

## V

# THE CONSTRUCTION AND THE TYPES OF MASTABA CORES IN THE NUCLEUS CEMETERIES

### 1. MATERIALS AND METHODS OF CONSTRUCTION OF THE CORE-MASTABAS OF THE NUCLEUS CEMETERIES

#### a. The Clearing of the Rock-surface for Foundations

AS explained in Chapter II, the nucleus cemeteries of cores are six in number, four in the Western Field, one in the Eastern Field, and one south of the Cheops pyramid. All these cores are founded on the surface of the grey nummulitic limestone which forms the promontory on which the Giza Necropolis was built. In the case of the four cemeteries of the Western Field and that of the Eastern Field, the rock-surface has been cleared, either at one operation or in successive areas, before the construction of the cores, and the streets were afterwards filled in with masons' rubbish to form a living-floor about on a level with the floors of the chapels. The dumping-places of the geological rubbish and sand removed in the clearing operations cannot now be definitely ascertained. In the excavation of the small *Wady* Cemetery, north of G 2000, we discovered that this cemetery had been covered by the debris cleared away when that mastaba was built. Probably the debris cleared from Cem. G 1200 and Cem. G 2100 was also dumped out to the north. That from Cem. G 4000 seems, on the other hand, to have been piled south of the massive wall which bounds that cemetery on the south. A certain amount of rubbish was undoubtedly used in the filling of the cores.

The cores south of the First Pyramid, excavated by Professor Junker, Cem. G I S, were also founded on rock, but according to Junker's observations were built in cleared areas only a little larger than the projected core, or in foundation trenches. This fact has a special significance for the dating of that cemetery.

#### b. Kinds of Building Stone used in Core-mastabas

The stone used in all the cores of these six cemeteries was of local origin. The fine white limestone from the Mokattam Hills was used, however, in the casing, the stone chapel, and the lining of the burial-chamber, which were all constructed after the cores. The local stone is of the two chief varieties of coarse nummulitic limestone, a softer yellow-drab stone, and a harder grey stone, and both of these occur in several qualities. In general the stone blocks used in each core are of fairly uniform quality and obviously from the same quarry. But a number of the massive cores of later construction contain stones of both the yellow-drab and the grey stone. The yellow-drab stone occurs as follows:

- (1) In the 10 cores of Cem. G 1200, of a harder quality; core type II a.
- (2) In the 5 western cores of Cem. G 2100, also of a hard quality; core types II a and II b.

- (3) In the 5 earliest cores of Cem. G 4000, of hard quality; type II b.
- (4) In the facing of 4 massive cores, harder quality; type III.
- (5) In the 6 eastern mastabas of Cem. G 2100, softer quality; type II a.
- (6) In G 4860 and the 25 cores of the Échelon Cemetery, poorer stone; type II a, usually with 2 shafts.
- (7) In the Eastern Field, in the masonry filling the old Cheops quarry east of his temple to form the foundation of the causeway corridor.
- (8) In the 5 massive cores added to the cemetery of twin-mastabas in the Eastern Field; a softer quality mixed with grey blocks.

The hard nummulitic stone occurs as follows:

- (1) In the core-work of the 3 large and 7 small pyramids, in the core-walls of the temples of those pyramids, and in the causeways.
- (2) In the great boundary wall south of the Western Field.
- (3) In the mastaba cores of Cem. G 4000, excluding the first 5 and the last cores; 46 cores of type IV i.
- (4) In the 12 original cores of the Eastern Field; type IV i.
- (5) In the reconstructed cores of the 8 twin-mastabas of the Eastern Field; type IV ii and IV ii + IV iii.
- (6) In the additional core-work added to 3 mastabas of type II a in Cem. G 1200, and to 2 mastabas of type II b in Cem. G 4000.
- (7) In the 5 additional cores added to the cemetery of twin-mastabas, mixed with yellow-drab stone; type IV iii and IV iv.
- (8) In the cores of Cem. G I S, of which some contain a mixture of yellow stone.

It is obvious that the various beds of stone were being worked practically simultaneously during the construction of the nucleus cemeteries.

### c. Method of Construction of the Core-mastabas

The construction of each core appears to have been carried out in approximately the same manner. The preparation of the surface for the first course is difficult to determine without tearing down the retaining wall, but apparently an emplacement is roughly dressed in the rock surface. On this was set the first course of the retaining wall and the space within immediately filled with rubbish to the top of the course. The top of the course was roughly dressed and the second course set on top of the first and again filled in behind. Thus the construction of the courses and the filling of the interior proceeded practically *pari passu* both for the small-course cores and for the massive cores. The casing of the shaft above the rock was carried out simultaneously course by course with the retaining wall and with stone of the same size and quality. In the case of the solid mastabas of type II b the solid stone-work was built *pari passu* with the retaining wall. The joining of the stones in the small-course retaining wall was moderately good and showed a certain amount of chinking with coarse pinkish plaster, so that the exterior appearance of all cores of type II a, II b, and III was that of a well-finished wall of stepped vertical courses. In the massive cores, while the courses are well fitted horizontally, the stones in the course are not carefully fitted together. The outward appearance of the whole is not that of a well-finished structure, and it may be safely assumed that all the cores of type IV were intended to be faced as type III or cased in white limestone.

2. THE TYPES OF MASTABA CORES

The mastabas of Dyns. I-III, with the exception of those in the enclosure of the Zoser pyramid, were of c.b. of two types of construction.

I a: The filled mastaba with a retaining wall of c.b. and a filling of sand, gravel, or rubbish; in the largest and most important of the filled mastabas the interior was divided by c.b. walls into compartments which were filled with sand, gravel, or rubbish; from Dyn. I to Dyn. VI.

