



The Skyline of Rome

An archaeological interpretation of high-rises in Rome in the beginning of the Third Century AD By means of the Forma Urbis Romae and archaeological sources.

Julius Pilzecker

Figure 1: Fragment 10g of the Forma Urbis Romae(<http://formaurbis.stanford.edu>).

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Chapter 1 Introduction

1.1 Background

Through historical texts and the interpretation of modern historians of these texts the image is created that Rome was a city full of skyscrapers at the peak of the Roman empire (Storey 2003, 3). The height of Roman *insulae*¹ grew proportionally to the strength of the empire, which led to some insulae reaching staggering heights (Carcopino 1940, 24). Skyscrapers were multistoried structures that appeared as mixed-use buildings with shops for the wealthy on the ground floor and housing for the lower-class occupants on the upper floors (Modi 2014, 25). It was a necessity to make buildings higher to house the continuous influx of immigrants, generally poor peasants, from the entire Roman Empire. These immigrants were drawn by the elaborate sprawl of public buildings, which made the city-center a heavily desired place within Rome (Jongman 2003, 100-103). The demand for high buildings greatly benefited the profits of the landlords, but also created a clash between commercial buildings and public architecture on who could build the tallest building. This meant that the skyline of Rome became a competitive place (Tipton 2017, 76). The increases in height caused risk and distribution problems because of how complicated and concentrated the space for urban housing in Rome was. The differences in wealth and height led to problems with blocking the light and view, which were basic rights of Romans (Dig. 19.2.25.2). Juvenal declares that the height of residential buildings created the danger of broken things being thrown out of windows from upper floors (Juv. 3.199). The absence of light and view and the danger of things thrown out of windows, led to the need of restrictions of height of the Roman buildings (Tipton 2017, 76-77). According to Strabo and Tacitus it starts with emperor Augustus, who limited the height of roman buildings to 70 roman feet, which is about 20 meters today (Geography 5.3.7; Annals 15.43). Nero restricted the height even further and lowered it to about 60 roman feet, which is 18 meters. Later, under the rule of Trajan, the height was restricted to about 57 roman feet, which is 17 meters (Storey 2003, 8). These restrictions were however difficult to administer because of the hilly landscape of the city. Therefore, the administrators were unusually quiet regarding the actual height of buildings (Tipton 2017, 76-77).

These examples strongly suggest that high-rises were omnipresent in Rome, but these

¹ An insula has multiple interpretations, but I will be using it as a term to describe a group of apartment buildings.

sources are all historical. Historical sources have the tendency to be biased and can lead to a flawed or incorrect vision, which makes historical sources not always very trustworthy (King 2017, 3). Historical sources offer narratives that archaeology must correct or dispute (King 2017, 7). To achieve this, archaeological sources are needed to refine these historical sources regarding high-rises in Rome.

Many of the residential or public buildings of imperial Rome are not visible in the urban landscape of modern day Rome. The few available archaeological resources in our possession make it difficult to evaluate the height of Roman buildings (Madeleine 2008, 293; Packer 1971, 66). There are however some theories that attempted to calculate the height of Roman buildings, as Packer thought it was possible to measure the height through the thickness of the ground floor walls (1971, 195). Hermansen continued this theory and made an argument that a 50 cm thick wall supported two-floor buildings, 60-65cm supported three floors, 80 cm supported four floors and 90 cm supported five floors (Hermansen 1982, 51). This theory is however panned by Storey who applied this theory on 308 preserved buildings and performed 1273 measurements in Rome, Ostia (Storey 2001, 395-396). The results of Storey's experiment did not match the expectation, because only 10,8% of the cases were applicable with the theory of Packer. From this experiment can be concluded that there is no predictive relation between the thickness of a wall and the height of a building. Meiggs also argues that the Romans probably could not have measured the strength of their materials. Therefore, they possibly build thicker walls than necessary to be sure that the building would not collapse (Meiggs 1973, 241). Another theory to calculate the height of Roman buildings was to measure the accumulated materials on the ground surrounding a former multifloored building and base the height upon that material and staircases. This is not possible, due to the lack of sufficient preserved and accurate records of these accumulations (El Hadidi 2017, 83; Storey 2001, 396).

These theories imply that the height of Roman buildings cannot be measured solely by archaeological sources. So instead, I will mainly be utilizing the Forma Urbis Romae (FUR) as the archaeological visualization of staircases and high-rises. The FUR has been extensively used for research by the scholar community to understand Roman city life, since the discovery of the first fragments in 1562 (Reynolds 1996, 9). The FUR is a map of Rome made at the beginning of the third century AD under the authority of the emperor Septimius Severus (Reynolds 1996, 1). The map was measured 13 by 18.1 meters and was attached to a wall in the *Templum Pacis*. The scale used for this immense map was

around 1:240 and is in its general appearance still used as a foundation of modern archaeological plans of the structures of ancient cities (Reynolds 1996, 1). The map existed of an estimated 150 marble slabs, as depicted on figure 2, hence its nickname 'the marble plan'. The slabs are big flat pieces of marble that function as the paper of a normal map. However, a huge piece of marble of 13 by 18.1 meters is impossible to move, thus it was divided into sizable chunks. Each slab is about 160cm by 70 cm and is sometimes with the long side up and sometimes with the wide side up (fig. 2). The fragments are divided into sections of Roman numbers with an Arabic number. The whole FUR is displayed on this plan, with all the buildings, details and symbols engraved on these marble slabs. However, no slab has been preserved completely, resulting in only fragments of a slab surviving. Of the whole map, only 10-15% is discovered and preserved. There are some fragments that have been found but later lost and are only preserved through Renaissance drawings (Reynolds 1996, 13). In 1998 all the fragments were moved from the *Braschi Palace* to the *museum of Roman civilization* in the Rome, where they remain today (www.formaurbis.stanford.edu). Information gained from this map must be used with extreme caution because of the large missing sections. However, because the preserved fragments are random, it can be assumed that they are representative for the whole (Packer 1971, 76). In its complete state, the Forma Urbis displayed, amongst other things, the ground floor of nearly every

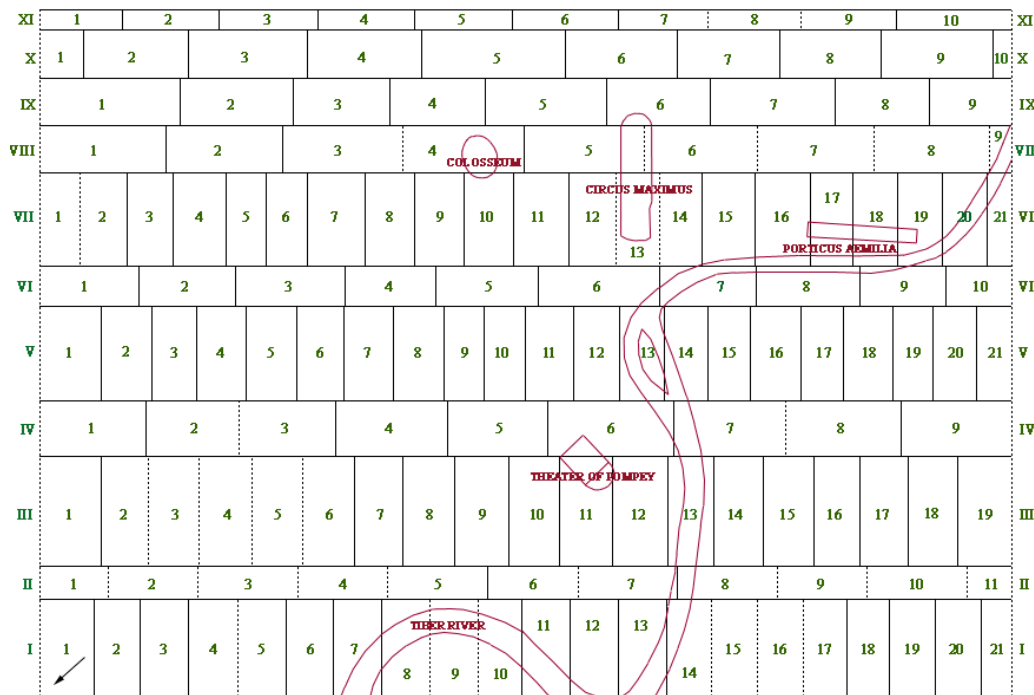


Figure 2: The slab map of the FUR with prominent buildings visible for location recognition. The north arrow is detectable on slab I-1.

building of Rome, whilst not making distinctions between rich or poor. The map also incorporates a variety of architectural symbols, of which some are identifiable on other Roman maps and others, which are exclusive to the *FUR*. The interpretation of most of these symbols are relatively clearly defined through their archaeological context, however some of them are still up to debate (Packer 1971, 77; Reynolds 1996, 2). When glancing over the fragments of the plan, the outline of every individual house is the first thing noticeable. More thorough inspection reveals also other components displayed, such as names of locations and a symbol for aqueducts, which are clearly visible on the plan and provide detailed information about the city. The component of the map I will be focusing on in this thesis are the symbols used for representing staircases. These staircase symbols on the marble plan indicate the number of floors in an *insula*, making it a useful object for illustrating the distribution of staircases and the representation of high-rises in Rome.

In 2008, Madeleine made a new interpretation of the symbols representing staircases on the *FUR*, which I will be applying in this thesis. Her interpretation argument is the most coherent and corresponds the most with the rest of the map. In short, the symbol resembling a V-shape is interpreted as a staircase. However, the specifications of her interpretation and the discussion concerning the staircase symbols will be further addressed after the typology. Zicans and Gatti formulate the fundamental basis for the symbols to staircases and Pedroni and Madeleine enhanced their concept with a detailed description on how staircases could represent multiple floors of a building (Madeleine 2008, 291-316; Pedroni 1992, 223).

1.2 Aim of the thesis

The objective of this thesis is to ascertain, by means of archaeological sources, the relative quantity of high-rises in imperial Rome in the beginning of the third century AD and where they were mainly located within the city. Also included as an archaeological source is the *FUR* and the applicable staircase symbols displayed on it. Important to remark is that this thesis refines the statements made in historical sources concerning the high-rises of Rome with these archaeological sources. Therefore, the goal of this thesis is to answer the following question: Compared to historical sources, what do archaeological sources of Rome state concerning the height of Roman buildings and how are these high-rises distributed throughout the city?

1.3 Methodology

The research question can be divided into two parts. The first part is: what do archaeological remains of Rome tell us about the height of Roman buildings? The second part is: how are the high-rises in Rome distributed?

To answer the first part of the research question it needed to be clear what these archaeological remains contain and how the height can be measured. The FUR and specific archaeological excavations in Rome have been combined to create an interpretation of the different kind of high-rises within Imperial Rome. The FUR is used as a tool to show the different heights of Roman buildings represented on the plan, by making and interpreting a morphological typology of staircases. In the past Gatti and Cressedi have made a typology of staircases in 1960, but since then, more than 30 essential new fragments have been found. Thanks to the work of the Stanford Digital FUR Project (SDFURP), this typology can be extended and is better substantiated with up to date literature (Gatti and Cressedi 1960, 203-205; <http://formaurbis.stanford.edu>). A morphological typology is used, because the staircase symbols have different variations that needed to be separated to make an interpretation of their availability and the distribution of the symbols. The typology needed to be morphological because the symbols can only be categorized on their physical characteristics. The typology is focused on the physical traits, the quantity, the location and distribution of the symbols. These elements of the typology are needed to substantiate my own interpretations for the research question.

The typology is based on a database I made from all the fragments of the SDFURP, which include a staircase symbol. This staircase database in figure 3 facilitates the search for fragments with staircases, because of the 1186 fragments documented in the Stanford Project, only 186 fragments include staircases. The staircase database contains the following aspects:

stanfc	Sla	Size sl	# stairs	stairs int	# of bars	stairs ex	closed	identified location	link webpage	remarks
87	-	small	1	1	1x7			-	http://formaurbi	combination of V an
89	-	medium	1	1				-	http://formaurbi	closed of area
8bde	VIII-5	small	1	1				Septizodium (Septizox	http://formaurbi	Shops (tabernae)
8fg	VIII-5	medium	2	2			2x0	Imperial box (pulvinar	http://formaurbi	
8h	VIII-5	small	2	0		2		public building, circus	http://formaurbi	
92*	VI-8	medium	2	2	1x1, 1x2		1x1,1x2	Riverfront structures i	http://formaurbi	including a warehou
95c	-	small	1	1				-	http://formaurbi	
95d	-	medium	2	2				-	http://formaurbi	
99a	-	small	1	1	1x1			-	http://formaurbi	
fn23	V-19	medium	2	2	1x2			near the Via Campana	http://formaurbi	Commercial or indus
fn26	-	medium	1	1				-	http://formaurbi	big V?
fn27	-	medium	1	0		1		-	http://formaurbi	

Figure 3: Database entries.

The Stanford Project number

This number is used for identification of the fragment in the database of the Stanford Digital FUR Project. This is also the fragment number referred to when a staircase on a fragment is elaborated. Sometimes a combination of fragments that fit together is created, displaying more information of the plan. In that case the fragment is followed by one or multiple letters. To a fragment is referred to in the thesis as followed “fragment 1abcde”.

