength legion. The number and size of auxiliary units is more problematic. According to a military diploma, the provinces' auxiliary garrison in 86 A.D. was made up of two *alae* and four cohorts,³⁴ with a nominal strength of 2,240

²⁹ Jos. *BJ* 7.280.

³⁰ Schulten (n. 2), 170.

³¹ As do Brännow and Domaszewski (n. 12), 224 and Schulten (n. 2), 175. Masada had long been the site of a Roman garrison (Jos. *BJ* 2.408) and its topography would have been well-known to the military. While the Roman force there was massacred at the beginning of the Jewish War, individuals who had served there previously were certainly available to Silva. In addition, operations against nearby Herodion and Machaerus in the prior years would have provided ample opportunities for reconnaissance.

³² Jos. *BJ* 7.5.

³³ J. Roth, "The Size and Organization of the Imperial Roman Legion", *Historia* 43/3, 1994, 346-62.

³⁴ *CIL* 16.33: two quingenary *alae* (*Ala Veterana Gaetulorum* and *Ala I Thracum Mauretania*), a milliarian cohort (*Cohors I Thracum Milliaria*), two quingenary

infantry and 1,152 cavalry, around 3400 men.³⁵ The Judaean garrison in 73 was probably the same or larger than that of 86.³⁶ Units were certainly moved between 70 and 86, but while the actual units present in 86 may not have been the same as those in 73, since the province was peaceful it was more likely that units had been removed than added.

Josephus states that Silva utilized the entire garrison of Judaea.³⁷ The Romans had quite regularly placed garrisons around the country during the war, made up of units detached from their main force.³⁸ The reason for garrisons was, according to Josephus, to “keep the rebels in check and give confidence to the peaceful inhabitants on Vespasian’s departure.”³⁹ The situation facing Silva was quite different. The rebellion had been over for close to three years, and, if an emergency arose, troops could be moved from Masada to any point in the country in a few days. There was no compelling reason, therefore, for Silva to have left any units behind when he marched to Masada. Of course, the individual units may have been somewhat under-strength, and some soldiers left behind on administrative duty. Conversely, militia troops may well have accompanied the regular army force, to make up for under-strength Roman units.⁴⁰

Based on the probable size of Judaea’s garrison, and assuming that the entire force accompanied Silva, the force which marched on Masada totaled approximately 8,000 soldiers. This number agrees in general with the capacity of

cohortes peditatae (*Cohors I Augusta Praetoria, Cohors II Cantabrorum*) and one *cohort equitata* (*Cohors II Thracum equitata*). See Hawkes (n. 15), 203, Cotton and Geiger (n. 2), 14-5.

³⁵ Quingenary *ala*: 512 cavalry ([Hyg.] *De mun. castr.* 16, Arr. *Tact.* 18, J. Kromayer and G. Veith, *Heerwesen und Kriegsführung der Griechen und Römer*, 1928, 497-8), quingenary *cohort peditata*: ([Hyg.] *De mun. castr.* 28, Kromayer-Veith *ibid.*, 495, E. Birley, “*Alae and Cohortes Milliariae*”, in *Corolla Memoriae Erich Swoboda Dedicata*, 1966, 54, R. W. Davies, “A note on a recently discovered inscription from Carrawburgh”, *Epigraphische Studien* 4, 1967, 111, milliarian cohort: either 1,000 (Kromayer-Veith *ibid.* 495, Birley *ibid.* 54) or, more probably, 800 infantry (Davies *ibid.*, 111, cf. [Hyg.] *De mun. castr.* 1.2, 28.6). A quingenary *cohort equitata* had 120 cavalry in it ([Hyg.] *De mun. castr.* 24.4-5, Jos. *BJ* 3.67-8), but the number of infantry is controversial, either 360, 380 or, most likely, 480 infantry. If the latter number is correct, the total is 600 men (G.L. Cheeseman, *The Auxilia of the Roman Imperial Army*, 1914, 29, Davies, *ibid.*, 110, D.L. Kennedy, “Milliary Cohorts: The Evidence of *BJ* III.4.2. (67) and of epigraphy”, *ZPE* 61, 1985, 253 n. 6).

³⁶ As pointed out by Schulten (n. 2), 85.

³⁷ Jos. *BJ* 7.252: *estrategusan epi touto tèn en tois topois dunamin sunagagôn*.

³⁸ Jos. *BJ* 2.507, 3.31-4, 309, 4.28-31, 130, 4.41-2, 4.46-8, 5.51, 5.50.

³⁹ Jos. *BJ* 4.120

⁴⁰ Militia units accompanied the campaigns of Quinctilius Varus in 4 B.C. (Jos. *BJ* 2.52) and Cestius Gallus in 66 A.D. (Jos. *BJ* 2.502-6).

the two large and six small Roman camps at Masada, which Schulten put at 8,000, Richmond at *ca.* 7200 and Yadin at 9,000.⁴¹

In addition to the troops, there were non-combatant slaves (*calones*) permanently attached to the Roman army. Schulten estimates their number at 2,000⁴² and a ratio of 1:4 consistent with the practices of the first century army.⁴³ It is not surprising that quarters for such military slaves are not attested archaeologically: they would not have had separate quarters but would have slept with the pack animals or with the unit's gear.

These regular military slaves should be distinguished from the Jews who Josephus says carried supplies for the army.⁴⁴ Yadin calls these individuals Jewish "prisoners" and estimated that 6,000 were present at Masada.⁴⁵ The civilian laborers used at Masada were probably not prisoners from the Jewish War, which had ended three years previously. Josephus is scrupulous in recording the fate of captives. According to him, the Romans took 97,000 prisoners during the war; Titus pardoned and released 40,000 of them and another 11,000 starved to death while in captivity.⁴⁶ Of the remaining 46,000, some were immediately executed or sent to the mines in Egypt,⁴⁷ "many" brought to Caesarea to die in games,⁴⁸ and a "multitude" (*ochlon*) transported to Rome to march in Vespasian's triumph.⁴⁹ The remaining prisoners were sold to private slave dealers.⁵⁰ Josephus does not mention, or imply, the retention of any prisoners by the military for labor service or any other purpose, nor was there any need for such slaves.⁵¹

Both in war and peace the Roman army routinely requisitioned necessary labor from *free* provincials.⁵² Thus, the Jews mentioned by Josephus were not "prisoners" or "slaves" but rather impressed or corvée labor enlisted for the duration of the campaign. These civilian Jewish laborers, serving primarily as porters carrying supplies from En Gedi or Hebron, would have been quartered and fed in those settlements, where they would have been less of a logistical strain on the Roman military.

⁴¹ Schulten (n. 2), 86, Richmond (n. 2) 152, Yadin (n. 2), 223. Hawkes (n. 15), 197 put the number at 6,000, but this estimate is based on his notion that an under-strength Tenth Legion camped first at B, and later moved to F, while in fact a full-strength legion was divided between the two camps.