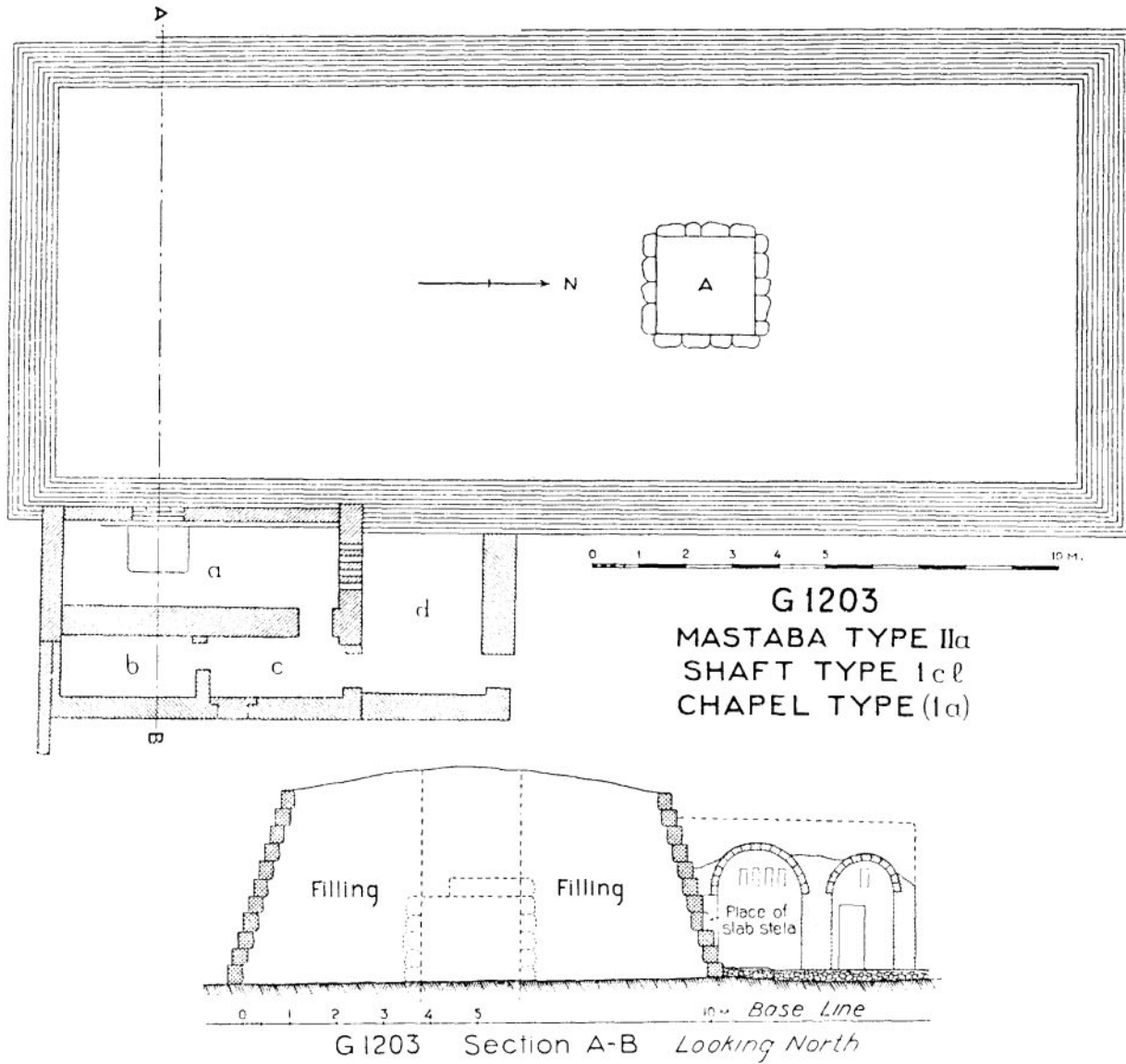


Fig. 1

I b: A similar mastaba, filled solid (or more or less solid) with c.b., roughly laid as headers; private mastabas from the beginning of Dyn. III: both these types were plastered outside with mud which in turn was coated with white plaster.

The exception, the mastabas in the enclosure of the Zoser pyramid, are stone-cased rubble cores. The type with rubble-faced core does not appear among the earliest stone mastabas at Giza. The types of core-mastabas are as follows:

(1) Type II a: a filled mastaba (as I a) with a retaining wall of small drab limestone blocks in low-stepped courses, filled with sand, gravel, rocks, and rubbish; no niches; slab-stela; single burial-shaft, the upper part of which, through the filling of the mastaba, is cased with stone blocks similar to those of the retaining wall; 2-m. burial-shaft (Fig. 1).

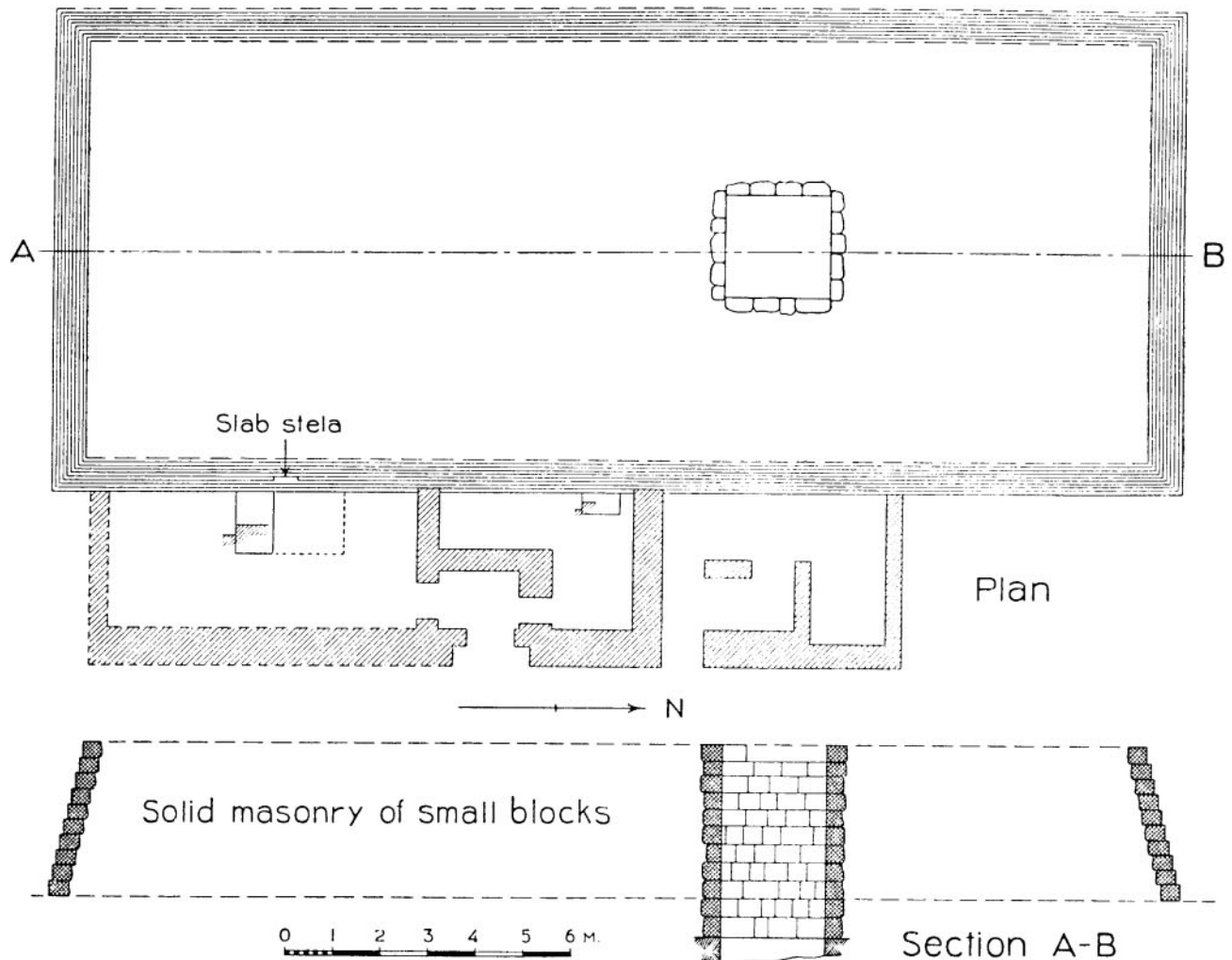
Cem. G 1200: 10 mastabas.

Cem. G 2100: 10 mastabas, like those in G 1200.

Cem. G 4000: 1 mastaba: 2 2-m. shafts.

Cem. en Échelon: 25 mastabas: 1 or 2 2-m. shafts.

No examples occur in the Eastern Field, Cem. G 7000.