Slab number

This column is used to indicate the slab number, which is used for identifying fragments that are located on the same slab, useful for the general distribution of high-rises. Important to acknowledge is that only 76 of the 187 fragments have an identified location on a slab. If the location of a fragment is not known on a slab, the fragment can still be useful because it contributes to the total number of staircases on the map. This is referred to in the thesis as followed “slab VII-7”.

Slab size

The column of the slab size contributes to the distribution of high-rises and displays the distribution on a micro level when the slab number is known. The size varies between small, medium and large.

The number (#) of staircases on the fragment

This column displays the number of staircases on the fragment, which is useful for interpreting the distribution of high-rises in a very specific region of the map. This column also decides whether a fragment of the database of the SDFURP should be incorporated into the staircase database. It includes both interior and exterior staircases.

Interior staircases

The column of interior staircases displays the number of interior staircases on the fragment. The interior staircase is part of the number of staircases on the fragment.

Exterior staircases

The column of exterior staircases displays the number of exterior staircases on the fragment. The exterior staircase is part of the number of staircases on the fragment.

The number of staircases on the fragment displaying different heights

This column displays the number of interior staircases that represent more than one floor. The number of staircases displaying different heights on a fragment can range between one second floor building and ten multiple floored buildings.

Identified location

The next column is used when a public building or other important location indicator is visible on the fragment.

SDFURP Link webpage

The following column is the direct weblink to the fragment in the SDFURP.

Remarks

The last column is used for remarks on the fragments, for example when a staircase has an unusual shape or if the fragment is a renaissance drawing.

After the typology, the existing interpretations of the staircases on the FUR is addressed. These interpretations define the reasoning why this specific symbol is interpreted this way. It also substantiates why my research of the staircases is legitimate and useful. First the interpretation of Ziçans is approached, followed by the interpretation of Gatti & Cressedi, Pedroni, and finishing with the interpretation of Madeleine (Gatti & Cressedi 1960; Madeleine 2008; Pedroni 1992 &). Gatti & Cressedi created the basis for the interpretation, while Pedroni and Madeleine proposed a concept that is based on the work of Gatti & Cressedi (Gatti & Cressedi 1960, 203-205).

After it has been clarified which and where the different staircases are located on the FUR, the remaining archaeological evidence of high buildings within Rome will be addressed. There is little archaeological material available concerning the height of Roman buildings, but the archaeological examples that will be addressed improve the validity of arguments formulated from the interpretation of the FUR. The archaeological material has been divided into two groups: public buildings and residential buildings. A distinction between the groups has been made, because residential buildings should have been limited to the restricted heights of the emperors. However public buildings are state-funded and are not limited to the height restrictions. The limit was implemented because of the need for light and view for *insulae* (Tipton 2017, 76-77). The results of these archaeological sources are used to create an estimation of the height per floor, which is needed to formulate my interpretation of the height of high-rises.

After the height of a high-rise has been defined, the focus shifts to the distribution of high-rises in Rome. The arguments in historical sources imply that high-rises in Rome were omnipresent, therefore this chapter will attempt to make an interpretation regarding the distribution of these high-rises, but according to archaeological material. The combination of the typology and the archaeological excavations will be combined to

formulate this interpretation. The distribution is an attempt to reveal if and where high-rises in Rome are generally and specifically are located. It will be measured by analyzing which fragments include the staircase symbol, identifying the slabs of these fragments, and mark these on the slab map of figure 2. Not all the fragments are localized. On this marked slab map patterns will be visible, which can be used for the distribution of the staircase symbol. Therefore, also the high-rises can be identified. The general location will be revealed by formulating how high-rises are distributed on the slab map, which is a macro scale of Rome. If a pattern is identified of a general location, the pattern is described in detail by addressing the fragments of the slabs of the specific location. Fragments can be interpreted as a micro scale of Rome, because it displays small details of the map. The specific location focusses on the spread of these staircases within the streets and perceives if types of symbols are clustered together. For both distributions, a total number of high-rises is needed to formulate a correct interpretation. The revealed results are still an interpretation of only the 10-15% of the FUR that has been recovered and very few archaeological sources. Therefore, this interpretation should be regarded as an indefinite interpretation. The interpretation is however necessary to refine the historical sources from an archaeological point of view. The results from the definition of high-rises and the distribution of them on the FUR will be compared to the historical sources. This is conducted in the conclusion to answer the research question.

1.4. Structure of the research

This thesis will conform the following structure. The first chapter will include a morphological typology of the symbols representing staircases on the FUR. This elaborates on the height of the staircase symbols and where they are generally distributed according to height. After the typology, it will be explained how this symbol is defined as a staircase and why this is the interpretation that I perceive to be true.

The next chapter addresses my analysis of the different aspects of the research question. First, a comparison between archaeology and the FUR is made and is used for further substantiation of the archaeological data. The height of Roman buildings will be divided in public and residential buildings.

Secondly, an interpretation of the distribution of high-rises is made. There will be a distinction between general and specific distribution. This interpretation is needed to compare the results with the historical sources, which will be accomplished in the conclusion.

Chapter 2 The staircases on the FUR

Before addressing why there are symbols identified as a staircase, it is necessary to understand which different types of V-shapes the FUR contains. Zicans and Gatti & Cressedi have made a brief interpretation of the staircases, but after that, there are no more typologies produced of staircases on the FUR (Gatti & Cressedi 1960, 203-205; Zicans 1941, 188-189). It is necessary to create a new typology because new interpretations have come up that reshape the way the symbols are understood. This new typology is more extensive on details and includes new fragments, compared to the previous ones.

2.1 A typology of the V-shapes

The typology of the V-shapes is focused on the physical model, the size, the quantity on the FUR, the location of the fragments or slab on the FUR, and the distribution of the symbols. The size of a symbol is length by width in centimeters. The color figures are accessed from the SDFURP and the black and white figures are taken from Carettoni's work (<http://formaurbis.stanford.edu>; 1960). The black and white figures include a scale, used for the measuring of the sizes. A few exceptions are not located on the black and white figures and are therefore not measured.

The types that will be distinguished in this typology are presented in table 1.

Table 1: The different types in the V-shape typology

Type	Quantity visible on the FUR
Basic V-shape	269
V-shape with outward triangle	2
V-shape with closed end	3
V-shape with one transverse bar	10
V-shape with one transverse bar with closed end	2
V-shape with two transverse bars	28
V-shape with two transverse bars with closed end	3
V-shape with three transverse bars	23

V-shape with four transverse bars	3
V-shape with five transverse bars	3
V-shape with six transverse bars	1
V-shape with seven transverse bars	2

The Basic V-shape

The basic V-shape symbols exist of two diagonal lines that start next to each other and move outwards. The symbol resembles the letter 'V' as depicted on figure 4. In this V-shape there is nothing between the diagonal lines but space. The V-shape is recognized by being displayed within a building and is therefore classified as an interior symbol. A V-shape within a building is generally oriented towards an entrance and situated as close as possible to the road.

They vary a lot in size, between 0.8 cm by 0.6 cm and 2.9 cm by 1.6 cm.

The V-shape on fragment fn26 on figure 5 is larger than the largest measurable V-shape but cannot be measured due to being absent on the black and white figure.

The number of V-shapes on the FUR totals 269 and are located throughout the whole map. This is the most common symbol encountered of this typology by far.

This type of V-shape is visible on 141 fragments of the FUR and is localized on 22 slabs.

Of the identified locations this symbol is spread throughout the whole city.

Outwards triangle

The FUR includes two V-shapes as an outward triangle, located on fragment 165abd and depicted on figure 6.

They exist of two diagonal lines, that start near each other and move outwards. The ends of the diagonal lines are connected to a transverse bar, creating a shape of a triangle.

The sizes of this V-shape are 1.1 cm by 2.3 cm and 1.6 cm by 2.3 cm

It is plausible that fragment 165abd fragment is located near the *bath of Diocletian* on the eastern part of Rome (www.formaurbis.stanford.edu).

V-shape with closed end

the FUR includes three examples of V-shapes with a closed end.

This type of V-shape consists of the basic V-shape with at the end of the diagonal lines a bar that connects the two lines, creating a triangle shape. Within the triangle is an empty space.

The size of this V-shape varies between 0.8 cm by 0.8 cm and 1.6 cm by 1.6 cm.

These V-shapes are situated in the halls of elongated buildings and are directed towards



Figure 4: The left part of fragment 10g including four V-shapes.



Figure 5: Fragment fn26 with an unmeasurable V-shape.



Figure 6: The right part of fragment 165abd, including two inverse V-shapes.



Figure 7: Fragment 8fg with two V-shapes with closed ends.



Figure 8: The left part of fragment 1abcd with a V-shape with a closed end.

the entrance of a room. Fragment 8fg is depicted on figure 7 and includes two of these V-shapes, which are located next to each another. The V-shape on figure 8 of fragment 1abcd seems to be located aligning a corridor and next to linked houses. These V-shapes are located on slabs VIII-5 and XI-6, which are located next to the colosseum and further south.

The V-shape with one transverse bar

There are ten examples of V-shapes with one transverse bar on the FUR.

This V-shape consists of the basic V-shape, with the addition of a transverse bar between the diagonal lines. This V-shape resembles a reversed letter "A". Before and after this bar are empty spaces. The transverse bar on these V-shapes are generally positioned in the middle or wider area of the V-shape as seen on figure 9, 10 and 11. They vary in size between 0.8 cm by 0.5 cm and 1.6 cm by 1.8 cm.

Slab IV-7 includes a cluster of this category V-shapes.

V-shape with one transverse bar with closed end

There are two V-shapes with one transverse bar and with a closed end on the FUR, of which one is ambiguous.

This V-shape consists of the normal V-shape with closed end but includes a transverse bar between the diagonal lines.

These V-shapes is 1.6 cm by 2 cm.

The unambiguous V-shape is located on fragment 92 on figure 12, on slab VI-8. This slab is situated near the Tiber.

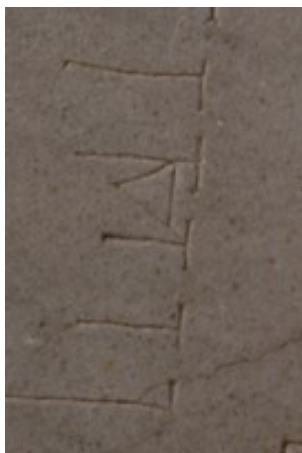


Figure 9: A part of fragment 1bcde with a V-shape with one transverse bar.



Figure 10: Fragment 37gi with a V-shape with one transverse bar on the left and Two V-shapes with two transverse bars on the right.



Figure 11: Fragment 345 with three V-shapes, the middle one has one transverse bar.



Figure 12: Fragment 92, the left V-shape has one transverse bar and a closed end. The Right V-shape mirrors the left one, but has two V-shapes.



Figure 13: Fragment 32fn, the center V-shape has a transverse bar and a closed end.



Figure 14: Fragment 37Aac with V-shapes with two transverse bars.

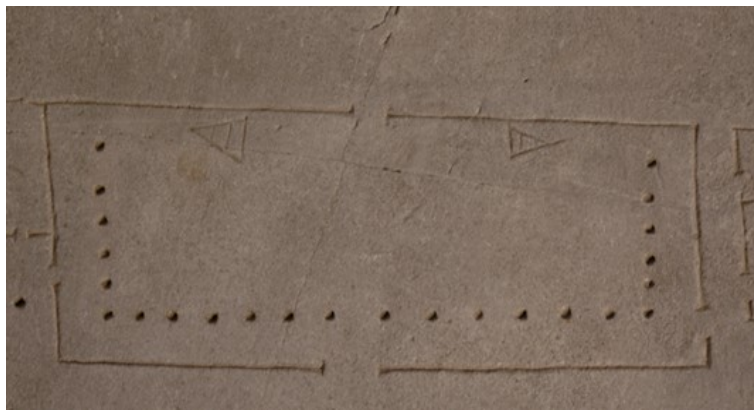


Figure 15: Fragment 28a with two V-shapes with two transverse bars. These V-shapes are mirroring each other.

V-shape with two transverse bars

Of the 31 V-shapes with two transverse bars, 28 have an open end and are therefore categorized V-shapes with two transverse bars. This V-shape consists of the basic V-shape, but between these diagonal lines are two transverse bars. Before, between and after the transverse bars within the V-shapes are empty spaces. Some examples are visible on figure 10 and 14.

They vary in size between 1 cm by 0.8 cm and 2.1 cm by 1.3 and some symbols are wider than they are long.

These V-shapes are localized in three general areas; the first area is located on slab VIII-3 and VII-7, where four V-shapes are located and is generally close to the colosseum. the second area is located on slab VI-8, VI-9 and V-19, where five V-shapes are located and is next to the Tiber river. The third area is located on slabs IV-5, IV-6, IV-7 and III-12, where 17 V-shapes are located. The third area surrounds the theatre of Pompey.

V-shape with two transverse bars with closed end

The FUR has 3 V-shapes with two transverse bars and with a closed end.

This V-shape consists of the normal V-shape with closed end but includes two transverse bars between the diagonal lines. Before, between and after the transverse bars within the V-shapes are empty spaces.