⁴² Schulten (n. 2), 88.

⁴³ Roth (n. 33), 354-8.

⁴⁴ *Jos. BJ* 7.277.

⁴⁵ Yadin (n. 2), 233. He gave no rationale for this number.

⁴⁶ *Jos. BJ* 6.384, 419-20.

⁴⁷ *Jos. BJ* 6.386, 417

⁴⁸ *Jos. BJ* 7.24-5.

⁴⁹ *Jos. BJ* 7.138.

⁵⁰ *Jos. BJ* 6.384, 417.

⁵¹ Nor is there reason to think the population as a whole suffered in status, see B. Isaac, "Judaea after A.D. 70", *Journal of Jewish Studies* 35, 1984, 49-50.

⁵² Plut. *Brut.* 25, *Ant.* 68, Matthew 27:32, Mark 15:21, Dio Cass. 65.4.5.

Roman soldiers almost always built siege works themselves, without any civilian labor.⁵³ This was done for security purposes: when a sortie occurred, the soldiers working on the ramp were expected to defend it.⁵⁴ Civilian workers would only get in the way, or worse, assist the enemy in destroying the ramp.

Under normal circumstances, even the work of excavating the enormous amount of earth necessary for the ramp and transporting this material to the base of the ramp would have been done by soldiers.⁵⁵ It is likely, though, that some Jewish corvée labor was present at Masada. Due to the small military presence at Masada and Silva's wish to prevent escape by placing troops on all sides of the fortress, the use of Jewish corvée labor would have been attractive. Requisitioned slaves did excavation and transportation work at the siege of Zela in 47 B.C.⁵⁶

There is some archaeological evidence for the presence of this Jewish corvée labor at the site. The walled area near the siege ramps, measuring some 1200 square meters, which Schulten called the *Bauplatz*,⁵⁷ was probably not a construction site, which would not have needed a wall around it. Rather it is more likely to have been a camp for the corvée laborers; without undue crowding, it could have accommodated some 3,000 persons.⁵⁸ In addition, the 30 so-called *canabae* found near Camps E and F⁵⁹ were probably not for "camp followers and tradesmen" as suggested by Yadin,⁶⁰ but rather for the civilian supervisors of the corvée laborers. This would explain why there are no *canabae* found near camp B or anywhere on the east side of Masada, as the Romans did not build siege works in this area.⁶¹ Thus, the Roman force at Masada probably totaled approximately 13,000 men: 8,000 Roman combatants, 2,000 military slaves and 3,000 Jewish corvée laborers.

As for the defenders of Masada, under the command of Eliezar Ben Ya'ir, Josephus gives an exact figure: 967 men, women and children.⁶² While Josephus

⁵³ *RE* 6.2, 2242, s.v. *Festungskrieg* (W. Liebenam).

⁵⁴ Two cohorts, which allowed the siege ramp they were working on at the siege of Phraata in 36 B.C. to be burned, were decimated and placed on barley rations, Front. *Strat.* 4.1.37, Plut. *Ant.* 39.

⁵⁵ Caes. *BGal.* 3.25, Jos. *BJ* 3.161-5.

⁵⁶ *BAlex.* 73.2.5. These slaves come from the immediate vicinity and thus are analogous to requisitioning free labor from the locality of Masada, and not with the use of prisoners from the Jewish War.

⁵⁷ Schulten (n. 2), 95, originally suggested by Brünnow and Domaszewski (n. 12) 224.

⁵⁸ At the rate of men per square meter indicated in [Hyg.] *De mun. castr.* 25 about 6,000 laborers could have fit in this area, but this is without any allowance for paths through the camp.

⁵⁹ Schulten (n. 2), plan XXVIII, Richmond (n. 2), 151.

⁶⁰ Yadin (n. 2), 224-5.

⁶¹ As noted (though misinterpreted) by Hawkes (n. 15) 201.

⁶² Jos. *BJ* 7.399-400: 960 victims and seven survivors (two women and five children). For the question of numbers in the *BJ*, see Price (n. 8) 204-9.

implies that each *Sicarius* had a wife and children with him in the fortress,⁶³ this seems unlikely, and the adult male population may have represented as much as 50 percent of the total. On the other hand, there were certainly significantly numbers of women and children present, as the fortress had doubtless attracted refugees and had been the homebase of the *Sicarii* for several years.

Schulten estimated the Jewish fighting force at 500,⁶⁴ but this should be seen as a maximum figure, and Feldman's figure of 200-300 defenders is equally likely.⁶⁵ Thus while the Roman military force was relatively small, it vastly outnumbered that of the defenders, by a factor of at least sixteen to one, and possibly as much as forty to one.

Jewish Resistance

The problem of logistics, the topography of the fortress and the overwhelming superiority of the Roman forces certainly would have made a direct assault on the fortress the most attractive course available to the Romans. The question remains whether the *Sicarii* would have been able to delay Roman construction of siege works. As is often the case, the best defense against a siege ramp was the offense. In a sortie or *eruptio*, the defenders sallied forth and attempted to burn to attackers' siege works.⁶⁶ Even under the best of circumstances, an effective sortie is difficult to execute from Masada as there are only three possible places of egress, all of which are easily guarded.⁶⁷ It is true that a sortie had been successfully used by the defending Herodians in the siege of Masada in 40-39 B.C, but this had been directed against a relatively small and ill-disciplined force.⁶⁸ The *Sicarii* at Masada faced the Roman army at the height of its effectiveness. The Jewish defenders at Machaerus had also effected sorties,⁶⁹ but while Josephus does not give the size of the defending garrison it was likely to have been much larger than that at Masada.

Indeed, it was the small number of defenders at Masada which made successful sorties impossible. Even assuming that there were 500 male adult defenders at Masada, not all of them would have been available for such attacks.

⁶³ Jos. *BJ* 7.389: *tosoutos autois gunaikôn kai paidiôn kai tês autôn sphagês erôs enepesen.*

⁶⁴ Schulten (n. 2), 172.

⁶⁵ L. Feldman, "Masada: A Critique of Recent Scholarship", *Christianity, Judaism and Other Greco-Roman Cults: Studies for Morton Smith at Sixty*, ed. J. Neusner, 1975, 239.

⁶⁶ Veg. *Epit.* 4.28. This tactic was used at Avaricum (Caes. *BGal.* 7.22.4), Massilia (Caes. *BCiv.* 2.1.4) and at Jerusalem (Jos. *BJ* 5.473ff.) see W. Wimmel, *Die technische Seite von Caesars Unternehmen gegen Avaricum*, 1973, 10.

⁶⁷ Jos. *BJ* 7.280, Schulten (n. 2), 92.

⁶⁸ Jos. *AJ* 14.391.

⁶⁹ Jos. *BJ* 7.193.