MASTABA G 4250: JUNKER, GIZA II S page 193

Fig. 2

- (2) Type II b: in outward appearance like II a, but filled solid with small stone blocks (cf. I b); no niches; slab-stelae (Fig. 2).  
 G 4000: 2 2-m. shafts.  
 G 4150, 4160, 4250, 4260: 1 2-m. shaft: slab-stela.  
 G 2130: 1 2-m. shaft.
- (3) Type III: retaining wall of large blocks of grey nummulitic limestone set in high-stepped courses and filled with gravel and rubbish, or more or less solid with massive blocks; the massive stepped core is faced with small blocks of drab limestone giving the same outward appearance to the core as that of type II a and b; slab-stela in 2 out of 4.

- i: without recess for interior chapel: G 4350, 4140 (Fig. 3).
  - ii: with recess perhaps broken in massive core, but reconstructed with massive masonry and faced with small-stepped courses: G 2000, G 7410+20 (Fig. 4).
- (4) Type IV: massive core like type III, but without the facing of small blocks; slab-stela in rows 5 and 6 of Cem. G 4000.
- i: without recess for the interior chapel: G 4360-4760, G 4450-4850, G 4240-4840. All the remaining cores in Cem. 4000, except 3 cores altered in Dyns. IV-V. Twelve original cores con-

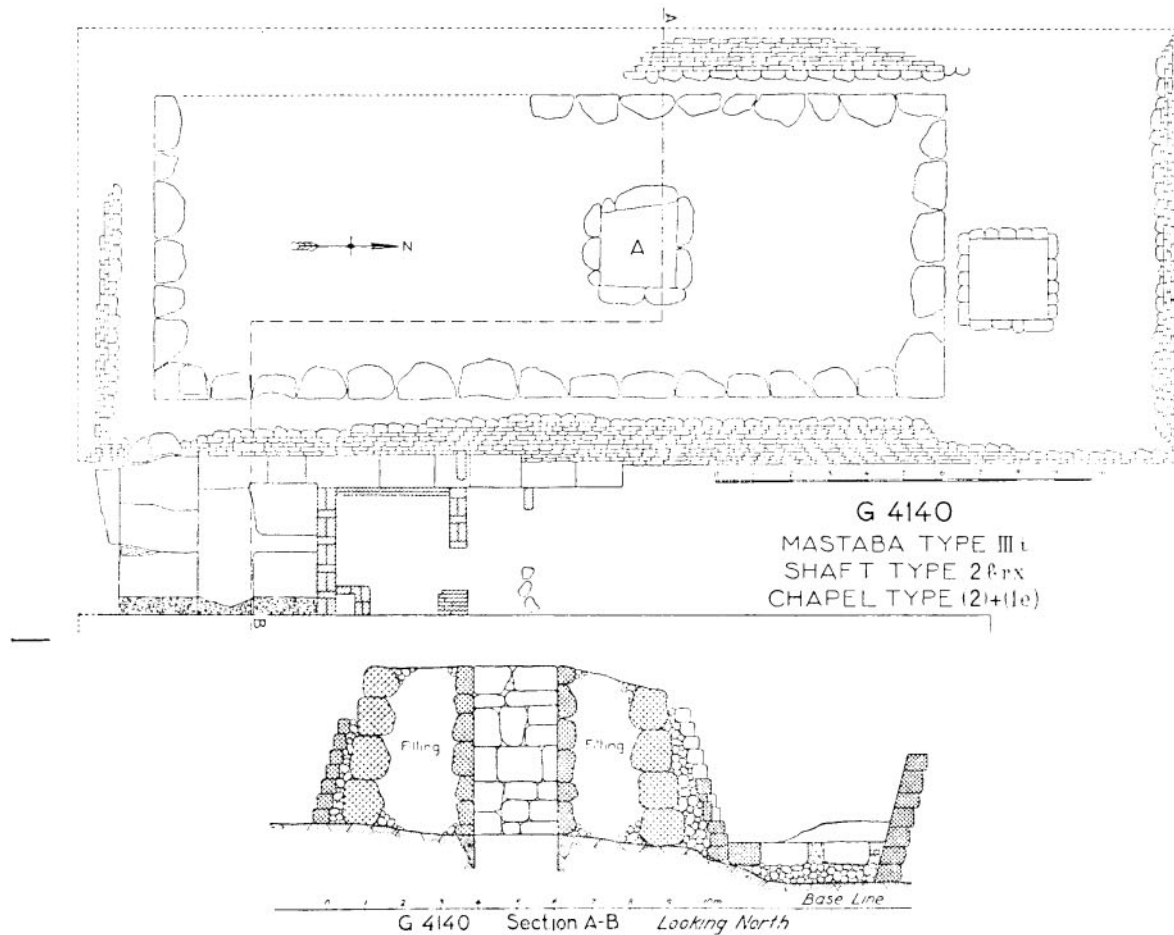


Fig. 3

structed in Cem. G 7000 and incorporated with alterations in mastabas G 7110+20 to 7410+20 and G 7130+40 to G 7430+40. Probably also the 10 cores in Cem. G I S (Fig. 5).

- ii: massive core-mastabas with recess broken and reconstructed later. The 12 original cores in Cem. G 7000 when they were incorporated in the 8 twin-mastabas of that cemetery and a few mastabas in G I S (Fig. 6).
- iii: with recess for interior chapel constructed in the massive core, *ab origine*. The additions to the southern row of 4 original cores in the Eastern Field made when these were reconstructed as twin-mastabas; G 7140-7440 (Fig. 7). Three outlying cores in the Eastern Field; G 7510, 7450, 7350 (Fig. 8).
- iv: massive core, the casing of which has been prolonged southwards to include an interior chapel; G 7650, 7530+40 (Fig. 9).

These core types are used also to designate the finished mastabas which contain those cores.