These V-shapes vary in size between 1.45 cm by 0.97 cm and 1.94 cm by 1.45 cm.

Fragment 92 on figure 12 has one of these V-shapes, located on slab VI-8. While fragment 28a on figure 15 has two of these V-shapes and is located on the slab next to it, slab VI-9. Both are in industrial areas, very close to the Tiber.

V-shape with three transverse bars

On the FUR are 23 V-shapes recognizable with this shape.

This V-shape consists of the basic V-shape, but between these diagonal lines are three transverse bars. Before, between and after the transverse bars within the V-shapes are empty spaces.

These V-shapes vary in size between 1,16 cm by 0,83 cm and 3.17 cm by 1.67 cm.

Fourteen of these V-shapes are located and are in two general areas. The first area consists of slab IV-7, where seven V-shapes of this category are located. The second area consists of slab VII-7 and VIII-8, where five V-shapes in this category are located. Some of these V-shapes are not located on slabs but are estimated to be located far from the city center in commercial and residential areas.



Figure 16: Bottom part of fragment 37Afgnil with two V-shapes with three transverse bars.



Figure 17: Top part of fragment 11d with one V-shape with three transverse bars.

V-shape with four transverse bars

In total three V-shapes of this category are visible on the FUR.

This V-shape consists of the basic V-shape, but between these diagonal lines are four transverse bars as depicted in figure 18. Before, between and after the transverse bars within the V-shapes are empty spaces. The transverse bars on fragment 37Afgnil on figure 19 and 20 are only clearly visible when looking at it in a black and white picture, hereby implying that the bars are only slightly engraved in the marble.

The size of these V-shapes varies between 2 cm by 1 cm and 2,16 cm by 1,66 cm.

The location of two of these V-shapes are identified on fragment 37Afgnil and slab IV-7, which is located on the western bank of the Tiber.



Figure 18: Fragment 401 with a V-shape with four transverse bars. normal

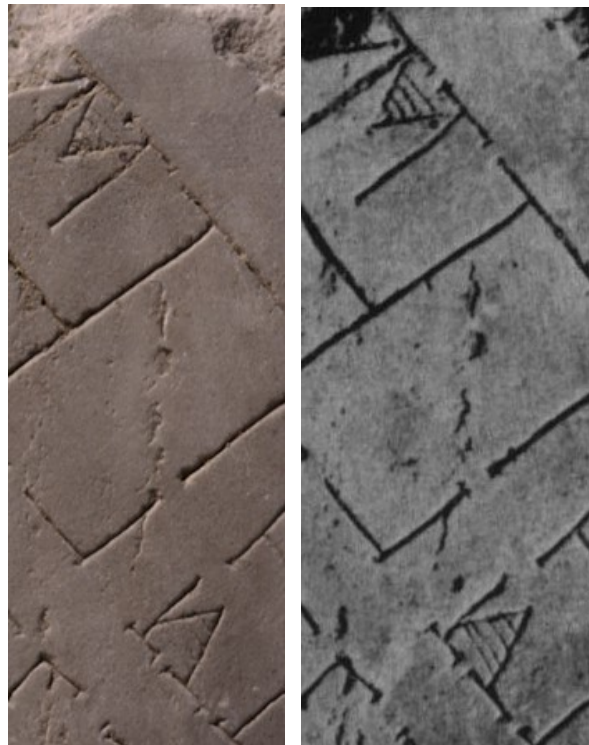


Figure 19 & 20: the right part of fragment 37Afgnil in color and black and white. Showing the difference between these figures (taken from the SDFURP & Carettoni 1960).

V-shape with five transverse bars

There are three V-shapes of this category visible on the FUR.

These V-shapes consists of the basic V-shape, but between these diagonal lines are five transverse bars. Before, between and after the transverse bars within the V-shapes are empty spaces. The V-shape on fragment 33abc is more rounded than angular and is only slightly engraved in the marble. Therefore, it is marked as ambiguous.

These V-shapes vary in size between 1,66 cm by 0,66 cm and 2,16 cm by 1,16 cm.

The two fragments that are located on slab V-17 and VII-18, in the western part of Rome

near the Tiber. Fragment 24c on figure 22 is next to the *Porticus Aemilia*. Fragment 121abc on figure 21 has an unknown location but is estimated to be located far from the city center near the Tiber.



Figure 21: Left part of fragment 121abc with four different V-shapes.



Figure 22: Part of fragment 24c with a V-shape with 5 transverse bars.



Figure 23: Part of fragment 33abc with a V-shape with 5 transverse bars



Figure 24: Fragment 87 with an ambiguous V-shape with seven transverse bars.

V-shape with six transverse bars

On figure 21 is fragment 121abc displayed that includes a V-shape with six transverse bars, depicted in the bottom-left corner.

This V-shape consists of the basic V-shape, but between these diagonal lines are six transverse bars. Some of the transverse bars are difficult to identify, but after a detailed examination come to a total of six. The areas before, between and after the transverse bars within the V-shape are empty spaces.

Its size is 2,33 cm by 1,16 cm, with regulatory intervals between the bars.

The V-shape is located on fragment 121abc on figure 21, which as described before, has an unknown location. It is however predicted to be located far from the city center near the Tiber.

V-shape with seven transverse bars

The FUR has two fragments displaying a V-shape with seven transverse bars of which one is ambiguous.

This V-shape consists of the basic V-shape, but between these diagonal lines are seven transverse bars. The areas before, between and after the transverse bars within the V-shapes are empty spaces. This V-shape is 3 cm by 1,5 cm.

Fragment 121abc on figure 20 includes a V-shape in this category on the bottom part of the fragment. Fragment 87 on figure 24 depicts the ambiguous V-shape and should not be interpreted as the norm, because it consists of a vertical and diagonal line instead of two diagonal lines. The location of this fragment is also unknown.

2.1.2 H-shapes

The FUR also displays a different symbol that is relatable to the V-shape. These H-shaped symbols consists of two vertical lines with multiple horizontal bars between them. The number of horizontal bars between the vertical lines can vary between 3 or 11 and are sometimes connected to the top and bottom of the vertical lines. It is possible that these symbols include a larger space between the horizontal bars as depicted on fragment 11a on figure 25. Their size varies a lot in both length and width, because the size is between 0.6 cm by 1 cm and 3.9 cm by 1.6 cm. The spaces between the bars can also vary a lot.

In total there are 126 H-shaped symbols on the FUR and are found outside of buildings. The symbols with a thicker and a smaller length are generally used at the front of

temples, while the thinner and lengthier H-symbols are used next to streets. The use of these symbols in streets imply height differences within the zone (Gatti & Cressedi 1960, 202).

The H-symbol is spread throughout the city center, just like the basic V-shape.



Figure 25: Left part of fragment 11a with multiple H-shapes depicted on them.

2.2 The existing interpretations of the V-shaped symbol.

2.2.1 Ziçans 1941

Ziçans tried to classify the different *tabernae*² on the FUR (Ziçans 1941, 183-194). During the identification of the different types, he encounters different types of V-shapes. Ziçans acknowledges that some buildings *tabernae* had multiple floors during the Imperial period, and because of that he made the classification in figure 26 of five different types of staircases.

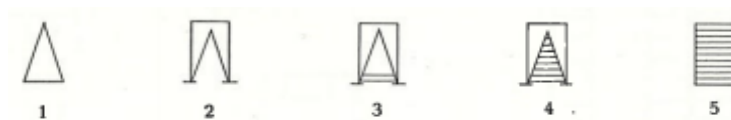


Figure 26: The typology of Ziçans (1941, 188).

He distinguishes the fifth type from the other four types and states that this type is rarely found indoors, the fourth type is also rarely visible. Ziçans observes that there are many staircases on the FUR but is unsure whether the different types resemble different staircases. He realizes that the FUR has many errors and that a specific kind of staircase can be indicated with different types of symbols, but that it is also important to argue why a type specifies a staircase. Ziçans finishes with addressing fragment 92 where he argues that the two staircases on that fragment are only differently depicted because they are different kind of staircases. The V-shapes in fragment 92 are the V-shape with one transverse bar with closed end and a V-shape with two transverse bars and a closed end. Ziçans proposes that the bars in a V-shape suggest the building material of the staircase. Stating that the V-shapes with transverse bars are made of stone and empty V-shapes are made from lighter materials, like wooden stairs. This is based on archaeological excavations as they have shown multiple constructions of stairs, wooden stairs, mortar and stone stairs and part wood part stone stairs. Ziçans points out that the height of a transverse bar specifies where in the staircase the stone steps ends and where the wood steps starts (Ziçans 1941, 188-189).

2.2.2 Gatti & Cressedi 1960

In the chapter of Gatti & Cressedi in the book of Carettoni *et al*, an attempt is made to create a map legend of the symbols on the FUR (1960, 202-203). Among these symbols is the V-shape which they identify as a staircase. They do not have firm proof of why

² A *taberna* is term for a one-room shop, and is regularly encountered on the FUR. An *insula* can be a collection of *tabernae* if they are connected to each other.

these symbols should be identified as staircases but do specify that their hypothesis is substantiated by the parallel bars within the V-shapes. According to them, these bars clearly represent steps of a staircase (Gatti & Cressedi 1960, 202-203). They continue with the standard V-shape and specify that these V-shapes are generally located within residential buildings, but rarely within public buildings. Which correlates with the standard V-shape type in the typology. They also focus on variations of the V-shape as seen on figure 27, of which some are perceived to be technical or implementing mistakes. They do however recognize that the existence of the concept of the staircase still overrules the errors. Lastly, they engage the V-shape with a closed end, such as fragment 92³. They interpret this V-shape as a ladder instead of a staircase but realize that these symbols are problematic to implement when they are located on the exterior part of the building (Gatti & Cressedi 1960, 202-203).

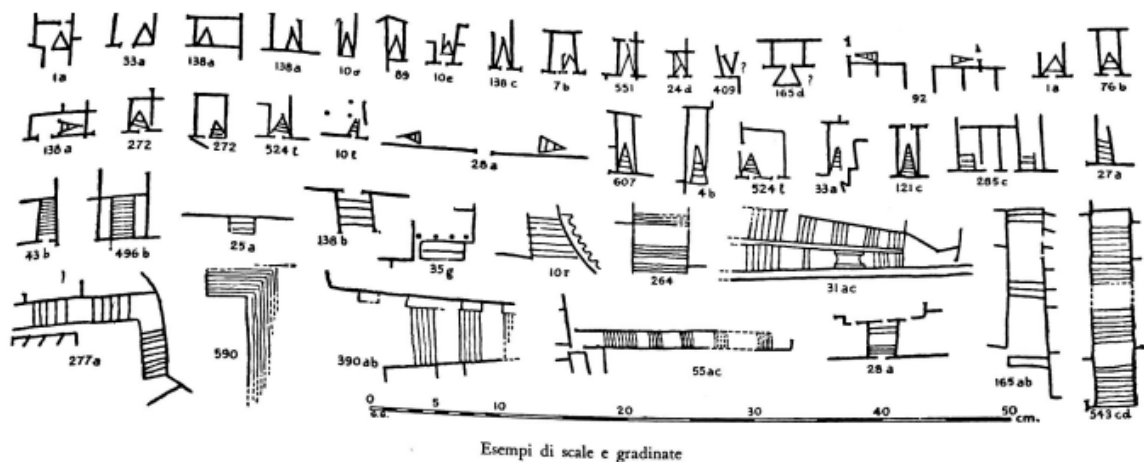


Figure 27: The typology of Gatti & Cressedi (1960, 203).

2.2.3 Pedroni 1992

Pedroni continues the efforts of Gatti & Cressedi. Pedroni agrees with Gatti & Cressedi that V-shapes should be interpreted as staircases. But Pedroni states that the transverse bars on a staircase could not indicate the number of steps on a staircase, because the symbols are conventional, and therefore not realistic. It also wouldn't explain the existence of V-shapes without any transverse bars, the standard V-shape. Therefore, Pedroni states that the transverse bars in the staircase symbol should be interpreted as an indication of the number of floors of a building. Pedroni does not validly argue why the transverse bars of the staircase symbol should be interpreted as different floors but does explain why this theory is applicable to the plan.

³ Figure 12 on p.16 in section 2.1.

Pedroni utilizes the interpretation of Caretoni *et al*, who interprets the plan as being functional for cadastral and fiscal use (1960, 214-218). Continuing that this symbol displays the established properties in Rome and were administered to identify where certain taxations had to be performed, similar like modern cadastral maps (Pedroni 1992, 224). Pedroni does realize that his explanation would also require a detailed register for every floor where the most essential information had to be stored. All the buildings containing a staircase symbol are according to Pedroni interpreted as a taberna. Tabernae are usually accompanied with a side- or backroom that is located slightly higher than the taberna. This room is referred to as a *mezzanine* and is displayed with no entrances on the FUR. Examples of rooms with no entrances or exits are visible on the right part of figure 17 and on the top left of fragment 21. This is caused, according to Pedroni, when the floor of the mezzanine is higher than the doorstep of the entrance as is depicted on figure 28. This principle complicates the identification of the plan, because it requires more difficulty to identify different properties.