The casement wall, which surrounds the top of the plateau and forms the fortress, is about 1500 meters in length. Therefore, even with only one guard every thirty meters, 50 men would have been on sentry duty at any one time, and another 50 resting from their watch, leaving at most 400 defenders for sorties.

Roman strategy further reduced the effectiveness of the defenders. Silva placed half the Tenth Legion and two cohorts of auxiliaries (a total of about 3,400 men) in Camps A, B, and C on the eastern side of the fortress. These troops covered the Snake Path and Masada's Eastern Gate, which, if unguarded, provided a way into the fortress.⁷⁰ This threat forced Ben Yair to split his forces and to deploy some of his men far from the ramp, as evidenced by the "rolling stones" found piled near the Snake Path and the southern cliffs.⁷¹ Even if Ben Yair had left only 100 men to guard the Snake Path meant that at most about 300, and perhaps as few as 100, defenders would have been available for a sortie. Such a small attacking force would have had virtually no chance of success. Half a legion, 2,400 of the best soldiers in the world, would have been working on the ramp at any one time, and some 500 auxiliaries were camped only minutes away.

If sorties were not possible, the next best defense against a siege ramp was to try to slow down Roman construction by shooting or hurling missiles at the attackers. At Masada, however, the defenders were not numerous enough to sustain a rate of small missile fire necessary to slow down construction.

If the defenders had possessed a large number of artillery pieces, they might have been able to delay, though not stop, construction of the ramp. Vegetius noted that artillery could set a siege tower on fire from a distance,⁷² but such fire would have been ineffective against the ramp itself. Unless the defenders possessed such artillery in large numbers, they could do little but harass the Romans.⁷³ The rebel forces at Jerusalem had captured Roman artillery pieces and used them to some effect,⁷⁴ but there is little reason to think that the *Sicarii* possessed much, if any, artillery at Masada.

Josephus does not mention any artillery among the stores left there by Herod the Great (between 37 B.C. and 4 A.D.),⁷⁵ but even if he had, and such pieces

⁷⁰ Hawkes (n. 15), 199 thought that the Tenth Legion occupied first camp B, to cut off the expected flight of the *Sicarii* and only moved to camp F when resistance became obvious. Flight to the west, however, was just as possible, and Hawkes' view has been discredited by excavation. Schulten (n. 2), 100 theorized that the placement of camps A, B, and C was to block escape via the Wadi Sebbe, but the Wadi Nimre seems an equally likely escape route.

⁷¹ E. Smallwood, *The Jews Under Roman Rule from Pompey to Diocletian*, 1981, 337, Yadin (n. 2), 156, 163.

⁷² Veg. *Epit.* 4.18, Kromayer and Veith (n. 35) 447.

⁷³ Cf. Aul. Hirt. *BGal.* 8.4, Veg. *Epit.* 4.15.

⁷⁴ Jos. *BJ* 5.267.

⁷⁵ Jos. *BJ* 7.295-8. For the use of artillery by Herod, see I. Shatzman, "Artillery in Judaea from Hasmonean to Roman Times", in D.H. French and C.S. Lightfoot,

were still serviceable after 70 years of storage,⁷⁶ they had probably long been removed by the Roman to Caesarea or Jerusalem.⁷⁷ No legion had been stationed in Judaea before 70 and the Roman garrison at Masada in 66 was probably only a small detachment of auxiliaries, which probably did not have artillery.⁷⁸ Israel Shatzman has argued that the view that the defenders at Masada lacked artillery is based on circumstantial evidence, which is a good point, but he admits that such artillery is never directly attested.⁷⁹ Some of the circumstantial evidence is compelling, for example, the siting of camps E and F, both of which would have been open to artillery fire if the defenders had possessed any.

In any case, Roman military technology provided a number of passive defenses against missiles hurled or fired from the summit by the *Sicarii*. Both small missiles such as arrows and most ballista stones and darts would have been deflected by the use of *plutei* and *vinei*, portable defensive screens placed in front of the siege works.⁸⁰ Josephus makes this point himself in his description of the siege of Jotapata.⁸¹ Large rolling stones of some 30 cm. diameter were discovered stacked at various points along the casement wall and were certainly intended to bombard the attackers from above.⁸² The number of such stones, however, must have been limited and both the stones and larger artillery ammunition could have been stopped by the wooden palisades (*portici*, *musculi*), set up to guard the workers at the head of the ramp.⁸³

The Romans also took active measures to prevent interference in the construction of the ramp. In order to provide fire cover for the soldiers' work, the Roman built a 60 cubit (27 meter) high tower (*purgos*).⁸⁴ Such siege towers sometimes contained a battering ram,⁸⁵ but Josephus makes clear that the

The Eastern Frontiers of the Roman Empire, British Archaeological Reports, International Series, 535/2, 1989, 465-8.

76 It has been argued that artillery pieces could be kept in service for considerable periods of time, D. Baatz, "Hellenistische Katapulte aus Ephyra", *Ath. Mitt.* 97, 1982, 232.

77 D. Campbell, "Auxiliary Artillery Revisited", *BJ* 186, 1986, 124 n. 54.

78 Auxiliary units were not normally issued artillery, E. Marsden, *Greek and Roman Artillery*, 1969, 191, Campbell (n. 77), 117-132. The counterarguments of Shatzman (n. 75), 468-74 are not convincing.

79 Shatzman (n. 75), 474-5.

80 For *plutei* and *vinei*, see Caes. *BGal.* 7.25, 41.4, 72.4, Veg. *Epit.* 4.15, T. Holmes, *Caesar's Conquest of Gaul*, 1899, 604, Liebenam (n. 53), 2243, Kromayer and Veith (n. 35), 444.

81 Jos. *BJ* 3.163-4.

82 Yadin (n. 2), 156, 163, see Veg. *Epit.* 4.8.

83 Caes. *BCiv.* 2.2.3, Tac. *Hist.* 2.22.9, Veg. *Epit.* 6.16, Wimmel (n. 66), 40.

84 Jos. *BJ* 7.367-9, cf. Sall. *Iug.* 76.3.2, O. Lendle, *Texte und Untersuchungen vom technischen Bereich der antiken Poliorkeik*, 1983, 192.