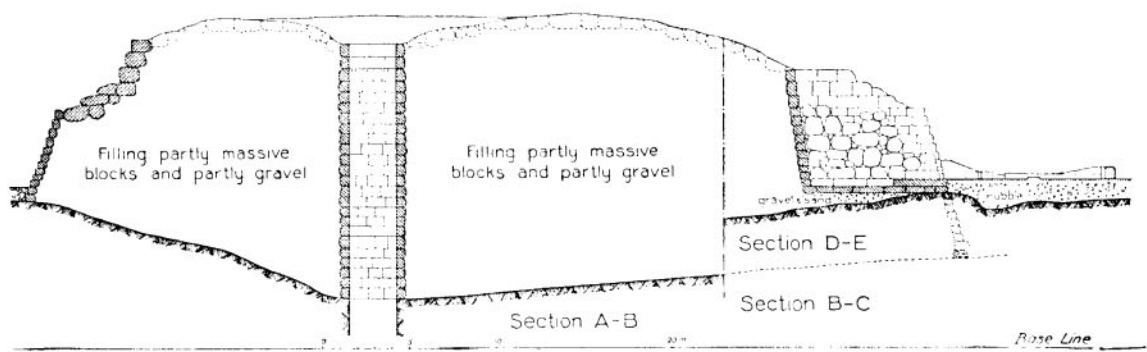
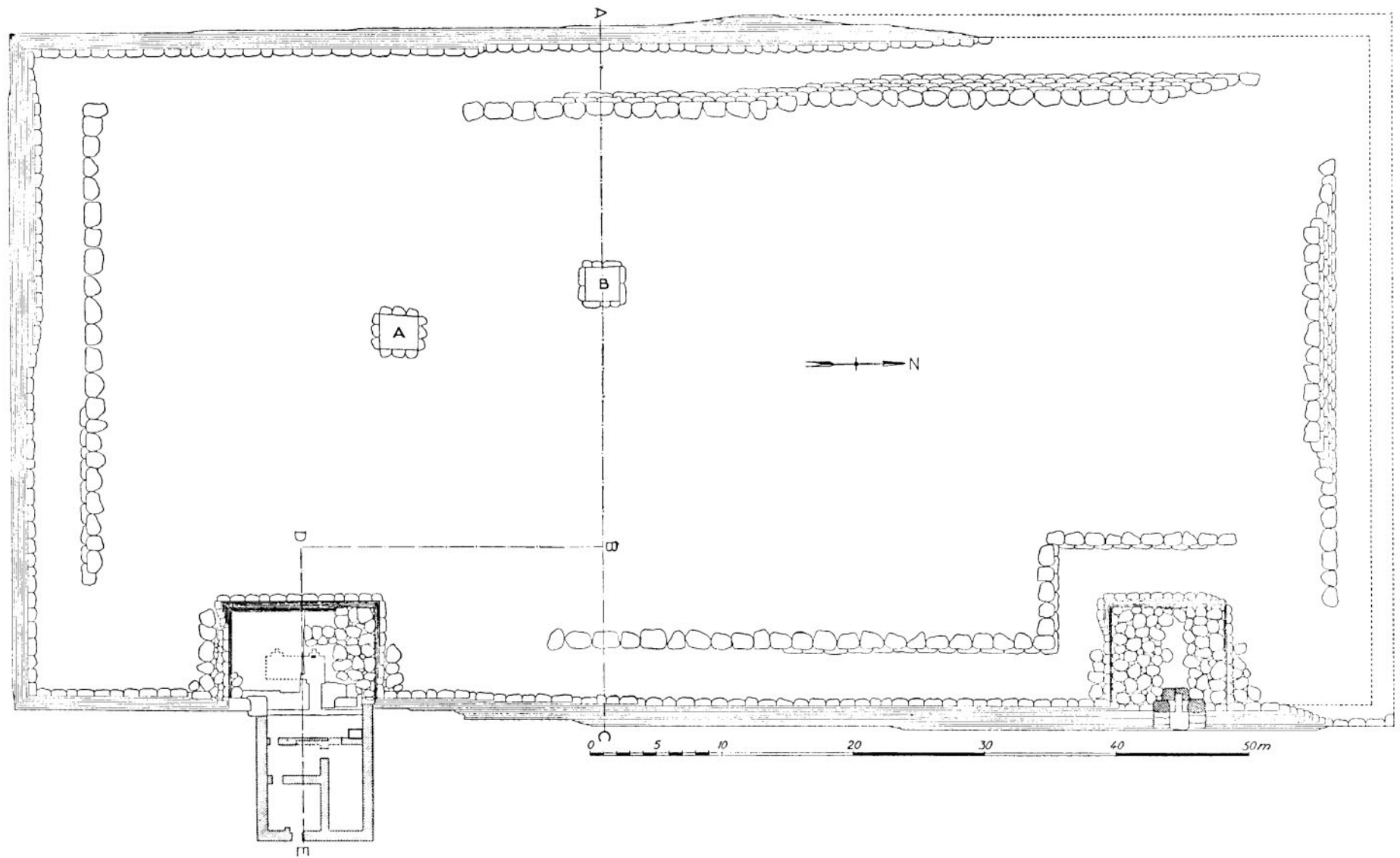


Fig. 4. G 2000

For the sake of convenience I give here the type designation used for mastabas of other later types, including those of Dyns. V and VI:

- (5) Type V: a filled mastaba with a retaining wall consisting of two layers of stone: the outer layer is of fine white limestone dressed to a sloping surface, and supported behind by a nummulitic block; built course by course and filled in *pari passu*: interior chapel of type III of white limestone; G 7050 (Fig. 10).

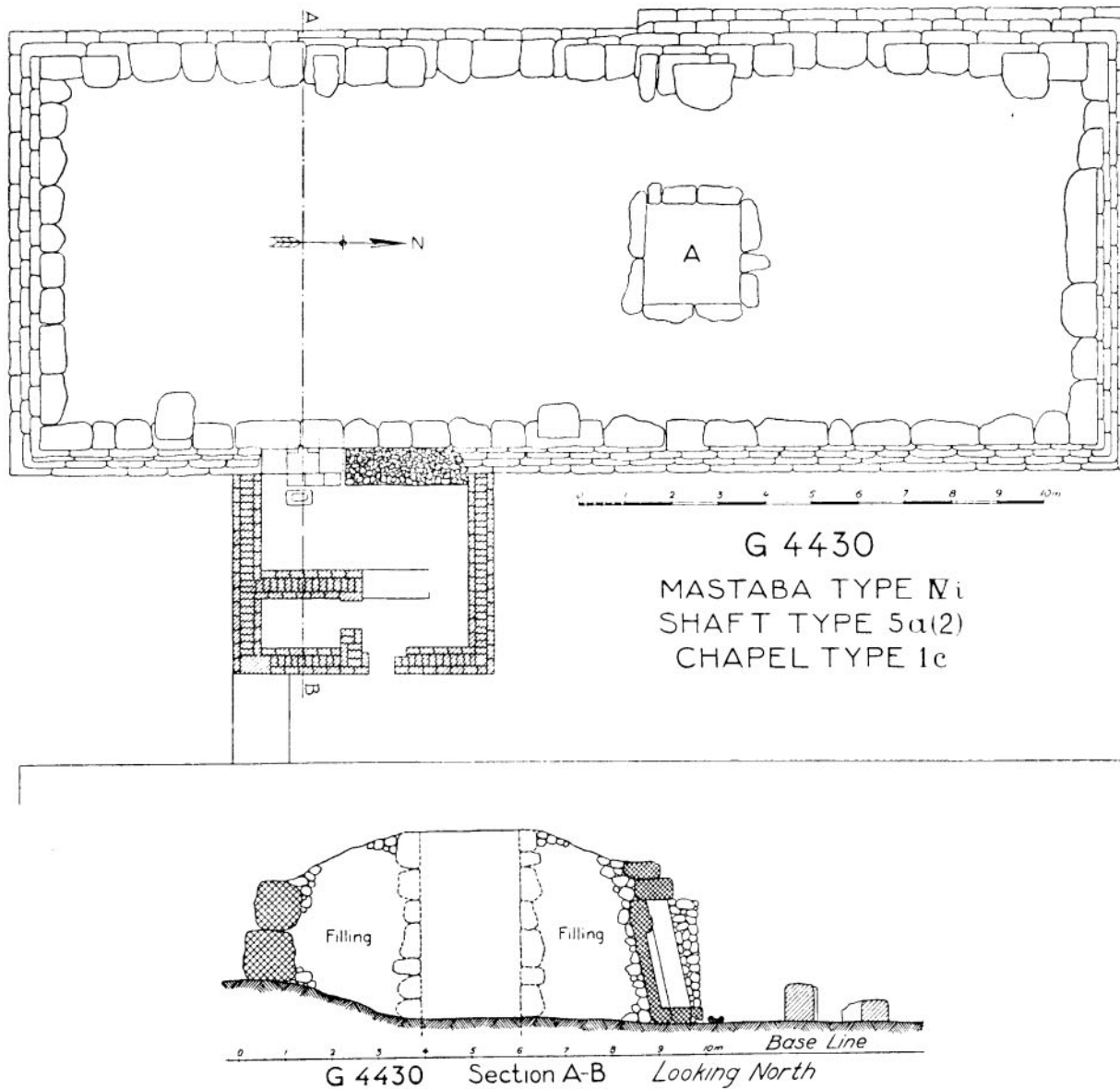


Fig. 5

- (6) Type VI: with interior chapel of type (3) and subsidiary northern niche:

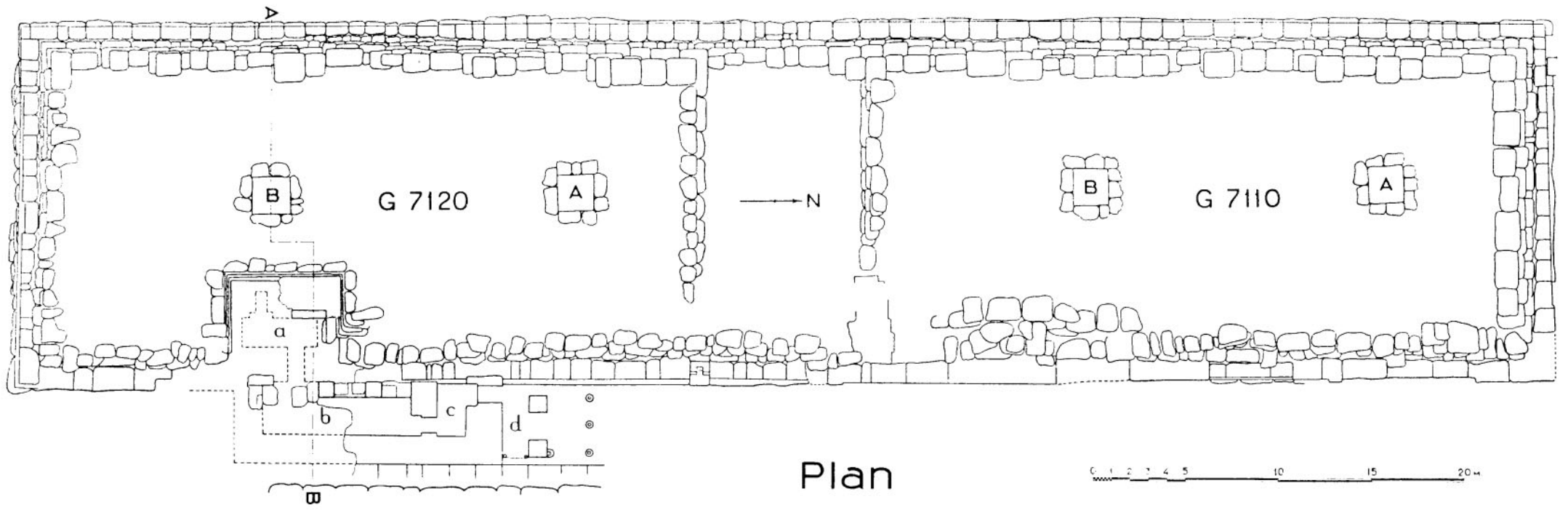
VI a: filled mastaba with grey nummulitic retaining wall of large slabs set sloping and dressed to a sloping surface; filled with rubbish or more or less solid with massive grey blocks; 2 2-m. shafts.

Examples in Cem. G 7000: the last princely mastabas added to the nucleus cemetery;

G 7550, 7660, 7750, 7760, 7060, 7070, 7810, 7820 (Fig. 11).

VI b: similar form of z-masonry with or without rubble-faced core.

VI c: as VI b with retaining walls of u- or zu-masonry; no examples.



Plan

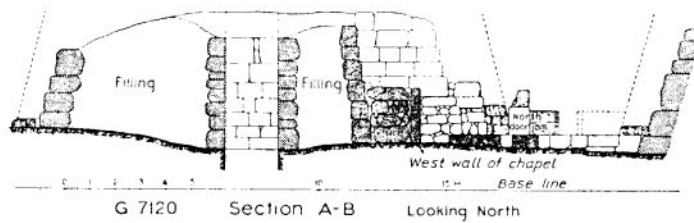
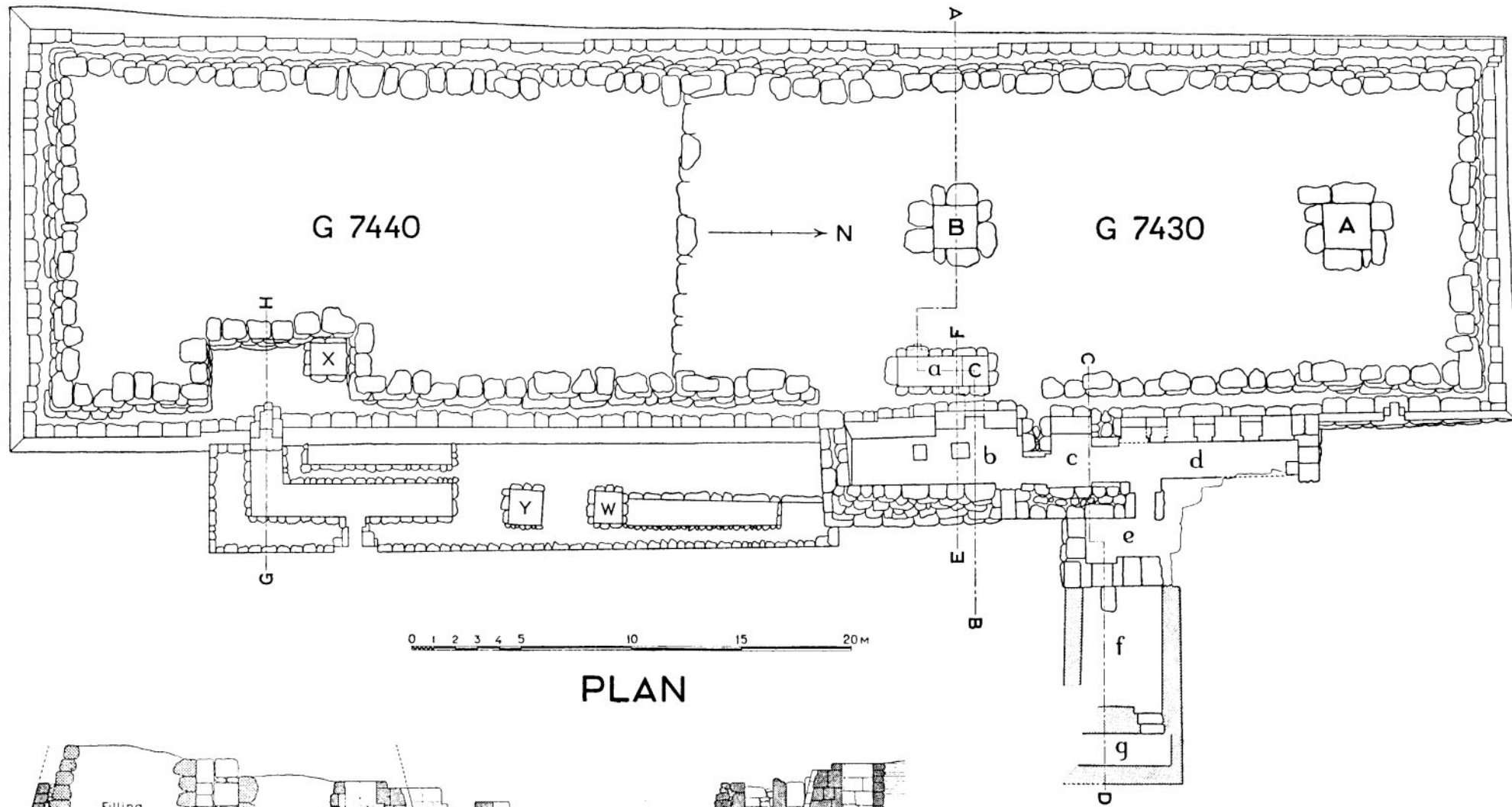
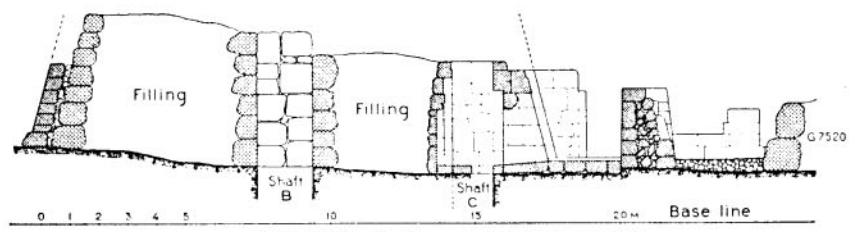