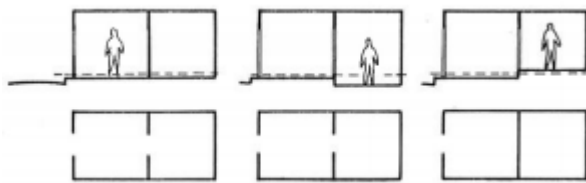


Figure 28: The explanation of the rooms with no entrances according to Pedroni (1992, 228).

Pedroni has found some symbols on two fragments that do not comply with his theory, fragment 28 and fragment 92⁴. Both fragments include V-shapes with a closed end and with two or three transverse bars as depicted in the typology. Pedroni discusses that these V-shapes must be exterior staircases because they are far away from an entrance and only accessible within a special environment. However, these exceptions oppose his explanation of the symbol representing multiple floors. Multiple floors can only be located on top of existing rooms and therefore the symbol should be located internally (Pedroni 1992, 223-231).

Trimble also points to the same problem but acknowledges that the concept of Pedroni is an interesting one. Trimble argues however, that this statement supports the cadastral function of earlier urban maps but emphasizes that these criteria are difficult to substantiate on the FUR (Trimble 2008, 67-98). Trimble argues that most of the V-shaped symbols on the map have no bars, even when the building would suggest otherwise. While also implying that vice versa, bars are shown on V-shapes when it is

⁴ Figure 12 and 15 on p.16 in section 2.1.

implausible that a building has multiple floors. As indicated with fragment 92 and 28. Stating that there is much inconsistency in following the criteria implied by Pedroni. Trimble only criticizes Pedroni but does not attempt to present her own argument that can properly explain the inconsistencies (Trimble 2008, 67-98).

2.2.4 Madeleine 2008

Madeleine proposes multiple concepts about the FUR, all of them based on the ideas of Pedroni. First, she addresses that there are many mezzanines represented on the FUR, and states that a simple taberna with or without a mezzanine should be considered as a single-floored architectural building. She based this on the fact that there are many examples of insulae on the fur that include tabernae but do not include a V-shape. According to Madeleine the V-shapes do not represent tabernae with mezzanine, but tabernae with an upper floor. Completely disregarding the mezzanine. The interpretation of Madeleine therefore not only removes the concept of mezzanines on the FUR, but also raises the number of floors visible on the map. Madeleine proposes as seen on figure 29 that instead of counting the bars, the number of floors are represented by the spaces between these bars. Figure 30 indicates how her interpretation is represented on the FUR and in insulae. She made this measurement by identifying the fragments with their number of staircases, ranging from 1 to 7 floors. She based her interpretation on 155 disjointed parts of fragments and divided the localized fragments into the regions of Augustan Rome⁵. Afterwards she divided the number of staircases in the different floors and combined this factor the regions in a crosstab. She continues with stating that these symbols could function as an indicator for marking independent land property by using the symbol for every change of ownership. Property in Rome was divided differently than it is now, because ownership was based on superficies. A term used for referring to anything placed on and connected to the ground. Hereby implying that a Roman building was inseparable from the ownership of the ground underneath it. This means that property was not divided per room, but per section of a housing block. The symbol is thus used to describe the outlines of the number of rooms and the number of floors of which a property exists of. Madeleine therefore proposes that the rooms should not be associated as individual rooms, but as

⁵ The 14 administrative regions of Augustan Rome were implemented in 7BC and are irregular in shape and size (Reynolds 1996, 209-210).

a collective. This whole collective of rooms has the number of floors represented by the V-shaped symbol (Madeleine 2008, 291-316).

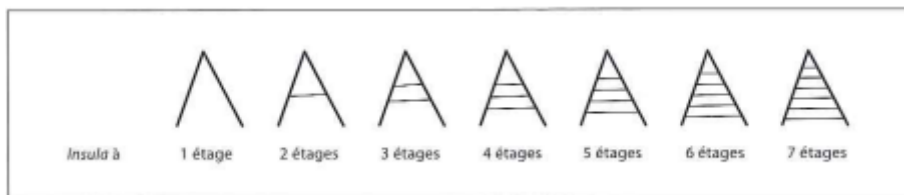


Figure 29: The different types of V-shapes according to Madeleine (2008, 297).

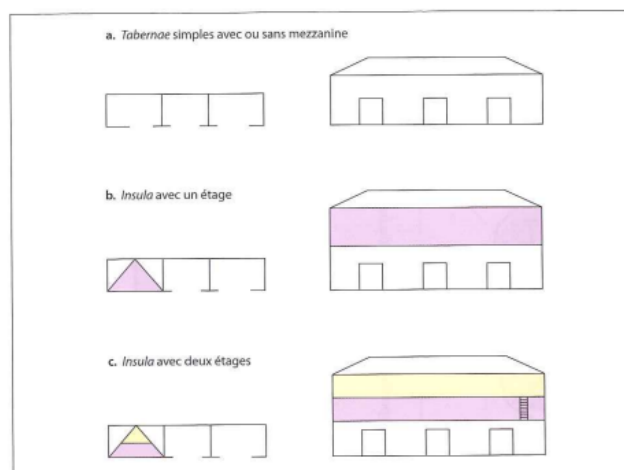


Figure 30: Madeleine's interpretation with examples for how the house would look like (2008, 299).

2.2.5 Conclusion

Madeleine has made the most recent interpretations of the V-shaped symbols on the FUR; therefore, all the interpretations have been explained. I will substantiate why this thesis will be partly in accordance with the interpretation of Madeleine. I agree with counting the floors by means of the spaces between the transverse bars within a V-shape. Pedroni's argument that both a standard V-shape and a V-shape with a transverse bar imply a single upper floor seems incorrect. No other symbols on the FUR have two different symbols for the exact same interpretation, so this should not be an exception either. The spaces between the transverse bars corresponds to the order of V-shapes. The basic V-shape indicates one upper floor, the V-shape with one transverse bar has two spaces, and thus indicates two upper floors, and so on. This interpretation is consistent with the number of transverse bars. What I do not agree with, with Madeleine's interpretation, is the concept of one V-shape being a height indication for multiple rooms and the symbol being used as a marker for independent land property. When we look at fragments 37Aac on figure 31, we can see the top part includes



Figure 31: Fragment 37Aac, the top part includes many V-shapes, the bottom none.

multiple V-shapes, and the bottom part none. Madeleine's interpretation would lead to believe that the bottom part is no independent land. However, that must be impossible for such large areas. When looking at the top part, one fragment cannot decide the height for the whole housing block, as with multiple V-shapes this would create a huge mess to identify which buildings have the height of which V-shape. Therefore, I believe that the interpretation of a V-shape should be more simplistic. A V-shape only indicates the height for the room the symbol is located in. As this is for administrative purposes much easier to register.

For the V-shapes with closed ends, I have another interpretation. The V-shapes with closed ends indicate a staircase with one floor going into the ground. But more transverse bars imply more upper floors.

These V-shapes are largely findable in *Horrea*⁶, as these buildings needed as

much space as possible. Building in height causes problems with weights and possible dangers that these horrea needed to deal with every day. Thus, a floor underground seems like a suitable solution. Madeleine's literature seems to correspond with the main question of this thesis. However, the differences are that Madeleine main target is to only question the restrictions of heights by emperors, while this thesis includes more historical sources based on the proof of heights and its distribution. Madeleine does not utilize the full potential of all the fragments and only identifies not accurately enough the different types of V-shapes. Lastly, Madeleine uses distribution to only show that the V-shapes are in different regions. However, with the usage of slabs, a different scale is used, resulting in different patterns.

⁶ A warehouse.

With formulating the framing of my interpretation, I have set the rules for approaching the FUR for my analysis. Now, we can start with depicting the heights of archaeologically excavated buildings.

Chapter 3 The height of Roman buildings

3.1 Comparison with archaeological material

There are only a couple of cases where archaeological excavations have been performed within Rome that give insight into the height of Roman buildings. This is caused by the difficulty archaeology has with identifying how many floors a building has (Madeleine 2008, 295). Especially a lack of archaeological examples of shops and residential apartments make it impossible to generate an accurate impression of the high-rises of Rome. We will be addressing some of the buildings that are archaeologically excavated, and try to relate them to the slabs of the FUR. Public buildings will also be observed, because the height of these structures insinuate that the restrictions for residential buildings were not applicable to public buildings. A question that arises from the archaeological excavations is: How do the archaeological examples correspond with the results of the FUR?

The combination of the archaeological examples and the FUR will formulate the answer on the height of Roman buildings. First the residential buildings will be dealt with, followed by the public buildings.

3.1.2 Residential buildings and shops

Packer has devoted a lot of his work to the archaeology of Ostia and Rome. In his publication *the Insulae of Imperial Ostia* he focused on the specifications of different *insulae*, describing the number of rooms and number of floors per *insula* (1971, 80-92). From this information he calculated the population per building. The number of floors per building in Ostia fluctuates between 2 and 6, but averages around four floors per *insula*. Packer also concentrates on the urban living conditions in Rome (1971, 74-79). In Rome he looked for dwellings that have generally the same type as Ostian structures. The first apartment he speaks of is an apartment embedded in the Aurelian wall that is estimated to be four stories high (Packer 1971, 75). The Aurelian wall was however built between 270 and 275, making this building impossible to be detectable on the marble plan.

Relatively near the *Porta Tiburtina* were the Baths of Diocletian located, which were constructed also at the end of the third century AD. However, before the construction of the baths, the area was filled with *insulae* with *tabernae* at street level and residential buildings on the second floors (Packer 1971, 76). The archaeological remnants were found below the surface of the Piazza Della Indipendenza during a 1969 excavation of an

extension for the subway.

The location of the apartment near the Porta Tiburtina would be located around slab X-1, near the edge of the slab map. The shops existing before the Baths should be located on slab VI-1. There are no localized fragments known in or near these slabs.

Between 1928 and 1930, an excavation was executed of the remains of a large Roman imperial house on the Via Giulio Romano (Packer 1971, 75). This building is known as the *Ara Coeli Insula*. Terrabilini first published about the building in the 1740's in his *Diario*, but it took almost 200 years to start the excavation (Packer 1971, 75). The building was well preserved, and five floors still existed before the excavation in 1928. After the excavations, another floor was uncovered of the west wing, making the building a total of six floors in height. The height of the building is estimated to be 23 meters, 6 meters higher than Trajan's limit (Storey 2003, 9-10). The model of the house has the same characteristics of a wedding cake, it got smaller when the building got higher. This technique is based on the few other high buildings in Rome and was habitually done at slopes of hills. Only here could houses benefit from the load bearing potential of the Capitoline hill (Storey 2003, 9). The fact that the building is still preserved implies that it was built more robustly than other common buildings (Lugli 1941, 210 in Reynolds 1996, 151). The insula is according to my estimation localized on slab V-12. Eight fragments are to be found on slab V-12 with the symbol on it, yet all of them are exterior or two floored staircases.

The basilica of Saints John and Paul on the western slope of the Caelian Hill incorporate parts of two dwellings of at least three stories high (Packer 1971, 75). The first dwelling has an incorporated two-story arcade that supports the upper floor(s) and dates to the second century AD. The second dwelling dates to the third century AD and seems to consist of only one shop on the ground floor with the upper levels reachable from a single street door. The basilica of Saints John and Paul is positioned on the ancient street *Clivus Scauri*, located on slab IX-5.

lastly, Packer addresses shops on the Via Nova near the Roman Forum and the Via Della Lungarina on the other side of the Tiber near the Tiber island (1971, 76). These dwellings had their entrances towards the streets and mezzanines in the back for habitation. The shops on these streets had four floors and are estimated to be positioned on slab VI-6 and V-14.

3.1.2 Public buildings

the Markets of Trajan were built next to Trajan's forum and were originally at least four stories high (Packer 1971, 76). Storey even refers to them as having six floors or more based on the usage of the load bearing potential of the Quirinal hill to keep upright (2003, 9). The Forum of Trajan has been located on slab V-9, thus the adjacent market should be on this slab as well. Next to the Forum of Trajan is Trajan's Column. It is one of the monuments that is superior in height than the surrounding area with a total length of 26.39 meters (Beckmann 2011, 75). This column is passed in height by the length of the Column of Marcus Aurelius. That column is 29.62 meters high and should be located somewhere on slab III-8. When we look at the Arch of Titus on the Forum Romanum, we see that it is 15.5 meters tall (Schmidt 2010, 9).

Next to the Forum Romanum with a height of 48 meters is the colosseum, one of the highest structures of Imperial Rome (Anon 1831, 1). This height is far beyond the



Figure 32: Fragment 13de displaying the circular lines of the rows of seats of the Colosseum.

restricted height enforced by the Augustus, Nero or Trajan, but is built next to the Palatine hill. Therefore, the height is not exceptionally visible in the landscape compared to the surround area. The available material of the FUR contains some fragments of this structure, but no interior staircases are visible on any of them. There are however lines visible that represent the row of seats, which are characterized by circling lines on fragment 13de on figure 32. The fragments of

the colosseum are located on slab VIII-4. The Pantheon was 44 meters high and was finished in 125 AD (Costelloe 2012, 251). It should be located on or close to fragment IV-5.