85 Vit. *De Arch.* 10.3. An example is illustrated on the Arch of Septimius Severus, see R. Brilliant, *The Arch of Septimius Severus in the Roman Forum*, 1967, plate 87.

battering ram at Masada was separate from the siege tower.⁸⁶ The tower at Masada held artillery pieces and archers, to be put into use as soon as the ramp approached arrow-shot of the enemy.⁸⁷ If the reconstruction of the siege ramp by Adolf von Lammerer is correct, then the top of the tower would have been at the level of the wall as the ramp came within range of the defenders' bows.⁸⁸ Firepower in the siege tower would have effectively eliminated interference from the defenders. Archaeology provides dramatic evidence of suppressing fire: the 300 ballista stones found strewn in a room near the breach, in which the defenders had stacked 13 rolling stones, were almost certainly from this Roman artillery.⁸⁹

There is no evidence of effective resistance by the defenders of Masada and little reason to think it occurred.⁹⁰ In Josephus' description of every other siege during the Jewish War, resistance is graphically described, even exaggerated,⁹¹ but the historian does not even mention any resistance by the defenders at Masada.⁹²

The Jews certainly had every motive to resist, but simply lacked the means. The Romans had every reason to take the fortress of Masada as quickly as possible, and they had the means to overcome its defenses in a relatively short period. The Romans would have been but little delayed in the erection of their siege works and the time allotted for the construction of the siege works should correspond closely to the total length of the siege.

The construction of the Roman siege works

The first job of the military arriving at Masada would have been to build and improve roads. This was necessary in order to bring in construction material, as well as to facilitate the movement of provisions into the area. Josephus describes how Vespasian built such a road during the siege of Jotapata.⁹³ This road, which ran from Gabara to Jotapata, a distance of some 10 kilometers, was completed by

⁸⁶ Jos. *BJ* 7.309: *en tautô de kai krion ho Silbas Megan kataskeuasamenos...*

⁸⁷ Lendle (n. 84), 71-106.

⁸⁸ Schulten (n. 2), Plan XIII.

⁸⁹ E. Netzer, *Masada III: The Yigael Yadin Excavations: 1963-65, Final Reports. The Buildings, Stratigraphy and Architecture*, 1991, 419. Shatzman (n. 75), 474-5 suggests that some of these balls may have been ammunition for Jewish artillery. One wonders why the defenders would have held back any ammunition, if indeed they had artillery.

⁹⁰ Richmond (n. 2), 144; Yadin (n. 2), 266; S. Cohen, "Masada: Literary tradition, archaeological remains, and the credibility of Josephus", *Essays in Honor of Yigael Yadin*, edd. G. Vermes and J. Neusner, 1983, 403.

⁹¹ Jos. *BJ* 2.430-440, 533-8, 3.150-288, 316-25, 6.71-97, 266-74, 284-9, 304-47, 466-72, 6.15-23, 157-92, 220-35, 7.190-200.

⁹² Of course, this is an argument from silence, as noted by Shatzman (n. 75), 474.

⁹³ Jos. *BJ* 3.141-2.

a detached force of infantry and cavalry, the size of which Josephus does not give, in four days.

At Masada the Romans constructed a road connecting camp D with camp F, and probably the road to Hebron and to En Gedi were improved.⁹⁴ If the whole force was utilized, there is no reason to think that this construction took more than about a week.⁹⁵ It is also possible that work on the roads may have been started prior to the arrival of the main force, as was the case with the siege of Jotapata.

The circumvallation

Immediately upon the Romans' arrival at Masada, Silva ordered camps built and a circumvallation wall constructed around the fortress.⁹⁶ The circumvallation at Masada measures some 4500 meters in length, with a width of between 1.5 and 1.8 meters (an average of 1.65 meters). It was probably originally 3 meters high, and thus contained about 23,000 cubic meters of stone. In addition, eight military camps and one civilian camp (the *Bauplatz*) were built, some on and some near the circumvallation. These totaled some 2,500 meters of wall, probably the same height as the circumvallation, but thicker, between 1.8 and 2.4 m. (averaging around 2m). The camps therefore contained another 15,000 cubic meters, giving a total of close to 38,000 cubic meters for the entire circumvallation.

Clearly, any military construction involves various steps carried out at varying rates. However, in order to provide a model for discussing the time needed to build the siege works at Masada, this study will posit a single construction rate in terms of amount of building material amassed per man per day. Busolt, in his discussion of the building of the Spartan siege ramp at Platea, assumed a construction rate of 1 cubic meter of earth per soldier per day,⁹⁷ a rate which Gomme considered "conservative."⁹⁸ This has been the only construction rate proposed for the building of siege ramps and while neither Busolt nor Gomme gave any rationale for this estimated rate, it is quite reasonable and agrees with other evidence.

Modern experiments in the building of ancient earth works support Busolt's rate on construction. At the building of a simulated ditch-and-bank prehistoric earth work at Overton Down in southern England in 1960, student volunteers using "modern" tools (i.e. pick, shovel and bucket), constructed a rampart at an average rate of 3.58 cubic feet per work per hour, the equivalent of almost exactly

⁹⁴ See note 25.

⁹⁵ Richmond (n. 2), 153-4.

⁹⁶ Jos. *BJ* 7.276.

⁹⁷ G. Busolt, *Griechische Geschichte bis zur Schlacht bei Chaeronaeia III.2: Der peloponnesische Krieg*, 1904, 965.

⁹⁸ A. Gomme, *A Historical Commentary on Thucydides, Books II-III*, 1956, 207.

1 cubic meter per 10-hour day.⁹⁹ The experimental reconstruction of a Roman military turf rampart, also constructed in England, but using prisoners as labor, gave similar results.¹⁰⁰

Modern estimates suggest that building with stone takes longer than with earth, 1.8 man/days per cubic meter of stone as opposed to one man/day per cubic meter of earth.¹⁰¹ But according to a speech given to Roman legionaries in Africa by Hadrian, the rate of building stone walls and turf walls could be about the same, if done by experienced troops.¹⁰² It is thus reasonable to infer that the work rates at Masada, where military construction was done in stone, would be similar to that using turf, given that the Roman troops were very experienced in such construction.¹⁰³

8,000 soldiers working at a rate of one cubic meter per day per soldier could have completed the entire job in under five days.¹⁰⁴ Since there exists some overlap between circumvallation and the camp walls, this construction time might also be reduced.

Josephus implies that the Romans completed the wall of circumvallation before beginning work on the siege ramps, and his narrative strengthens this impression by separating his description of these two phases of construction with a digression on the fortress and its history.¹⁰⁵ It is quite possible, however, that construction on the wall of circumvallation and the siege ramp began simultaneously, with half the legion and the auxiliaries building the former, and the other half of the legion the latter. If so, with fewer hands, the circumvallation would have taken seven days to build, but the construction of the ramp could

⁹⁹ P.A. Jewell ed., *The Experimental Earthwork on Overton Down, Wiltshire, 1960*, 1963, 58, D.W.A., "Prehistoric Earthmoving", *Settlement Patterns in the Oxford Region*, edd. H.J. Case and A.H.R. Whittle, CBA Research Report 44, London, 1982, 153-6.

¹⁰⁰ B. Hopley, "An Experimental Reconstruction of a Roman Military Turf Rampart", in S. Applebaum, *Roman Frontier Studies, 1967*, 1971, 21. The turfs measured 1 x 1.5 x .5 Roman feet and were cut, carried and stack at a rate of five per man/hour, also the equivalent of ca. 1 cubic meter per day. Relatively unmotivated prisoners were used for this reconstruction.