Fig. 6

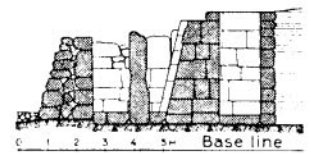




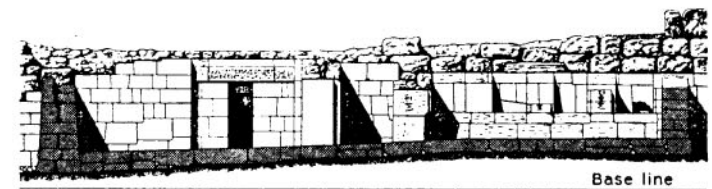
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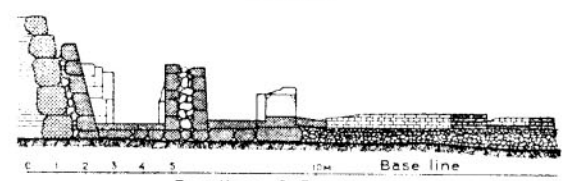
Section A-B Looking North  
G 7430



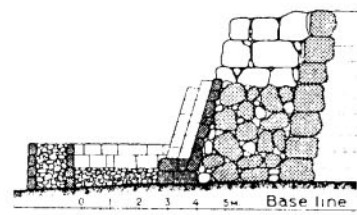
Sec. E-F Look. South  
G 7430



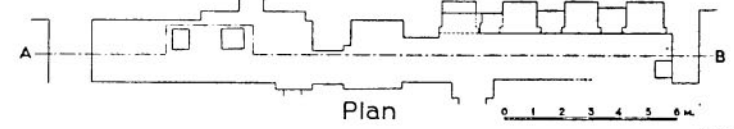
Section A-B Looking West



Section C-D Looking North  
G 7430

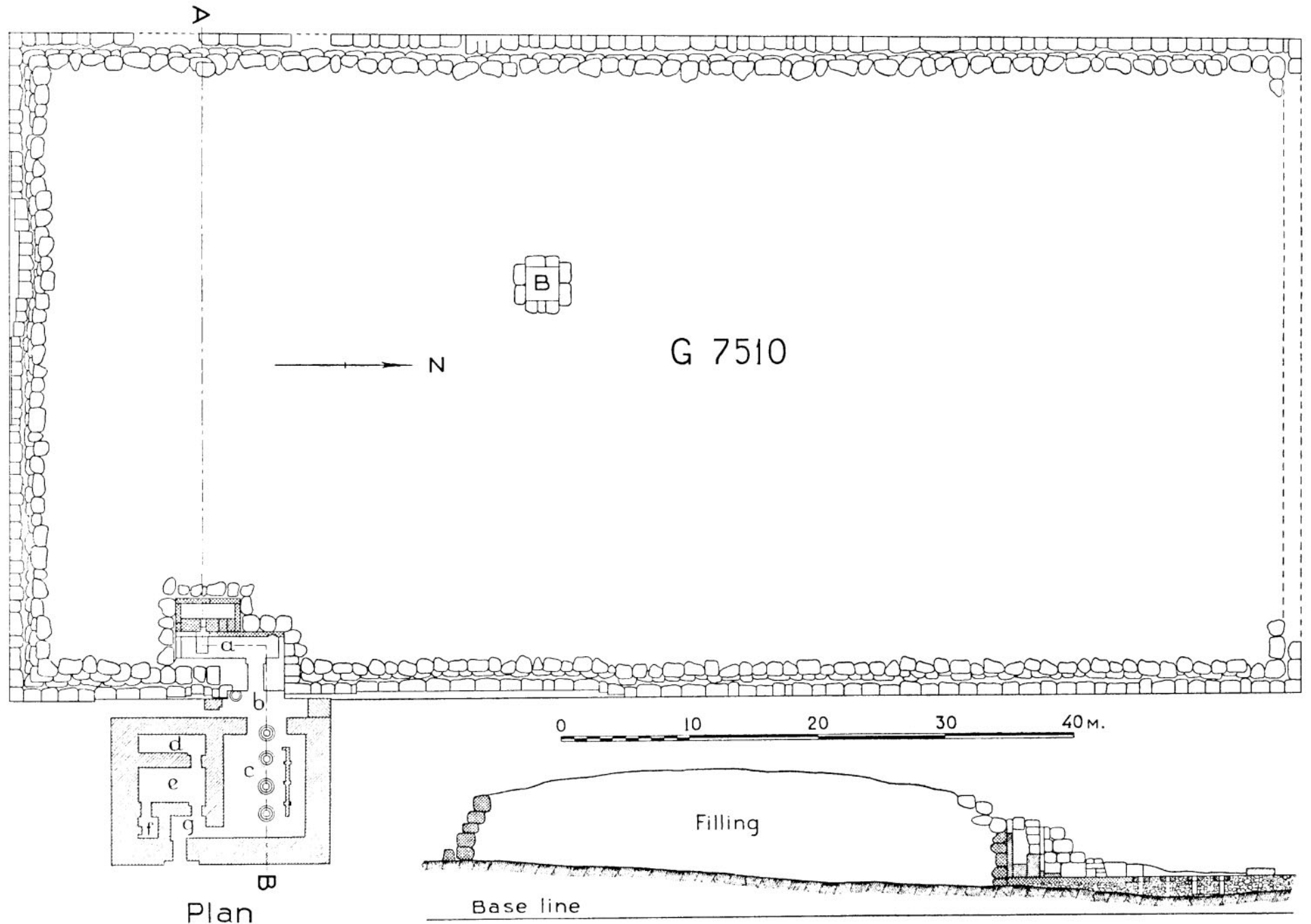


Sec. G-H Look. South  
G 7440

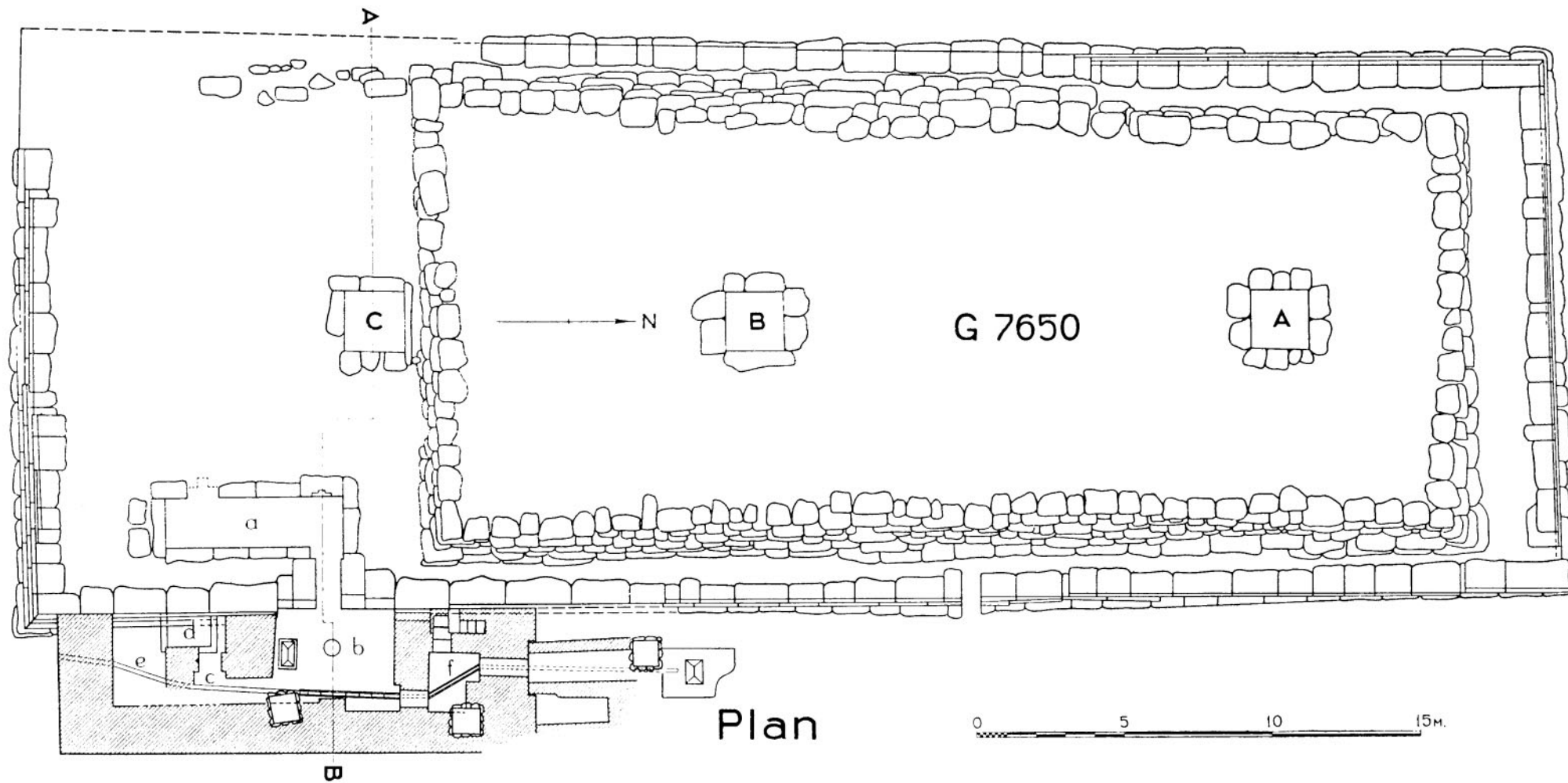


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G 7430. North Chapel

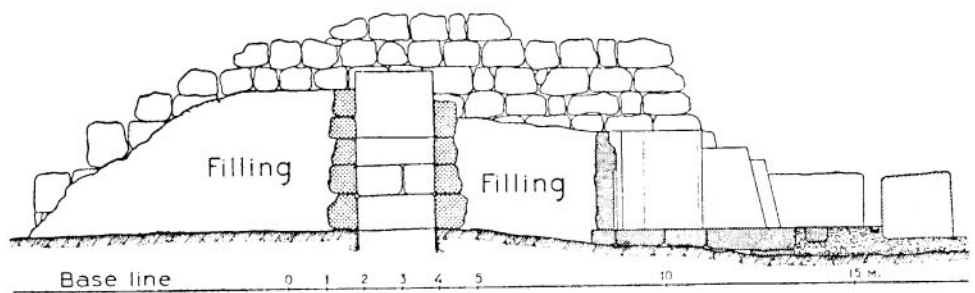
Fig. 7