3.2 Estimating the height of Roman buildings

Now that all the archaeological remnants of the residential buildings and the height of different public buildings is addressed, we can estimate the height of Roman buildings. For the estimation a height per floor is needed. Packer points out that the floors in Ostia vary between 2.5 meters and 4 meters and that a third floor could reach to at least 7.25 meters (1971, 150-152). Pedroni argues that the height of floors in Rome is slightly

lower, with 2.96 meters or 10 Roman feet based on buildings with seven floors and the limit of Augustus of 70 Roman feet or 20 meters (Pedroni 1992, 225). This is based on the limit of the restriction divided by the seven floors, resulting in 10 Roman feet per floor. Archer mentions that in Pompeii the height of a ceiling can range between 3.25 to even 5.20 meters (1981, 62-74). The range in Pompeii is not fully applicable to Rome, because Rome was a bigger city and needed to house much more people in a concentrated area. The archaeological remains in Rome of The Ara Coeli Insula suggest a floor height of 3.8 meters, based on the total height of 23 meters divided by the six floors. It must be mentioned that this building has been called exceptional and is placed extraordinarily compared to other buildings, making it likely that this height per floor was uncommon. Based on these estimations of different Roman cities, a range between 3 and 3,5 meters should be acceptable for the average height of the floors in Rome. If we put this range of 3 to 3.5 meters per floor and use it on table 1, we get the results of table 2⁷. From the results we can see that lion's share (254 buildings) of the Roman buildings are estimated at a height of 6 to 7 meters. This group of staircases are 72.7% of the total group of houses with staircases, showing that it is relatively uncommon to have a building higher than this. The buildings that have a second floor are a minor group with an estimated eleven buildings with a height of 9 to 10,5 meters. Buildings with this specific height is relatively underrepresented when compared to higher buildings. The V-shapes with three and four floors were more present in Rome, with 31 and 23 of the symbols located on the FUR. The remains of the dwellings incorporated in the basilica of Saints John and Paul on the western slope of the Caelian Hill would fit into this category. Interesting to see is that if we take the lower estimation of the height, the numbers still correlate with the restriction of the emperors of 17 meters⁸. If we take the higher estimation we see that the buildings with four floors do not comply with this restriction. Hereby implying that the high estimation of these buildings and the buildings with even more floors are exceptions to the restrictions implemented by the emperors. The fifth, sixth, seventh and eighth floor are low in numbers and are irregularities within Rome. The seventh and eighth floor are so high that they seem to reach the height of the columns of the emperors, especially if the high estimation is in place. However, none of the residential buildings seem to come close to match the heights of the biggest public buildings; the Pantheon of 44 meters or the Colosseum of 48 meters.

⁷ In these results, the ambiguous V-shapes are removed.

⁸ P.4 and Storey 2003, 8

We can see that buildings with a height of more than 6 to 7 meters were few in numbers and buildings higher than 15 to 17.5 meters were extremely rare. These extremely rare buildings must have had to be noteworthy and eye-catching in the streets compared to the general height of the surrounding buildings, as they are more than 10 meters above the common height of houses.

Table 2: The types of staircases with their estimated height.

Type	Quantity	Floor ⁹	Height in meters
Basic V-shape	269	1 st floor	6-7 m
V-shape with outward triangle	2	1 st floor?	6-7 m
V-shape with closed end	3	1 st floor?	6-7 m
V-shape with one transverse bar	10	2 nd floor	9-10.5 m
V-shape with one transverse bar with closed end	1	2 nd floor?	9-10.5 m
V-shape with two transverse bars	28	3 rd floor	12-14 m
V-shape with two transverse bars with closed end	3	3 rd floor?	12-14 m
V-shape with three transverse bars	23	4 th floor	15-17.5 m
V-shape with four transverse bars	3	5 th floor	18-21 m
V-shape with five transverse bars	2	6 th floor	21-24.5 m
V-shape with six transverse bars	1	7 th floor	24-28 m
V-shape with seven transverse bars	1	8 th floor	27-31.5 m

⁹ These floors are based on the UK floor system, which starts with the ground floor, followed up by the 1st floor, the 2nd floor etc.

3.3 Conclusion

Because of the many differences in height of all the buildings, a decision must be made when a building is considered a high-rise. To do this, a border must be defined to decide whether a building can be interpreted as a high-rise or if it is just an ordinary Roman building. A difference in available quantity can be seen on the FUR between buildings with a 2nd floor and buildings with a 3rd or 4th floor. The height of these 3+ floored buildings is at least double the height of buildings with the height of a 1st floor and even more when compared to buildings with no upper floors. Hereby implying that they should be easily recognizable from the street view. Also, 60 of the total of 349 V-shapes corresponds to the group of buildings with 3 floors or higher, suggesting that only 17.2% of the total number of V-shapes belong to this height group.

From this I conclude that a building is considered a high-rise when it contains at least a 3rd floor and is at least 12 to 14 meters in height.

Chapter 4 The distribution of high-rises within Rome

4.1 Spatial distribution of high-rises

The height of buildings in Rome based on the FUR and archaeological excavations has been established and from the results we can try to estimate the distribution throughout Rome of these high-rises. This estimation of the general distribution will be an attempt to determine if higher buildings were located more in the city-center or in the periphery. The specific distribution will be an attempt to estimate if there are clusters or hubs of multiple floored buildings in Rome. For both distributions I have used the data of my own database. It must be remembered that this distribution is based on the fragments and slabs of the FUR that are localized and display buildings with at least one upper floor.

with these specifications, only 56 fragments of the database suit the criteria as seen in table 3. The slabs of table 3 are highlighted on the slab map of appendix 1. This refined map shows all the localized fragments on slabs of the FUR according to the SDFURP in blue and the localized fragments on slabs that include V-shapes in red.

Table 3: Fragments localized on a slab with the number of V-shapes per fragment. For the number(#) of V-shapes reaching a specific floor, 1x2 means one V-shape with 1 transverse bar, implying 2 floors.

Stanford #	Slab #	Size fragment	# of V-shapes	# V-shapes reaching a specific floor
1abcde	XI-6	large	3	1x2
4b	X-5	large	1	1x4
6bcdf	IX-4	large	2	
7abcd	IX-6	large	7	
7e	IX-6	medium	1	
8bde	VIII-5	small	1	
8fg	VIII-5	medium	2	
10Aab	VIII-2	small	2	
10abcde	VIII-3	medium	1	
10f	VIII-3	small	2	
10h	VIII-3	small	1	
10lm	VIII-3	large	2	1x4
10opqr	VIII-3	large	2	
10v	VIII-3	small	1	1x4
11a	VII-7	large	3	2x4
11d	VII-7	large	2	1x4
11e	VII-7	large	5	
11fgh	VII-7	large	3	1x3, 1x4
15ab	VII-10	small	1	
20b	VII-12	medium	1	

21b	VII-14	medium	2	
21d	VII-14	small	1	
24a	VII-18	large	11	
24c	VII-18	large	13	1x6
24d	VII-18	medium	2	
25a	VII-20	large	3	1x4
27a	VI-7	large	4	
27b	VI-7	large	10	
28a	VI-9	large	6	2x3
28b	VI-9	large	8	1x4
28c	VI-9	large	6	
31dd	V-12	medium	1	
33abc	V-17	large	7	1x6
35cdefghi	IV-5	medium	2	1x3
35lpqr	IV-5	small	1	
35m	IV-5	medium	1	
37Aac	IV-7	large	10	1x2, 4x3
37Ade	IV-7	large	10	2x2, 5x3 and 3x4
10aa	VIII-3	medium	1	
10g	VIII-3	large	6	
37Afg hil	IV-7	large	9	2x3, 4x4 and 2x5
37Am	IV-7	medium	1	1x2
37f	IV-6	medium	2	2x3
37gi	IV-6	medium	3	1x2, 2x3
40cdefgh	III-12	large	1	1x3
92*	VI-8	medium	2	1x2, 1x3
138a	VI-8	large	3	2x3
138bcde	VI-8	large	9	1x3
574ab	VI-7	large	3	
629	V-13	medium	3	
fn23	V-19	medium	2	1x3
fn9	VII-13	medium	1	
230	IV-6	medium	2	
351	VII-13	medium	1	
538abdefg	IV-4	large	8	
538chijklmno	IV-4	large	2	

4.1.1 General distribution

Table 3 and appendix 1 tell us that there are 26 slabs that include V-shapes. The V-shapes are not visible on all localized slabs as the 24 other marked slabs do not include any V-shapes. When we look at the distribution, we see that that generally, the blue slabs alternate with the red slabs. However, there are some patterns to be recognized.

There is a diagonal sequence of red slabs from slab VII-7 to slab XI-6 and next to it a diagonal sequence of blue slabs from slab VII-8 to slab X-6. Another pattern that is visible is the color scheme of slabs covering the Tiber. Many of the slabs of the Tiber are red, especially on the western side of the river.

Fragment 121abc is the fragment with the extremely high residential buildings of 6, 7 and 8 floors. This fragment is therefore essential for interpreting high-rises in Rome. However, this fragment is not recognized on any slab, but is estimated to be far from the city center but along the Tiber. This estimation is based on the lesser-known commercial structures the fragment inherits (www.formaurbis.stanford.edu).

Northern slabs covering the Tiber (II-8 and I-10) show an absence of V-shapes and are therefore marked blue. These northern slabs covering the Tiber are in trend with the other northern slabs of the map, because almost all slabs from row I to row III show an absence of V-shapes. However, the data of this area of Rome is sparse as only 7 of the 51 slabs include localized fragments.

Chapter 3 concludes with a definition of a high-rise on the FUR and establishes that all buildings with 3+ floors are high-rises. The number of high-rises per slab is in yellow indicated on appendix 1. There is a clear distribution visible surrounding the Tiber with many of the high-rises located on slab IV-7. There is also a smaller cluster of high-rises on slab VII-7 and VIII-3. These distributions will be further addressed in section 4.2.2. While there is a clear presence of high-rises surrounding the river and on slab VII-7, the opposite is visible for the slabs around the Circus Maximus. The slabs including and surrounding the Circus Maximus include V-shapes, but not any high-rises. Raising the question for why the lack of high-rises is evident in this area. This question will also be addressed in the next section.

Four big public buildings are present on appendix 1, the Circus Maximus and the Colosseum are discussed in chapter 3. The slabs where the Circus Maximus is on located and visualized (mainly slab VII-13), are all red. However, the contrary seems to be appear at the Colosseum where no V-shapes are localized. The Circus Maximus was built in the valley between the Palatine Hill and the Aventine hill and all the slabs of that structure seem to incorporate V-shapes. However, the hills where Circus Maximus is located between, the Palatine Hill on slabs VII-11 and the Aventine Hill on slab VII-15, are mainly blue. This creates the question: are V-shapes located on the top of the hills in Rome? appendix 1 is combined with an elevation map, appendix 2, resulting in Appendix

3 (www.en-gb.topographic-map.com). The slab map is oriented northwards to align with the elevation map. The results are slightly difficult to see, but the height map combined with the slab map answers the question. The five hills visible on appendix 3 are mostly covered within the blue slabs. Only the Palatine hill is partly covered by the red slab VII-12. However, this slab contains only one known V-shape, on fragment 20b. The archaeological sources as the Ara Coeli insula and the shops on the Via Della Lungarina are in line with the interpretation, because the Ara Coeli Insula was built adjacent to a hill and the shops on the Via della Lungarina were built in the lower areas near the Tiber. The shops on the Via Nova were built on a street sloping the Palatine Hill, but the shops seem to be located on the lower parts of the slope. The archaeological remains of the two dwellings in the basilica of Saints John and Paul are also built on a slope. Hereby, I illustrate the picture that no upper floored buildings were built on top of the hills. An explanation for the presence of V-shapes on the lower areas in Rome could be that the lower areas could compensate in height with the elevated areas in Rome. meanwhile, the higher areas were already much more visible in the urban landscape, and buildings were therefore forbidden to be built even higher.

4.2.2 Specific distribution

Slab IV-7 includes a collection of fragments with many high-rises on it. The collection is visible in black and white in appendix 4 and depicts in total 30 V-shapes of which 25 have transverse bars. Many of the V-shapes seem to be located on the diagonal street from the top left to the bottom right. But other diagonal streets also include multiple V-shapes. Only the top part of the collection, the top part of fragment 37Aac, has no V-shapes. There is a transition in height visible on this street, with 1- to 2-floored buildings on the top left part shifting to 3- to 4-floored buildings on the bottom right. The number of V-shapes might have something to do with the nearby river, as this was a residential and commercial area.

In subchapter 4.2.1 the question was raised why slab VII-7 and VIII-3 seems to include a cluster of high-rises. Rodríguez-Almeida suggests that these slabs mark the edge of the *suburba*, an inorganized and chaotic neighborhood (AG 1980, 78). This area was a commercial and residential district on the north-eastern side of the Forum Romanum (Steinby 1995, 379). An inorganized and chaotic neighborhood implicates less or no control of the government and therefore more impoverished people. Less wealthy people live in the higher floors of buildings, thus high-rises in this area should be

present. If the interpretation of Rodríguez-Almeida is right, it would indicate that fragments located north-east of slab VII-7 and VIII-3 would include (many) more V-shapes. However, no localized fragments are identified in this area.