¹⁰¹ J.D. Anderson, *Roman Military Supply in North-East England*, BAR British Series 224, 1994, 89, citing I. Baker, *A Treatise on Masonry Construction*, 1909.

¹⁰² *CIL* 8.18042 Bb (Lambaesis): (*munitiones*) [*quas*] *alii* [*per*] *plures dies divis[is]ent, e]as uno die peregistis; murum lo[ngi] operis et qualis mansuris hibernaculis fieri solet non [mul]to diutius exstruxistis, quam caespite exstruitur.*

¹⁰³ The soldiers of the Roman garrison in Judaea had been on campaign for at least five of the last six years, and had built circumvallations and other siege works on numerous occasions: Jos. *BJ* 3.178, 4.13, 5.261, 6.151, 7.190.

¹⁰⁴ Richmond (n. 2), 153 estimated it took about a week, using the three-day circumvallation of Jerusalem (Jos. *BJ* 5.508-9) as a guide.

¹⁰⁵ Jos. *BJ* 7.280-303.

have started immediately after Silva's arrival, shortening the total length of the siege by five days.

The Roman forces guarding the perimeter, half a legion and all the auxiliaries, numbered about 5,800 soldiers, represented well over one man per meter of the circumvallation. This density of this force made a barrier wall superfluous, as the number of pickets would have made escape virtually impossible even without such a wall. The circumvallation may have been constructed primarily as "busy work" for the army. If this is so, it was so, it is less likely that Silva would have delayed the building of the ramp in deference to what was, strictly speaking, an unnecessary circumvallation.

The siege ramp

The building of the siege ramp was clearly the most time-consuming phase of the siege. The time needed to construct the ramp will be estimated in two ways. First, the original volume of the ramp will be calculated and the theoretical construction rate applied and an approximate figure derived for the necessary construction time. Second, the time recorded for the raising of ramps in other sieges will be evaluated and historical circumstances, which might lengthen or shorten the construction time needed, compared with those at the siege of Masada.

At first glance, the siege ramp at Masada appears enormous. However, the present appearance of the ramp differs considerably from its original size and shape. As noted in 1933 by von Lammerer and confirmed by a recent geologic survey by Dan Gill, the Roman ramp is built on top of a large natural spur.¹⁰⁶ Thus, what is for the most part a natural earthen slope easily can be confused with an enormous Roman siege work. In addition, the situation of the ramp next to a deep wadi makes the siege ramp appear far larger than it is in reality.¹⁰⁷

Two thousand years of erosion have spread the remains of the siege ramp over this spur: at present the ramp is funnel-shaped, 225 meters long, some 50 meters at the narrowest, lowest part and widening to some 220 meters at the top.¹⁰⁸ The point, however, is not the present dimensions of the ramp, but those at the time of the siege. In the most thorough analysis to date, von Lammerer calculated that the siege ramp at Masada was originally 150 meters long and 25 meters wide.¹⁰⁹ The ascent of the slope is not constant, and the ramp's height

¹⁰⁶ A. von Lammerer, "Der Angriffsdam", in Schulten (n. 2), 167, D. Gill, "A Natural Spur at Masada", *Nature* 362/12, Aug. 12, 1993, 569-70.

¹⁰⁷ Josephus' figure of 200 cubits (90 meters) for the ramp's height (Jos. *BJ* 7.306) is probably measured from the bottom of the Wadi Sebba next to it, Schulten (n. 2), 171, Yadin (n. 2), 226, Gill (n. 106) 570. The present distance from the bottom of the Wadi Sebba to the top of the ramp is 115 meters.

¹⁰⁸ Gill (n. 106) 570.

¹⁰⁹ Von Lammerer (n. 106), 169, 175.

varied, from a maximum of 30 meters at the center to around 10 meters at either end.¹¹⁰ Taking the average thickness of the ramp to be 20 meters, the siege ramp at Masada contained approximately 37,500 cubic meters of earth and timber.¹¹¹ The siege ramp at Masada was certainly large, but its building was by no means a phenomenal feat by the standards of Roman military engineering.

The building of siege ramps involved two steps: first the material had to be collected, then the ramp itself had to be constructed. In the case of Masada, the earth for the ramp was certainly excavated locally and, as argued above, was probably done by the *corvée* labor force at the site.¹¹² Indeed, the small hill behind the siege ramp, over which the circumvallation runs, may be the remains of a much larger hill from which this earth was removed.

Comparative evidence gives some idea of the amount of time needed for this excavation. According to field manuals from the American Civil War and World War I, inexperienced soldiers were expected to dig at a rate of ca. 3 cubic meters in an eight-hour day.¹¹³ Earth could be transported for 100 meters by two men using a stretcher at a rate of ca. 6 cubic meters in 8 hours.¹¹⁴ Assuming that one-half of the 3,000 man *corvée* labor force at Masada was digging and the other half transporting the earth, sufficient earth could have been excavated and moved in under nine days.

Timber was also an important element of the siege ramp,¹¹⁵ and in the case of Masada all timber had to be brought in from elsewhere. It is possible that the siege ramp that had been used the previous year at Machaerus was dismantled and the timber removed to Masada.¹¹⁶ Other sources of wood were available, including the oasis of Jericho, the forest of Zoar and the forest of Jardes, on the north, south and east banks of the Dead Sea, respectively.¹¹⁷ This timber could

¹¹⁰ *Ibid.*, plan XIII, cf. Gill (n. 106) 569.

¹¹¹ I.e. 150 m. times 25 m. times 20 m. divided by 2 (as a ramp would be half the volume of a cube of these dimensions). The estimate of Gill (n. 106), 569 of 250,000 cubic meters appears to count a considerable portion of the natural slope as part of the ramp.

¹¹² Cf. *BAlex.* 73.1.5, *Front. Strat.* 3.7.4.

¹¹³ E. Viele, *Handbook of Field Fortifications*, 1861, 24, [British] General Staff, *Field Service Pocket Book*, 1916, 104 (80 cubit feet per 8-hour day). This rate, however, could be greatly increased: enslaved African-Americans making bricks for the Confederate military dug clay at a rate of 9 to 12 cubic meters per day, C. Mohr, *On the Threshold of Freedom: Masters and Slaves in Civil War Georgia*, 1986, 181.

¹¹⁴ General Staff (n. 113), 98: two men carry two cubic feet a distance of 50 yards every two minutes. The Romans did not use the wheel-barrow, which was introduced to the West in the Middle Ages.

¹¹⁵ *Caes. BGal.* 4.12.4, *BCiv.* 2.1, *Lucan Phar.* 3.394, 426, Kromayer and Veith (n. 35), 444, Wimmel (n. 66) 37-8.