Section A-B Looking North  
 Fig. 8. G 7510

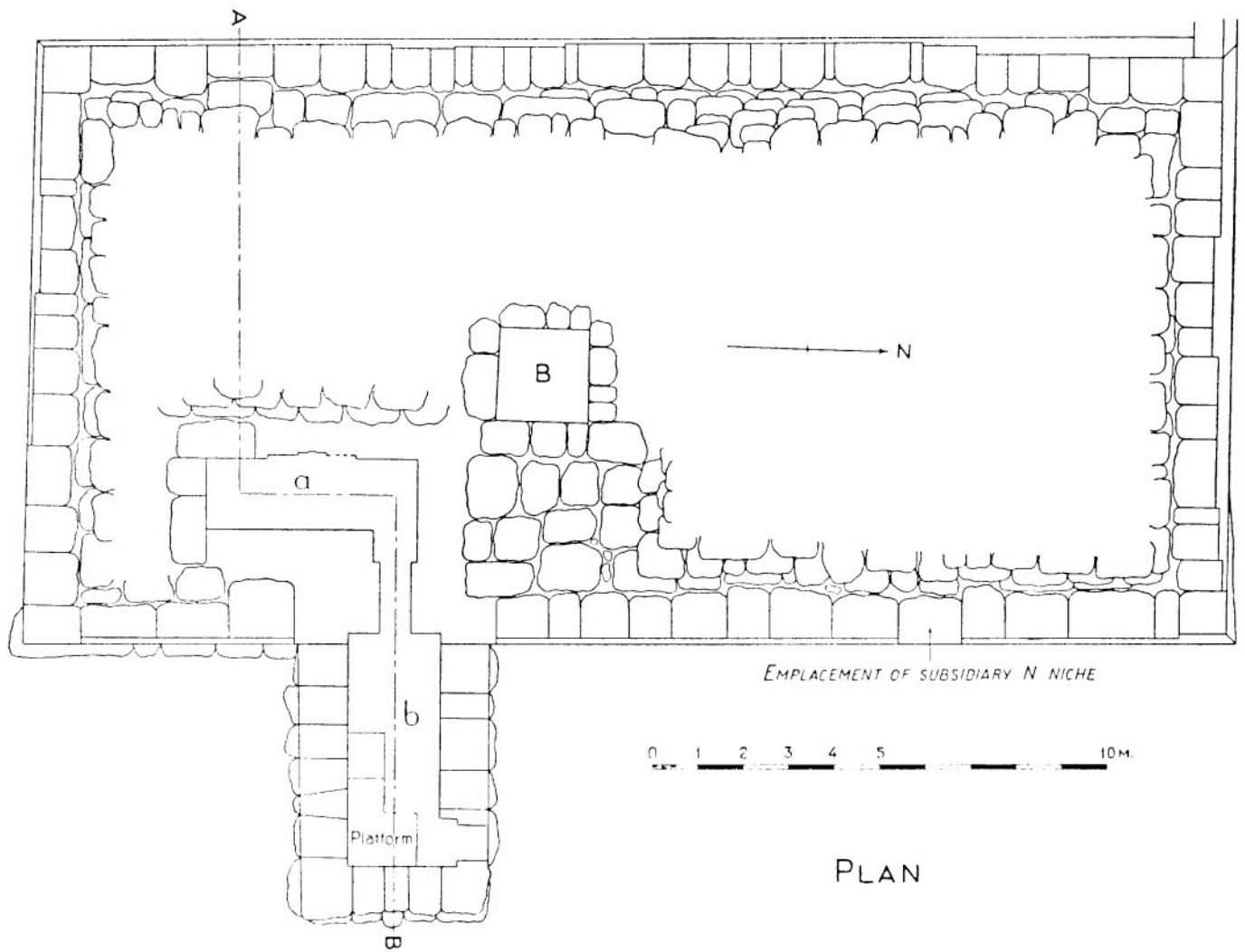


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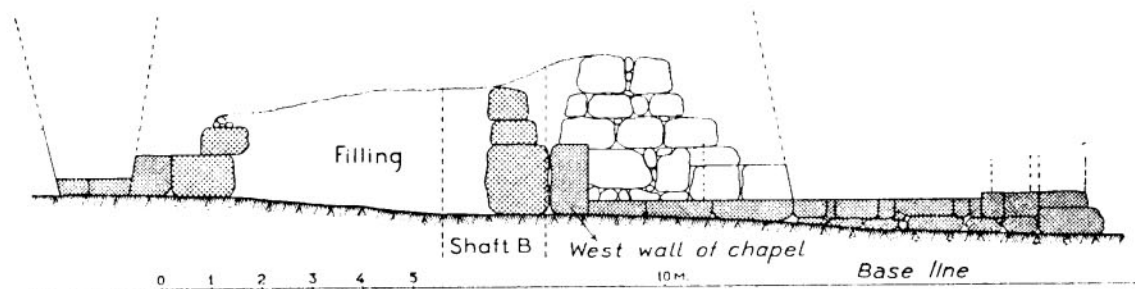


Section A-B Looking North

Fig. 9. G 7650



PLAN



G 7050 Section A-B Looking North

Fig. 10. G 7050

VI d: as VI b, built of rubble-faced core-work plastered with mud; no examples.

VI e: like VI b, built with retaining walls of c.b., or rubble core cased on one or more faces with c.b., or solid c.b. mastaba; G 1457 (Fig. 12).

(7) Type VII: filled mastaba or core-mastaba with interior chapel of type (4).

VII a: constructed of large nummulitic blocks as VI a; G 1031.