Slab VI-8 includes fragment 138bcde that includes multiple neighboring V-shapes (fig. 33). The fragment includes 2 vertical streets, with the rightmost street including five standard V-shapes. The V-shapes on this street do not include any transverse bars and are therefore not useful for research to high-rises. That said, these examples of lower multifloored buildings do show that street include multiple V-shapes neighboring each other. Meaning that this kind of clustering could also commence for high-rises in yet undiscovered fragments. Slab VI-8 is located west of the Tiber.



Figure 33: Fragment 138bcde with two vertical streets with many standard V-shapes.

Figure 34 displays the same concept as figure 33, as the bottom horizontal street of fragment 24c shows many V-shapes. The top street also exhibits multiple V-shapes and faces the *Porticus Aemilia*. What is clearly visible is the wide range of sizes of the standard V-shapes. These sizes however, do not influence the function V-shape in any way. Fragment 24c is located on slab VII-18, located near the Tiber.



Figure 34: Bottom part of fragment 24c displaying many standard V-shapes.

Fragment 121abc¹⁰ is the fragment with the tallest high-rises as far as we know on the FUR. However, this fragment has not been localized on the slabs. Even though it is not located, it still holds valuable information about the accumulation of V-shapes. These high-rises are close together which corresponds to the previous clustering's of V-shapes. The difference with this fragment is that these high-rises are not located on the same street. Based on the general distribution of fragments, I assume that this fragment is located on a lower part of the city. Probably on the western bank of the Tiber. I base this on the great presence of other multistoried buildings clustered in this area. Therefore, this fragment should be assumed to be nearby slab IV-7.

There is one public building that will be addressed for the specific distribution of V-shapes, the Circus Maximus. Figure 37 displays the southern part of the Circus Maximus and six clear V-shapes. These V-shapes imply that the outer ring of this stadium was raised. However, this outer ring was only raised one floor as only basic V-shapes are visible. These V-shapes can be interpreted as clusters since five of these V-shapes are located very close to each other.

In the subchapter 4.2.1 the question was raised as to why the buildings surrounding the Circus Maximus do not get past the 2nd floor. The slabs surrounding the Circus include many small fragments, but few with a V-shape. This does however not disprove that V-shapes are only located in lower elevated areas, because most of the valley between the

¹⁰ Figure 21 on P. 18.

Palatine Hill and the Aventine hill is covered by the Circus. And the size of the Circus might be the reason as to why there are no high-rises in this area. It needed a lot of space to be built and needed to stand out from the surrounding buildings. Therefore, no buildings surrounding this stadium could be built higher.

4.2.3 Conclusion

In this chapter I made an interpretation of the distribution of the localized V-shapes of the FUR, with an emphasis on high-rises. These V-shapes are to be found on fragments, but only a small portion of the fragments are localized. Also, take in account that only 10 to 15% of the FUR has been discovered in fragment. The localized fragments of the FUR therefore represent only a fraction of the details of the total map. That said, some patterns concerning the distribution are however to be recognized. V-shapes seem to appear on mainly the lower areas of the city and are therefore dodging the hills of Rome. Especially nearby the Tiber are more V-shapes located. One of the slabs next to the Tiber is slab IV-7, which contains is a huge collection of localized fragments that fit together. This collection displays a clear pattern for specific distribution as it seems that many buildings of different heights are localized in the same street, with a gradual height change between the two ends of the street. The clustering of fragments is visible in other parts of the city, however not as vivid and with high-rises as on slab IV-7, insinuating the rarity of this phenomenon.

Chapter 5 Conclusion

The objective of this thesis was to answer the question: Compared to historical sources, what do archaeological sources of Rome state concerning the height of Roman buildings and how are these high-rises distributed throughout the city? The aim was to ascertain by means of the Forma Urbis Romae in combination with archaeological sources to make an interpretation on the relative quantity of high-rises and their location in Imperial Rome in the third century AD, resulting in a rough image of the spread of high-rises in Rome. A more explicit result was not possible, because of the few available archaeological sources and the lack of information from the FUR. The archaeological sources were very useful for establishing a height per floor but could only assist in the determination of the actual height of high-rises and the distribution of them. The FUR was however, more useful for determining these two features. The disadvantage of the FUR is the lack of localized fragments and overall lack of fragments. The typology was difficult to make because some fragments were partly deteriorated, making the perceiving of V-shapes difficult. However, clear differences in height and distribution based on the few fragments are visible but should be accepted with caution.

the results show that multifloored buildings are generally located in the lower areas close to the Tiber, while also avoiding the top of the hills. However, high-rises are relatively sparse as only 17% of the total multifloored buildings belong to this category. The localized high-rises are located on the western bank of the Tiber and northeast of the Forum Romanum. These high-rises are relatively clustered, but are very difficult to pinpoint, because of their sparse availability and the lack of localization.

The results point out a slightly different image than the image created by historical sources. History tells us that high-rises were omnipresent, but also restricted to 17 meters (Storey 2008, 8). The results show that high-rises are only relatively sporadically distributed in small clusters and evade elevated areas. Also, the results point out that high-rises are sometimes much taller than the restricted heights implemented by the emperors. From this I can conclude that the main influencers for the distribution of high-rises are the elevation of the area and the function of the house and area. It is however unclear if these high-rises are built before, during or after the restrictions. And if the sketched image of me would be different if all the fragments are known. Both considerations are difficult to answer because of the lack of information.

It will be interesting to see how relatable the high-rise distribution of Rome is to other Roman cities like Ostia, Herculaneum or Pompey. As archaeological resources in these

cities are more tangible and evident and no such thing as a 'marble plan' is made of these cities.

Abstract

Historical sources create an image that Rome was a city full of skyscrapers at the peak of the Roman empire. History also tells us that Rome inherited restrictions concerning the height of buildings (Storey 2008, 8). However, Historical sources have the tendency to be biased, leading to an incorrect vision (King 2017, 3). This leads to historical sources offering narratives that archaeology must correct or dispute. Therefore, this thesis questions what archaeological sources state concerning the height and distribution of Roman buildings in Rome? The height of Roman buildings cannot be measured solely by archaeological sources. So instead, I will mainly be utilizing a map called the Forma Urbis Romae (FUR) as the archaeological visualization of staircases and high-rises. This map displays all the insulae and staircases in Rome in the beginning of the third century AD. However, only 10 to 15% exists. By means of a typology of symbols presented as staircases and the spread of these symbols displayed in an edited version of the *slab map* of the FUR, an interpretation is made of high-rises. The typology includes the symbol “V” with transverse bars in it, with the spaces between the transverse bars being interpreted as floors within a building. A determination of the concept of a high-rise for Roman standards must be set. High-rises tower above the ordinary height of buildings and should be detectable in the urban landscape. The few archaeological remains form the basis of the height per floor, suggesting that the height per floor should be estimated at 3 to 3.5 meter. Based on these heights per floor, the multifloored buildings present on the map are interpreted to range from 6 to 31,5 meters. With a high-rise defined by a minimum of a 3 floored building of 12 to 14 meters. These high-rises are not very abundantly visible in the distribution of Rome and the tallest high-rises are particularly exceptional. These high-rises are only relatively sporadically distributed in small clusters and evade elevated areas. These results point out that archaeological results show a different image than what historical imply.

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Appendix 2: Elevation map of Rome from <http://en-gb.topographic-map.com/>.

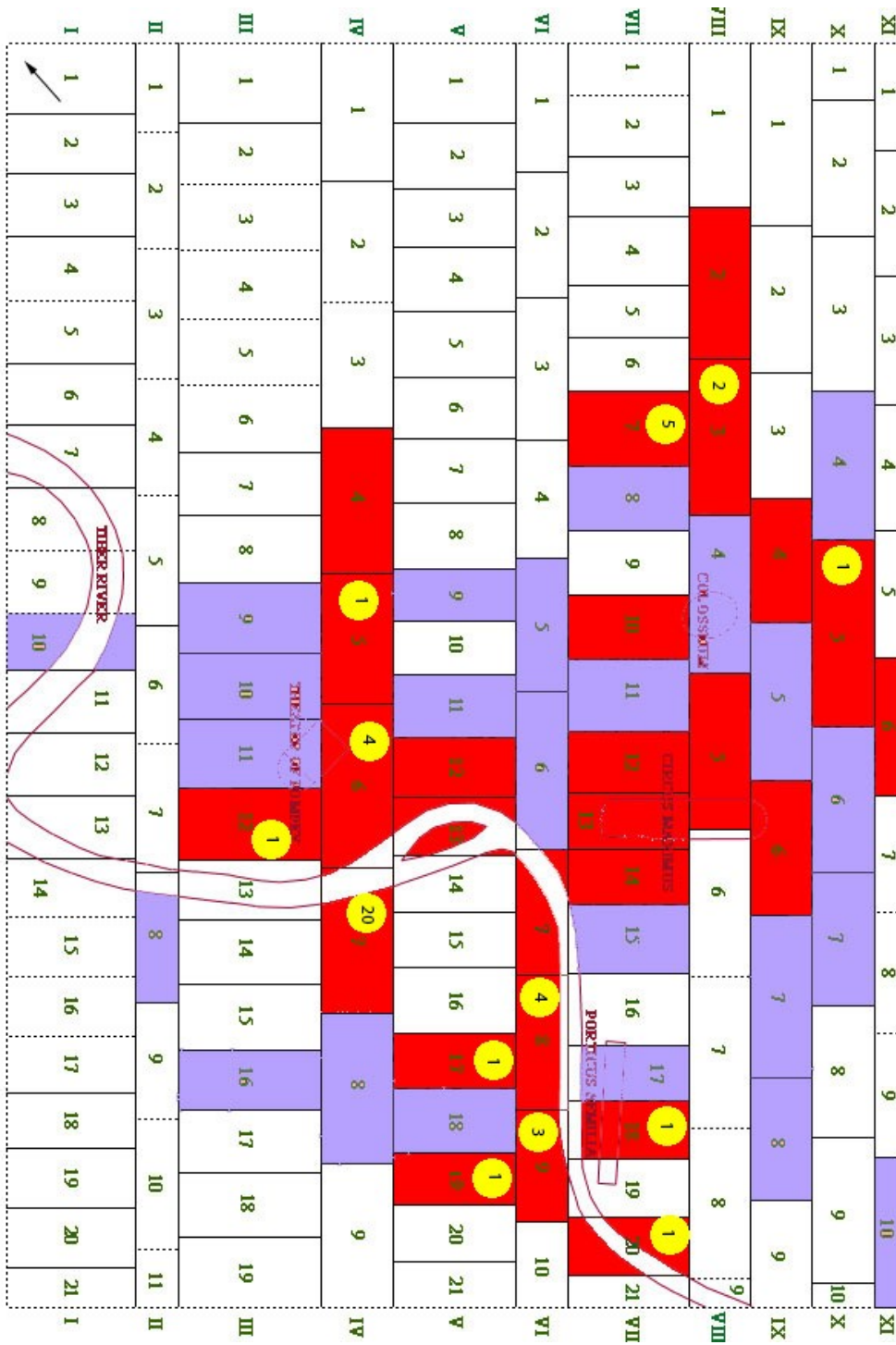
Appendix 3: The elevation map of appendix 2 combined with appendix 1. The numbers indicate the hills. 1: Capitoline Hill. 2: Palatine Hill. 3: Caelian Hill. 4 and 5: Aventine Hill. The high-rises are left out to accentuate the differences between slabs with and without V-shapes.

Appendix 4: Collection of fragments on slab IV-7.

Appendix 5: The database of the staircase symbol on the FUR.