¹¹⁶ *Jos. BJ* 7.190.

¹¹⁷ The exact site of the forest of Jardes is unidentified, but Josephus says Bassus "pushed forward" (*êpeigeto*) to Jardes (*Jos. BJ* 7.210) so a location north of

have been shipped across the Dead Sea to En Gedi and then transported to the siege by the same *corvée* labor which carried provisions. The most probable source of timber, however, was the hills around Hebron.¹¹⁸

The time required to gather material for the siege ramps need not be added to its construction time. Since the siege of Masada was certainly planned ahead of time, the collection of timber probably began well before the army arrived at Masada. In addition, the excavation of earth and the movement of material to the ramp site, could have been going on at the same time that the siege ramp was under construction. There was no reason for Silva to wait until all the material for the ramp was ready, before beginning work on the siege ramp. After one day of excavations, sufficient material would be available to begin work on the ramp. However, even assuming that the Romans kept their legionaries inactive until all preparations were complete, these would have added at most 9 days to the siege.

There were 4,800 legionaries at Masada, but if the auxiliaries in Camp E were used to guard the western perimeter, only the five legionary cohorts in Camp F were garrisoned near enough to the siege ramp to have worked on it.¹¹⁹ Therefore, only 2,400 soldiers (half a legion) were available to Silva for construction work. At first glance, it seems strange not to use the entire legion for construction, but this is due to a natural limit to the number of troops who could have worked effectively on the ramp.

Siege ramps were built by constructing large wooden revetments on either side, and filling them in with earth stabilized by timber.¹²⁰ While there are various theories on exactly how ramps were constructed, a simple method was probably followed in most cases, including Masada. The revetments would have been pre-fabricated by the *corvée* laborers, out of harm's way, then moved into position and secured by legionary soldiers. In the same way, earth and stabilizing timber also would have been transported to the base of the ramp by the civilian laborers, and then baskets of earth carried up the ramps by lines of soldiers. After dumping the earth, an equal number of line of soldiers would have passed back the empty baskets.¹²¹ Other teams would have packed down the earth,¹²² and have laid down stabilizing timbers.

Machaerus is unlikely, and to the east (in the Syrian desert) impossible. A likely location is around the Arnon river.

¹¹⁸ H. Cotton, personal correspondence.

¹¹⁹ Schulten (n. 2), 100, 106, Richmond (n. 2), 149-50. It would have made little sense to march soldiers from Camp B several miles each day to the site of the ramp.

¹²⁰ Described in Sil. Ital. *Punica* 13.105, Lucan *Phars.* 3.394-8, and more prosaically by Thuc. 2.75.2. Kromayer and Veith (n. 35), 212-3. American Civil War field fortifications were also built with wooden revetments, Viele (n. 113), 5.

¹²¹ Cf. F. Lepper and S. Frere, *Trajan's Column*, 1988, plate XV (scene XX). Plin. *NH* 33.71 describes the removal of gold ore by miners using this method. It is also possible that each soldier carried a basket up, dumped it, and returned, but

If the Masada ramp was 25 meters wide, then only 20 such lines (half passing up, half passing back) could have fit (at a meter apart). Therefore, assuming 100 to 150 soldiers per line, a maximum of 2,000-3,000 soldiers could have effectively worked on the ramp. This explains why only half of the Tenth Legion would have been needed to build the Masada ramp.¹²³ It is possible that construction was carried on twenty-four hours a day, in three eight hour shifts of 800 men each.

Given Busolt's construction rate of 1 cubic meter per soldier per day, the 37,500 cubic meter siege ramp at Masada could have been completed by 2,400 soldiers in less than 16 days. Put another way, the Masada ramp was raised at a rate of 1.25 meters in height per day. This construction rate of 2,400 cubic meters in volume per day, or 1.25 meter in height per day, agrees well with information drawn from the accounts of raising other siege ramps.

At Avaricum in Gaul, Caesar's army took 25 days to build a ramp that was 23.5 meters tall, probably 97.6 meters long and perhaps some 50 meters wide.¹²⁴ While the figures are problematic, and they are possibly too large, the volume of such a ramp would have been 57,300 cubic meters and the construction rate approximately 2,300 cubic meters per day. This work was accomplished despite heavy rains and fierce resistance from 40,000 Gauls.¹²⁵ Even if the reconstruction of the total size of the Avaricum ramp is wrong, its height is explicitly given (80 Roman feet or 23.5 meters). The rate of construction was thus 0.94 meters a day, lower than that of the Masada ramp due to the defenders' resistance.

In addition, the total time estimated for raising the siege ramp at Masada (21 days) is in general agreement with that needed to raise other ramps, the dimensions of which are not known. Josephus' *Jewish War* provides the most extensive survey of such data. Siege ramps were built at the siege of Jotapata in

the former method has the advantage that, in case of sortie, soldiers needed only to drop their baskets and draw their swords to be ready to fight as a unit.

¹²² According to Veg. *Epit.* 4.3 this was down with rods or poles (*vectes*).

¹²³ In a siege in which resistance was expected, the other half of the legion would have provided security.

¹²⁴ Caes. *BGal.* 7.24: *diebus xxv aggerem latum pedes cccxxx, altum pedes lxxx exstruxerunt*. The ramp is probably being viewed from the side, and *latus* refers to the ramp's length. The extraordinary width was probably because the ramp at Avaricum held two siege towers (*BGal.* 7.17), instead of a more normal single tower (as at Masada) and so was presumably twice as wide, but see Wimmel (n. 66), 7-9.

¹²⁵ Caes. *BGal.* 7.22-4, 28.

20 or 22 days¹²⁶ and at Gamla (two ramps, each by one legion) in 30 days.¹²⁷ At the siege of Jerusalem, a series of ramps were raised against the determined resistance of 23,000 defenders: those raised against the first wall took 15 days to complete, those against the second wall 17 days (and when these were destroyed, larger ones were completed in 21 days), those against the Temple wall were finished in 20 or 22 days, and finally two embankments built to capture the royal palace took 18 days to complete.¹²⁸

All these ramps were of different size, and were built under different conditions, but it is noteworthy that the average time of construction for known siege ramps in the Jewish War was 20 days, with resistance.¹²⁹ The lack of resistance at Masada would have allowed a faster rate of construction. It should be noted that the soldiers of the Tenth Legion were quite experienced with siege ramp construction. They had raised several *aggeres* at the siege of Jerusalem only three years before, and in the previous year had built one at Machaerus.¹³⁰ In addition, the soldiers would have been highly motivated to finish the siegework, and their stay in this unpleasant region, as quickly as possible.