Appendix

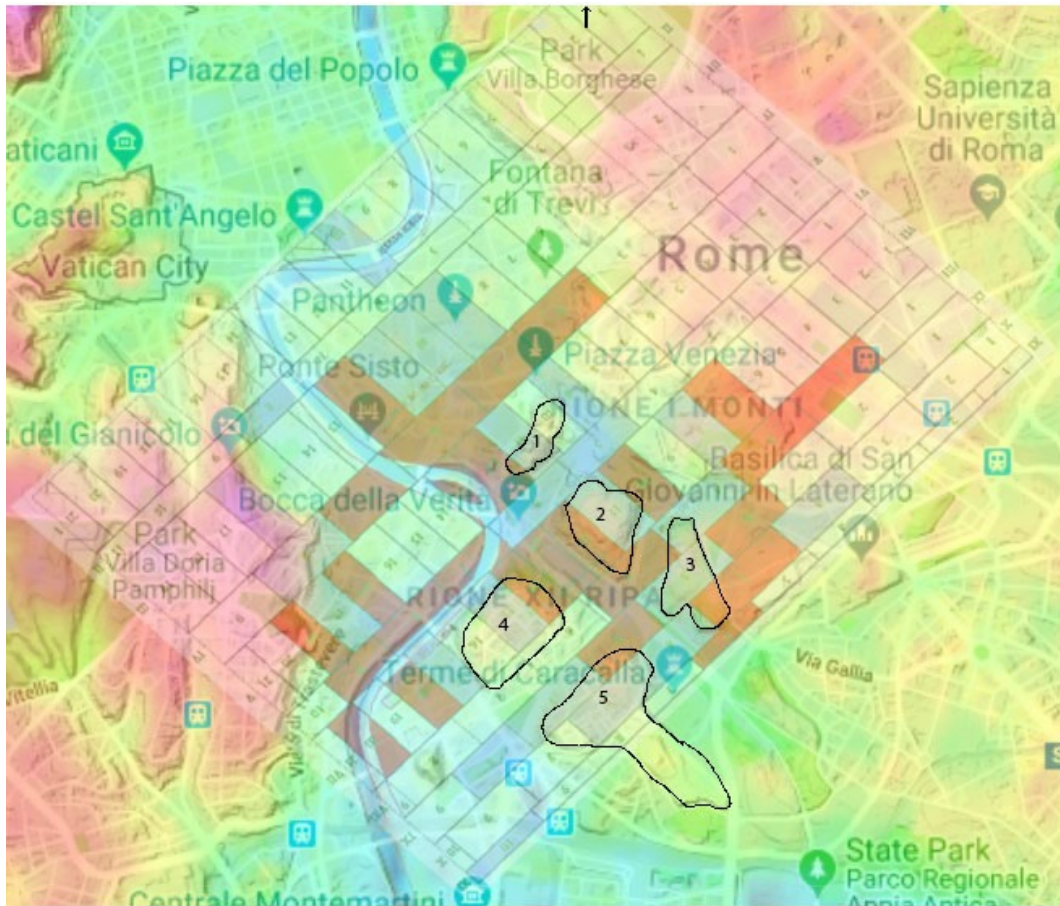
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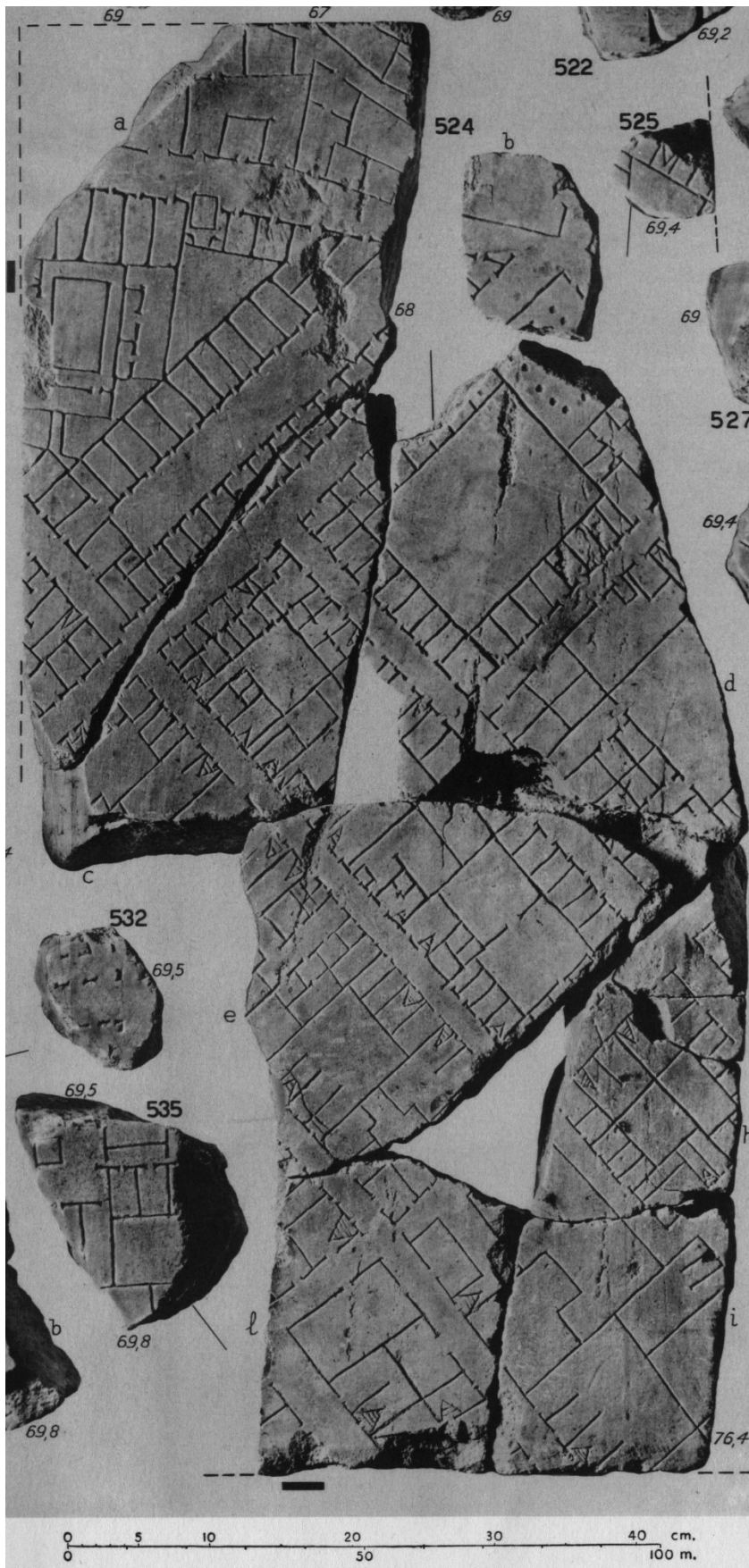
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Appendix 3: The elevation map of appendix 2 combined with appendix 1 (<http://en-gb.topographic-map.com/>). The numbers indicate the hills. 1: Capitoline Hill. 2: Palatine Hill. 3: Caelian Hill. 4 and 5: Aventine Hill. The high-rises are left out to accentuate the differences between slabs with and without V-shapes.



Appendix 4: Collection of fragments on slab IV-7.



Appendix 5: The database of the staircase symbol on the FUR.

stanford #	Slab #	Size slab collective	# stairs?	stairs interior	# of bars on stair	stairs exterior	closed end?	identified location	link webpage	remarks
108ad	-	medium	2	0		2			http://formaurbis.stanford.edu/fragment.php?record=285	
10aa	VIII-3	medium	2	1		1		Subura neighborhood	http://formaurbis.stanford.edu/fragment.php?record=39	renaissance drawing
10Aab	VIII-2	small	2	2				between the Vicus Sabuci and the Clivus Suburanus	http://formaurbis.stanford.edu/fragment.php?record=40	only top of the V is visible
10abcde	VIII-3	medium	1	1					http://formaurbis.stanford.edu/fragment.php?record=41	
10f	VIII-3	small	2	2					http://formaurbis.stanford.edu/fragment.php?record=42	
10g	VIII-3	large	6	6				Subura neighborhood including the Clivus Suburanus	http://formaurbis.stanford.edu/fragment.php?record=43	
10h	VIII-3	small	1	1					http://formaurbis.stanford.edu/fragment.php?record=44	
10i	VIII-3	medium	4	0		4		bath of trajan	http://formaurbis.stanford.edu/fragment.php?record=45	renaissance drawing
10lm	VIII-3	large	3	2	1x3	1			http://formaurbis.stanford.edu/fragment.php?record=46	
10opqr	VIII-3	large	3	2		1		Subura neighborhood bath of trajan	http://formaurbis.stanford.edu/fragment.php?record=48	
10v	VIII-3	small	1	1	1x3			section of Subura neighborhood	http://formaurbis.stanford.edu/fragment.php?record=51	

111ab	-	medium	8	8				http://formaurbis.stanford.edu/fragment.php?record=287	shops & multistory complexes
112	-	small	1	1 1x2				http://formaurbis.stanford.edu/fragment.php?record=288	shops in a multistory building
11a	VII-7	large	7	3 2x3	4		Subura neighborhood	http://formaurbis.stanford.edu/fragment.php?record=54	
11d	VII-7	large	3	2 1x3	1		Section of the Subura neighborhood	http://formaurbis.stanford.edu/fragment.php?record=57	
11e	VII-7	large	5	5			Atrium houses along the Vicus Patricius	http://formaurbis.stanford.edu/fragment.php?record=58	
11fgh	VII-7	large	6	3 1x2, 1x3	3		SE slope of the Viminal Hill incl. the Vicus Patricius	http://formaurbis.stanford.edu/fragment.php?record=59	
121abc	-	medium	5	5 1x1 1x3 1x5 1x6 1x7				http://formaurbis.stanford.edu/fragment.php?record=299	multistorey shops (tabernae) and stables
123	-	medium	1	1				http://formaurbis.stanford.edu/fragment.php?record=301	Arcaded back-to-back shops (tabernae)
126	-	small	1	0	1			http://formaurbis.stanford.edu/fragment.php?record=305	Neighborhood temple
138a	VI-8	large	3	3 2x2			flanking the Via Campana-Portuensis the Transtiberim	http://formaurbis.stanford.edu/fragment.php?record=313	commercial buildings
138bcde	VI-8	large	10	9 1x2	1		Quarter with the Via Campana-Portuens	http://formaurbis.stanford.edu/fragment.php?record=314	commercial/industrial space
143	-	small	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=319	
159	-	medium	2	0	2		-	http://formaurbis.stanford.edu	

									u/fragment.php?record=334	
15ab	VII-10	small	2	1	1		Temple of Peace (templum Pacis)	http://formaurbis.stanford.edu/fragment.php?record=77		
165abd	-	large	8	5	3		-	http://formaurbis.stanford.edu/fragment.php?record=339		
166	-	medium	3	3			-	http://formaurbis.stanford.edu/fragment.php?record=341		
16c	VI-5	small	1	0	1		Forum of Augustus with the Temple to Mars Ultor	http://formaurbis.stanford.edu/fragments/renaissance/016c.jpg	Renaissance drawing	
182	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=358		
184	-	large	3	3			-	http://formaurbis.stanford.edu/fragment.php?record=359		
18a	VII-11	medium	2	0	2		Section of Roman Forum including Fountain of Luturna	http://formaurbis.stanford.edu/fragment.php?record=85		
18bc	VI-6	large	1	0	1		Renaissance drawing: Section of the Roman Forum	http://formaurbis.stanford.edu/fragment.php?record=86		
19	V-11	medium	1	0	1		section of Roman Forum including Temple of Saturn	http://formaurbis.stanford.edu/fragment.php?record=91	renaissance drawing	
1abcde	XI-6	large	3	3 1x1		1x0	Imperial changing station outside the porta Capena	http://formaurbis.stanford.edu/fragment.php?record=1	standard V with closed end	
202	-	small	3	3			-	http://formaurbis.stanford.edu/fragment.php?record=379	residential and commercial quarter including shops	
207	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=385		
20b	VII-12	medium	1	1			The imperial palace on the Palatine Hill	http://formaurbis.stanford.edu/fragment.php?record=93	renaissance drawing	

20e	VII-12	small	2	0	2		Renaissance drawing: Platform with dual stairs	http://formaurbis.stanford.edu/fragment.php?record=96	platform of stairs
21b	VII-14	medium	2	2			Balneum Surae	http://formaurbis.stanford.edu/fragment.php?record=100	renaissance drawing
21d	VII-14	small	1	1			next to the Baths of L. Licinius Sura	http://formaurbis.stanford.edu/fragment.php?record=102	Arcaded street, shops with arcaded courtyard
220	-	small	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=398	
221b	IV-6	small	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=400	
228	-	medium	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=405	
229a	IV-6	small	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=406	
230	IV-6	medium	3	2	1		Temple to Jupiter Fulgur	http://formaurbis.stanford.edu/fragment.php?record=408	
234abc	-	medium	2	0	2		-	http://formaurbis.stanford.edu/fragment.php?record=412	
237	-	small	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=415	
242	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=420	
243	IV-6	small	1	0	1		Platform near the Largo Cairoli	http://formaurbis.stanford.edu/fragment.php?record=421	
245	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=423	Rows of shops (tabernae)
24a	VII-18	large	11	11			section of the Estate and warehouses of Galba	http://formaurbis.stanford.edu/fragment.php?record=107	renaissance drawing
24c	VII-18	large	13	13	1x5		Porticus Aemilia Estate and	http://formaurbis.stanford.edu/fragment.php?record=110	