The Stone Platform

After the siege ramp at Masada was completed, it was topped by a large stone platform (*bêma lithôn megalôn*), 50 cubits high and 50 wide (22.5 by 22.5 meters).¹³¹ Josephus attributes the building of the platform to the need to provide a stable base for the battering ram,¹³² thus the platform was probably

¹²⁶ The siege began Artemisius 21 (Jos. *BJ* 3.142) and the works started eight days later (3.145, 149, 155, 157, 161), i.e. Artemisius 29. It was completed no later than Daesius 20, when three assault towers were placed on the completed embankment (3.282). The two day difference depends on which calendar Josephus is using: the Jewish counterpart of Artemisius (Iyar) has 29 days, the Julian (May) has 31.

¹²⁷ Jos. *BJ* 4.83.

¹²⁸ Jos. *BJ* 5.248-51, 302, 466, 6.5, 93, 149, 220, 376, 392.

¹²⁹ According to the unemended text of Thuc. 2.75.3 the siege ramp raised by the Spartans at Plataea took 70 days to construct. Busolt (n. 97), 967 note 2 thought this impossibly long. Suggestions for emendations have included 17 days (*heptakaideka* for *ebdomêkonta*) and more plausibly 20 days (Θ for Ο), Gomme (n. 98), 207. When Cicero took Pindenissum, a mountain fortress in Cilicia, using a siege ramp, the siege lasted for 57 days, but the site is unidentified and few details are known, Cic. *Fam.* 15.4.10, *Att.* 5.20, see M. Wistrand, *Cicero Imperator*, 1979, 9.

¹³⁰ Jos. *BJ* 5.302, 466, 6.5, 93, 149, 220, 7.190.

¹³¹ Jos. *BJ* 7.306.

¹³² Jos. *BJ* 7.307. At the siege of Atrax in 198 B.C., a wheeled siege tower almost collapsed because of loosely packed earth, Liv. 32.17.

about 50 cubits long (22.5 meters) in order to accommodate the battering ram.¹³³ There are two ways of envisioning the stone platform: (1) as a stone ramp placed on top of the earthen ramp, and up which a wheeled siege tower or battering ram was pushed, (2) as a giant stone cube, placed at the end of the ramp onto which the siege equipment would have been hoisted. The latter reconstruction corresponds better to the image of a *bêma*, a word used both for steps and platforms. In addition, a cubic platform would have had the advantage of reducing the overall size of the ramp.

The top edge of the ramp presently reaches some 15 meters below the edge of the cliff. While Schulten assumed that the present height of the ramp included the remains of the stone platform,¹³⁴ much of the stone may well have washed down into the Wadi Sebbe below over the millennia.¹³⁵ Thus, the original top of the platform was probably at, or above, the bottom of the casement wall. The remains of this stone platform were described by de Saulcy in 1851 and by Lt. Conder, and it probably totally collapsed only in the 1927 earthquake.¹³⁶

The stone platform was probably a more or less solid structure. It may have been hollow, though, like the brick *turris* constructed by the Romans at the base of the walls of Massilia during the siege of 49 B.C.¹³⁷ If so, and if the dimensions above are correct, it contained some 11,400 cubic meters of stone and timber (though a ramp-like platform would be smaller). Assuming the same construction rate as for the ramp (1 cubic meter per soldier per day) 2,400 legionaries could have constructed this platform in under five days.

Battering down the casement wall

Once the platform was completed, the Romans placed a battering ram on it and began smashing a hole in the casement wall. Josephus says that the battering down was done “with difficulty” (*molis*).¹³⁸ The difficulty might have been caused by Jewish resistance or missile fire, but, as noted above, this is unlikely. The battering ram would have been well-protected. It probably sat on top of the

¹³³ According to Vitruvius, *De Arch.* 10.15.6, a 31 meter long ram was considered especially long, cf. Richmond (n. 2), 154.

¹³⁴ Schulten (n. 2), 171.

¹³⁵ Yadin (n. 2), 226.

¹³⁶ De Saulcy in Brünnow and Domaszewski (n. 12), 238: “La plate-forme qui [la jetée] couronnait s’est écroulée, par l’action des pluies et du temps sur le terrain peu solide qui lui servait de base; toute les pierres ont roulé dans les précipices béants à droite et à gauche”, C.R. Conder, *Survey of Western Palestine: Memoirs* III, 1883, 419: “On the mound is a wall of unhewn blocks, forming a sloping ascent some 70 feet high”. This “slope” does not necessarily reflect the platform’s original configuration and might have been the result of erosion.

¹³⁷ Caes. *BCiv.* 2.8-10. The Roman army’s method of construction under fire, as described by Caesar in this passage, is instructive.

¹³⁸ Jos. *BJ* 7.310.

stone platform,¹³⁹ under a solid wooden roof, covered with leather hides (the *testudo*), at the level of the bottom of the casement wall.¹⁴⁰ The *testudo* would have prevented the defenders from damaging the ram through rolling stones or fire.¹⁴¹

When the stone platform was finished, the siege tower which had protected the siege ramp was almost certainly placed *behind* the platform (overlooking it) not on top of it.¹⁴² Josephus mentions the battering ram after describing the siege tower, but does not say it was *in* the tower, because it was not. The tower was 60 cubits high and the platform 50 cubits, and therefore the top of the tower would have been on the same level, or slightly above, the top of the casement wall. Therefore, the artillery and archers easily could have kept the *Sicarii* from interfering with the battering ram.¹⁴³

If active resistance from the *Sicarii* did not cause the “difficulty” with the battering ram, it must have been some technical problem. On one hand, there may have been some difficulty in placing the ram and *testudo* in position: if the reconstruction given here is correct, both would have had to be lifted some 20 meters from the surface of the ramp onto the stone platform. This operation, however, would not have been very troublesome, particularly since such winches could be positioned both of the stone platform and the siege tower. In addition, Josephus implies that the difficulty was met during the battering process.¹⁴⁴

The outer casement wall of Masada is relatively thin, only 1.5 meters, and built without mortar.¹⁴⁵ Under normal circumstances, it would have survived only a few hours of battering. But according to Josephus, after the stone wall was destroyed, a second wall became visible, made of timber and earth.¹⁴⁶ In a recent article, Ehud Netzer has argued that this “wooden wall” was not behind and unattached to the casement wall, as was previously thought, but was built

¹³⁹ As clearly indicated by Jos. *BJ* 7.307. Yadin (n. 2), 230 seems to have had this in mind.

¹⁴⁰ Vitruvius, *De Arch.* 10.13.4, Vegetius, *Epit.* 4.14, Kromayer and Veith (n. 35), 219, 225.

¹⁴¹ O. Lendle, *Schildkröten: Antike Kriegsmaschinen in poliorketischen Texten*, 1975, 6-25. Such a *testudo* is illustrated on the Arch of Septimius Severus, Brilliant (n. 81), 67.

¹⁴² As thought by Hawkes (n. 15), 199 and Schulten (n. 2), 96. Josephus (*BJ* 7.309) mentions the battering ram after describing a siege tower, but does not say it was in the tower, because it was not.