								Warehouses		
24d	VII-18	medium	2	2				Section of riverfront	http://formaurbis.stanford.edu/fragment.php?record=111	
25a	VII-20	large	5	3 1x3	2			The Lollian Warehouses near the Tiber	http://formaurbis.stanford.edu/fragment.php?record=112	warehouses, possible headquarters of an organization incl. a small bath
264	-	medium	2	0	2			-	http://formaurbis.stanford.edu/fragment.php?record=439	Wide staircase flanked by shops
267	-	small	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=442	
273abcd	-	medium	1	1 1x3				-	http://formaurbis.stanford.edu/fragment.php?record=447	section of a large commercial and residential area
277ab	-	medium	3	0	3			-	http://formaurbis.stanford.edu/fragment.php?record=451	Section of crowded residential and commercial neighborhood
27a	VI-7	large	5	4	1			-	http://formaurbis.stanford.edu/fragment.php?record=115	Trastevere
27b	VI-7	large	24	10	14			Transtiberim Tiber River (Tiberis)	http://formaurbis.stanford.edu/fragment.php?record=116	renaissance drawing
281	-	medium	2	2				-	http://formaurbis.stanford.edu/fragment.php?record=455	
28a	VI-9	large	7	6 2x2	1	2x2		Transtiberim Temple of Fors Fortuna Tiber River	http://formaurbis.stanford.edu/fragment.php?record=120	
28b	VI-9	large	8	8 1x3				Transtiberim	http://formaurbis.stanford.edu/fragment.php?record=121	renaissance drawing
28c	VI-9	large	6	6				Via Portuense Transtiberim	http://formaurbis.stanford.edu/fragment.php?record=122	
300ab	-	medium	2	2				-	http://formaurbis.stanford.edu/fragment.php?record=473	Intersection of three city blocks (insulae)(?)
312	-	medium	2	2				-	http://formaurbis.stanford.edu/fragment.php?record=483	Section of mainly commercial architecture?
317	-	medium	2	2				-	http://formaurbis.stanford.edu	Passageway or ramp cutting

									u/fragment.php?record=488	through shops (tabernae) and elongated structures
31a	V-12	medium	2	0	2		SW edge of the Capitoline Hill	http://formaurbis.stanford.edu/fragment.php?record=133		
31b	V-12	medium	3	0	3		Large temple on the SW edge of the Capitoline hill	http://formaurbis.stanford.edu/fragment.php?record=134		
31c	V-12	small	2	0	2		SW edge of the Capitoline hill	http://formaurbis.stanford.edu/fragment.php?record=136	joined with 31b?	
31d	V-12	small	1	0	1		Temple of Bellona (aedes Bellonae)	http://formaurbis.stanford.edu/fragment.php?record=138		
31dd	V-12	medium	3	1	2		Porticus of Octavia and Philippus	http://formaurbis.stanford.edu/fragment.php?record=139		
31eeff	V-12	medium	1	0	1		Porticus of Philippus	http://formaurbis.stanford.edu/fragment.php?record=140	Renaissance drawing	
31h	V-12	medium	3	0	3		Two temples in the Vegetable Market	http://formaurbis.stanford.edu/fragment.php?record=144		
330*	-	large	7	6	1		-	http://formaurbis.stanford.edu/fragment.php?record=499	Single- and multi-storey apartment complexes	
334	-	small	2	2			-	http://formaurbis.stanford.edu/fragment.php?record=503		
335	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=504		
33abc	V-17	large	7	7	1x5		Magazzini a nord della via Campana-Portuensi	http://formaurbis.stanford.edu/fragment.php?record=160		
340	-	medium	3	0	3		-	http://formaurbis.stanford.edu/fragment.php?record=508		
345	-	medium	4	4	2x1, 1x3		-	http://formaurbis.stanford.edu/fragment.php?record=516		
347	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=517		

348	-	medium	2	0	2		-	http://formaurbis.stanford.edu/fragment.php?record=518	
350ab	-	medium	4	4			-	http://formaurbis.stanford.edu/fragment.php?record=519	
351	VII-13	medium	1	1			alongside the Circus Maximus	http://formaurbis.stanford.edu/fragment.php?record=520	Commercial quarter
354	-	medium	2	2			-	http://formaurbis.stanford.edu/fragment.php?record=522	Intersection between four (?) city blocks (insulae)
357ab	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=524	Rectilinear complex of rooms
35ab	IV-5	medium	2	0	2		Porticus Divorum	http://formaurbis.stanford.edu/fragment.php?record=166	
35cdefghi	IV-5	medium	2	2	1x2		Porticus Divorum	http://formaurbis.stanford.edu/fragment.php?record=169	
35lpqr	IV-5	small	1	1			Diribitorium, saepta julia	http://formaurbis.stanford.edu/fragment.php?record=176	
35m	IV-5	medium	5	1	5		Minerva Chalcidica Serapeum	http://formaurbis.stanford.edu/fragment.php?record=177	renaissance drawing
365	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=532	building with a peristyle (a domus?)
373a	-	medium	2	2			-	http://formaurbis.stanford.edu/fragment.php?record=540	Three sections of shops (tabernae)
373b		medium	2	1	1		-	http://formaurbis.stanford.edu/fragment.php?record=541	Asymmetrical sections of shops around open space
37Aac	IV-7	large	10	10	1x1, 4x2		Zona sotto I	http://formaurbis.stanford.edu/fragment.php?record=185	
37Ade	IV-7	large	10	10	2x1, 5x2 en 3x3		Zona sotto I	http://formaurbis.stanford.edu/fragment.php?record=187	
37Afg hil	IV-7	large	9	9	2x2, 4x3 en 2x4		Zona sotto I	http://formaurbis.stanford.edu/fragment.php?record=188	
37Am	IV-7	medium	1	1	1x1		left bank of the Tiber in the SW	http://formaurbis.stanford.edu/fragment.php?record=189	

							section of the Field of Mars		
37f	IV-6	medium	2	2 2x2			Small bath in the SW section of the Field of Mars	http://formaurbis.stanford.edu/fragment.php?record=199	small bath (balneum)
37gi	IV-6	medium	3	3 1x1, 2x2			Section of SW Field of Mars and the Tiber	http://formaurbis.stanford.edu/fragment.php?record=200	
385	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=551	
386	-	medium	2	2 1x2, 1x3			-	http://formaurbis.stanford.edu/fragment.php?record=552	Section of a multi-storeyed city block (insula)?
390ab	-	medium	2	0	2		-	http://formaurbis.stanford.edu/fragment.php?record=557	
400	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=565	
401	-	small	1	1 1x4			-	http://formaurbis.stanford.edu/fragment.php?record=566	
403	-	medium	2	0	2		-	http://formaurbis.stanford.edu/fragment.php?record=568	
409b	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=574	
409c	-	medium	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=575	
40cdefgh	III-12	large	3	1 1x2	2		Section of city blocks in SW area of the Field of Mars	http://formaurbis.stanford.edu/fragment.php?record=211	
418	-	medium	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=583	
421ab	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=586	
422ab	-	medium	2	2 1x3			-	http://formaurbis.stanford.edu	

									u/fragment.php?record=589	
426	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=592	
437abcd	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=600	
43ab	-	medium	1	0		1		Balneum Caesaris, (bath)	http://formaurbis.stanford.edu/fragment.php?record=216	
443	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=605	
461	-	small	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=622	
463	-	medium	1	0		1		-	http://formaurbis.stanford.edu/fragment.php?record=624	
464	-	small	1	0		1		-	http://formaurbis.stanford.edu/fragment.php?record=625	
477	-	small	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=634	
479	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=636	Unsure of V-shape
484	-	medium	2	2				-	http://formaurbis.stanford.edu/fragment.php?record=638	
485	-	medium	1	0		1		-	http://formaurbis.stanford.edu/fragment.php?record=639	
486	-	small	1	1	1x3			-	http://formaurbis.stanford.edu/fragment.php?record=640	
492*	-	small	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=646	tabernae in front of colonnaded courtyard
495de	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=651	
496ab	-	medium	3	2		1		-	http://formaurbis.stanford.edu/fragment.php?record=652	
498	-	medium	2	2				-	http://formaurbis.stanford.edu	

									u/fragment.php?record=654	
499	V-12	small	2	0	2		SW edge of the Capitoline hill	http://formaurbis.stanford.edu/fragment.php?record=655		
4b	X-5	large	3	1	1x3	2	Neronian branch of the Aqua Claudia	http://formaurbis.stanford.edu/fragment.php?record=8		
504ab	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=659		
517abcd ef	-	large	2	2			Area north of the Forum of Trajan	http://formaurbis.stanford.edu/fragment.php?record=671		including a portion of an aqueduct
519abc	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=673		
520ab	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=675		
527b	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=681		
536	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=690		
538abd efg	IV-4	large	8	8			Buildings on the NW slopes of the Quirinal	http://formaurbis.stanford.edu/fragment.php?record=692		
538chijk lmno	IV-4	large	3	2	1		Buildings on the NW slopes of the Quirinal	http://formaurbis.stanford.edu/fragment.php?record=693		
542	-	medium	2	2			-	http://formaurbis.stanford.edu/fragment.php?record=697		
546ab	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=700		
548ab	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=701		
551	-	medium	2	2			-	http://formaurbis.stanford.edu/fragment.php?record=703		irregular street separating two building complexes
552a	-	medium	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=703		Arcaded street flanked by

									u/fragment.php?record=704	shops (tabernae) and a piazza
55a	-	medium	8	2	6				http://formaurbis.stanford.edu/fragment.php?record=231	May depict a bath (Staccioli 1961)
564abcd	-	medium	1	1					http://formaurbis.stanford.edu/fragment.php?record=716	Commercial and residential section including long, narrow, deeply carved rooms
567	-	medium	2	2					http://formaurbis.stanford.edu/fragment.php?record=718	
574ab	VI-7	large	3	3				near the Via Campana-Portuensis Transtiberim	http://formaurbis.stanford.edu/fragment.php?record=724	Commercial and industrial quarter
576	-	small	1	1 1x2				Zona sotto I?	http://formaurbis.stanford.edu/fragment.php?record=726	Insulae
580	-	small	1	0	1				http://formaurbis.stanford.edu/fragment.php?record=730	
582	-	large	7	7					http://formaurbis.stanford.edu/fragment.php?record=732	
588	-	medium	1	1					http://formaurbis.stanford.edu/fragment.php?record=737	
590	VII-10	medium	1	0	1				http://formaurbis.stanford.edu/fragment.php?record=739	cornershaped exterior staircase
596	-	small	1	1					http://formaurbis.stanford.edu/fragment.php?record=743	
599	-	large	1	1					http://formaurbis.stanford.edu/fragment.php?record=746	bath?
613a	-	medium	1	1					http://formaurbis.stanford.edu/fragment.php?record=755	
629	V-13	medium	3	3					http://formaurbis.stanford.edu/fragment.php?record=770	Rectilinear streets separating five blocks or buildings
632ab	-	medium	1	1					http://formaurbis.stanford.edu/fragment.php?record=772	Row of shops and unidentified structures

659	-	medium	2	2			-	http://formaurbis.stanford.edu/fragment.php?record=794	arcades separating small rooms and large enclosures
675	-	large	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=815	renaissance drawing
676	-	large	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=816	renaissance drawing
681	-	medium	1	0	1		-	http://formaurbis.stanford.edu/fragment.php?record=820	renaissance drawing
684	-	medium	3	3			-	http://formaurbis.stanford.edu/fragment.php?record=823	Renaissance drawing: Rooms arranged around two courtyards
6bcd	IX-4	large	2	2			The Great Gladiatorial Training School	http://formaurbis.stanford.edu/fragment.php?record=22	
709ab	-	medium	1	1	1x2		-	http://formaurbis.stanford.edu/fragment.php?record=848	
76ab	-	medium	1	1	1x2		-	http://formaurbis.stanford.edu/fragment.php?record=254	
7abcd	IX-6	large	7	7			Circus Maximus with Arch of Titus	http://formaurbis.stanford.edu/fragment.php?record=26	
7e	IX-6	medium	1	1			south of the Circus Maximus	http://formaurbis.stanford.edu/fragment.php?record=27	Shops (tabernae)
81	-	small	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=258	
86	-	small	1	1	1x2		-	http://formaurbis.stanford.edu/fragment.php?record=263	
87	-	small	1	1	1x7		-	http://formaurbis.stanford.edu/fragment.php?record=264	combination of V and exterior stair
89	-	medium	1	1			-	http://formaurbis.stanford.edu/fragment.php?record=266	closed of area
8bde	VIII-5	small	1	1			Septizodium, along the N side of the	http://formaurbis.stanford.edu/fragment.php?record=29	Shops (tabernae)

								Circus Maximus		
8fg	VIII-5	medium	2	2			2x0	Imperial box in the Circus Maximus	http://formaurbis.stanford.edu/fragment.php?record=31	
8h	VIII-5	small	2	0		2		public building, circus maximus	http://formaurbis.stanford.edu/fragment.php?record=32	
92*	VI-8	medium	2	2	1x1, 1x2		1x1,1x2	Riverfront structures in Trastevere	http://formaurbis.stanford.edu/fragment.php?record=268	including a warehouse (horreum)
95c	-	small	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=273	
95d	-	medium	2	2				-	http://formaurbis.stanford.edu/fragment.php?record=274	
99a	-	small	1	1	1x1			-	http://formaurbis.stanford.edu/fragment.php?record=277	
fn23	V-19	medium	2	2	1x2			near the Via Campana-Portuensis Transtiberim	http://formaurbis.stanford.edu/fragment.php?record=854	Commercial or industrial space near the Via Campana-Portuensis
fn26	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=857	big V?
fn27	-	medium	1	0		1		-	http://formaurbis.stanford.edu/fragment.php?record=858	
fn32	-	medium	4	4	1x1			-	http://formaurbis.stanford.edu/fragment.php?record=862	
fn35	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=865	
fn38	-	medium	3	3				-	http://formaurbis.stanford.edu/fragment.php?record=868	
fn43	-	medium	1	1	1x3			-	http://formaurbis.stanford.edu/fragment.php?record=873	
fn8	-	medium	1	1				-	http://formaurbis.stanford.edu/fragment.php?record=875	

fn9	VII-13	medium	1	1				alongside the Circus Maximus	http://formaurbis.stanford.edu/fragment.php?record=876	Commercial quarter
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