¹⁴³ Jos. *BJ* 7.309-10, Vegetius, *Epit.* 4.27, Yadin (n. 2), 231. The tower would also have functioned as covered access to the stone platform.

¹⁴⁴ Jos. *BJ* 7.310-11: *en tautô de kai krion ho Silbas Megan kataskeuasamenos, sunecheis keleusas poieisthai tô teichei tas embolas molis men all'oun anarrêxas ti meros katêreipse.*

¹⁴⁵ Schulten (n. 2), 74.

¹⁴⁶ Jos. *BJ* 7.311. The wall bears a certain resemblance to the “Gallic walls” described in Caes. *BGal.* 7.23ff., and the “inner wall” described in Vegetius, *Epit.* 4.23, cf. Vitruvius, *de Arch.* 1.5.7, Livy, 38.6.1, Pliny, *NH* 35.169.

within it.¹⁴⁷ According to his reconstruction, the hollow space between the inner and outer casement walls was filled with timber, and then another timber wall built 2.5 m behind the inner casement wall, and the intervening space filled with earth and timber, as described by Josephus.¹⁴⁸ In fact, there is no reason to postulate a wall behind the casement wall at all, and it seems quite possible that the wooden wall was constructed entirely within the hollow space on the inner and outer casement walls. Either reconstruction fits the narrative of Josephus.

Josephus describes the casement wall and the wooden wall as separate structures, and indeed they are from the point of view of the spectator.¹⁴⁹ A wooden wall placed behind the outer casement wall would have made the battering down more “difficult.” Vegetius describes a similar arrangement, saying that backing a stone wall with 20 feet of packed earth makes it impossible to batter down,¹⁵⁰ but one should not exaggerate the delay caused by the timber wall at Masada, which was considerably smaller. Allotting one day to get the ram into position and three to batter down the outer casement wall adds another four days, maximum, to the siege.

Burning the wooden wall and taking the fortress

When the outer casement wall had been destroyed, the wooden wall (and the inner casement wall) still remained. The Romans certainly recognized that it would take time to batter down a wooden wall (which would absorb the shock of the ram), and setting the wall on fire was a relatively easy alternative.¹⁵¹ After the wall caught fire, Josephus says that the wind changed directions, first blowing the flames towards the Roman works (note the fear of the ramp burning) and then back towards to wall.¹⁵² Although Josephus does not mention it, after the fire had destroyed the wooden support, the inner casement wall could easily have been knocked down.

According to Josephus, the Romans waited overnight, until the morning of Xanthicus 16, to enter the fortress. Schulten found this delay remarkable, and Cohen used it to question the historicity of Josephus’ account.¹⁵³ Yet the fire would have burned intensely for several hours, and may well have continued after dark. In this case, the Roman decision not to storm the fortress at night is

¹⁴⁷ E. Netzer, “The Last Days and Hours at Masada”, *Biblical Archaeological Review*, Nov/Dec. 1991, 26-31. The wooden wall was constructed from beams taken from the roofs of buildings in the fortress. Netzer estimates that it would have taken “one to two weeks” to have built this wall, but since it would undoubtedly have been begun long before the siege ramp was completed, this gives no indication for the length of the siege.

¹⁴⁸ Jos. *BJ* 7.311-13.

¹⁴⁹ This is not to imply that Josephus was personally at the siege.

¹⁵⁰ Veg. *Epit.* 4.3.

¹⁵¹ Jos. *BJ* 7.314. Netzer (n. 147), 32 explains the lack of archaeological remains.

¹⁵² Jos. *BJ* 7.317-9.

¹⁵³ Schulten (n. 2), 177, Cohen (n. 90), 385-405.

perfectly reasonable. Josephus says that when the Romans entered Masada they discovered that the entire Jewish garrison, with the exception of two women and five children, had committed suicide.¹⁵⁴ Whether or not the story of the suicide is true, or exaggerated, it is clear that the fortress was taken the day after the wall was battered down.

Conclusion

Assuming that the Roman forces began working immediately upon their arrival at Masada, and there is no reason to doubt this, and allowing seven days to build roads, five days for the circumvallation, nine days for preparations, 16 days to build the siege ramp and five for the stone platform means that only 42 days would have been needed from the arrival of the army at Masada to the completion of the siege works. Adding in four days for the battering and one to burn down the wooden wall gives a total of 47 days, or just under seven weeks.

It is possible, of course, that unforeseen and unmentioned delays slowed the siege. Adding two weeks to account for such possibilities would result in a total of nine weeks, just over two months for the siege, from beginning to end. Conversely, it is also possible, and indeed more likely, that the siege was shorter than seven weeks. Work on the roads might have begun before the arrival of the main force, and some of the steps in constructing the siege works might have overlapped, shortening the length of the siege. In addition, the estimated construction rate of one cubic meter per soldier per day is probably too low. It is certainly possible that the amount of time necessary to build the siege works might have been as short as a month.

All in all, a nine week siege is the likely maximum, a four week siege the likely minimum, and a siege of seven weeks the most probable length for the siege of Masada. Postulating a siege of some seven weeks fits in well with the date given by Josephus for the fall of the fortress, whatever calendar is being used.¹⁵⁵

¹⁵⁴ Jos. *BJ* 7.400. Both T. Weiss-Rosmarin, "Masada, Josephus and Yadin", *Jewish Spectator* 32/8, 1967, 29-32 and Cohen (n. 86), 403 challenged the historicity of the suicide, but see D. Ladouceur, "Josephus and Masada", *Josephus, Judaism and Christianity*, edd. L. Feldman and G. Hata, 1987, 106-8.

¹⁵⁵ Assuming that Josephus is using a Julian calendar, and Xanthicus 16 is an equivalent of April 16, then the siege might have begun on March 1 and have run for 46 days. If Josephus were using the Jewish calendar, one might think that Nisan 16 (i.e. Xanthicus 16) would fall around April 1, since Nisan runs from mid-March to mid-April. A survey of the Jewish calendar for the years 1800-2000, however, reveals that Nisan 16 fell on or before April 1 in less than 10 percent of the years surveyed. Indeed, Nisan 16 fell on or after April 16 over 42 percent of the time and Nisan 16 can fall as late as April 28. Of course, the Jewish calendar in the first century A.D. was not regulated in the same way as the present one, Herr (n. 8), but it is clear that a siege starting in March could easily have been completed by mid- to late April.

A combination of Josephus' dramatic rhetoric and the striking topography of Masada (as well as perhaps the influence of politics) have misled scholars on the length on the siege of Masada. A careful analysis of the narrative account, an understanding of the parameters of Roman engineering capabilities and the recognition that the siege ramp lies on top of a sloping natural spur, suggest that the siege was a relatively short one. While the topography of Masada presented a challenge, overcoming the fortress was a straightforward application of Roman military technology by a small provincial force.

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