VII b: constructed of z-masonry, as VI b; G 1020 (Fig. 13).

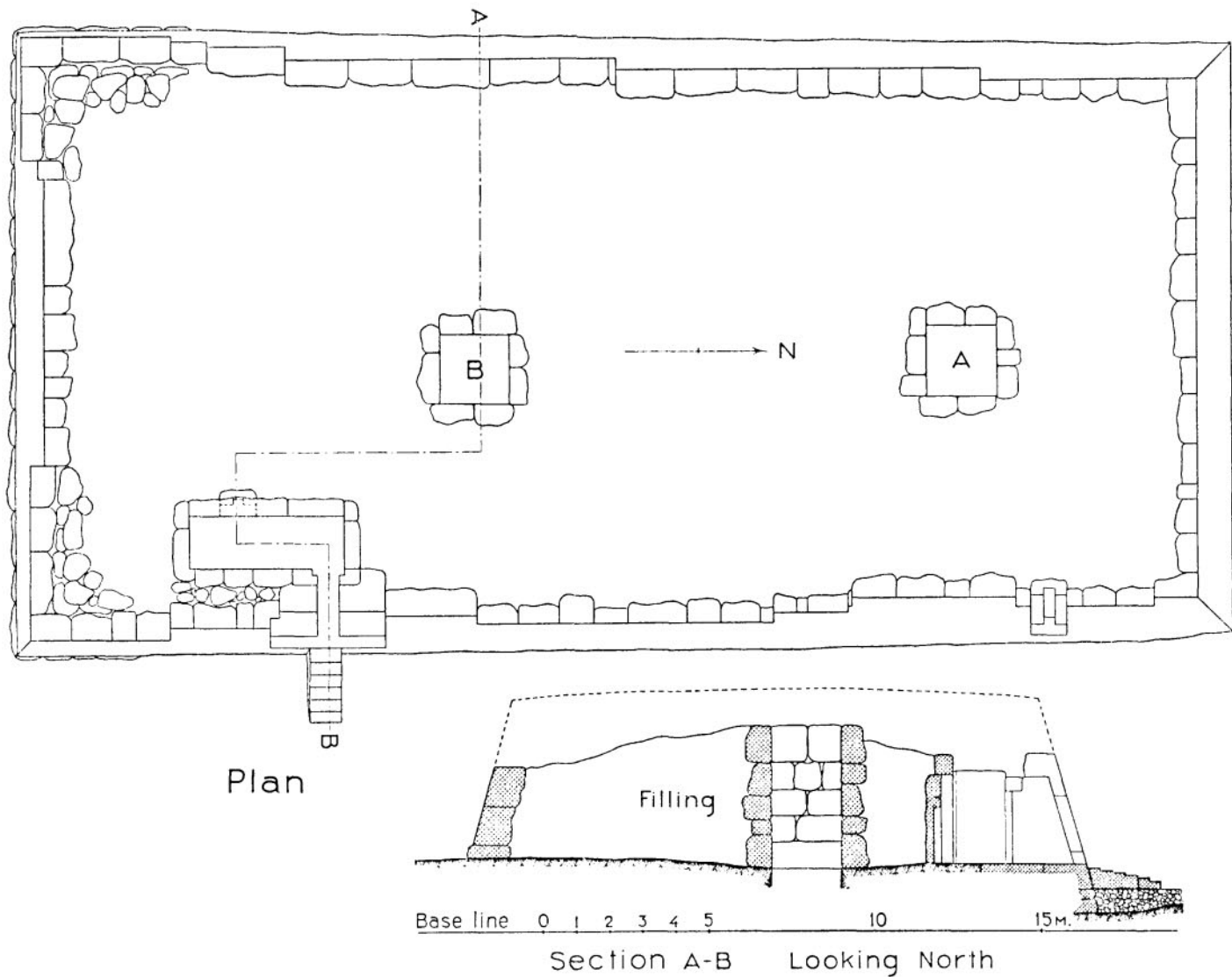


Fig. 11. G 7550

VII c: constructed of u- or zu-masonry, as VI c; no example.

VII d: constructed of rubble-faced core-work, as VI d; no example.

VII e: constructed of c.b. as VI e.

(8) Type VIII: with interior chapel of type (5), (6), or (7).

VIII a: built of nummulitic blocks of grey stone.

VIII b: built of z-masonry; G 1151.

VIII c: built of u- or zu-masonry; G 1029, G 1047 (Figs. 14, 15).

VIII d: built of rubble-faced core-work; no examples.

VIII e: built of c.b.

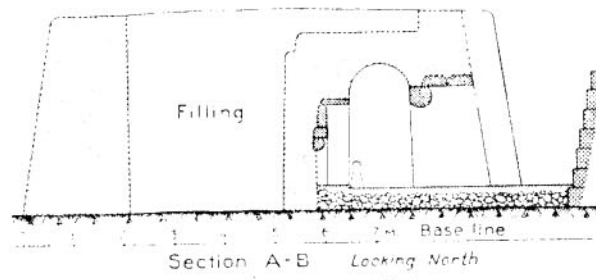
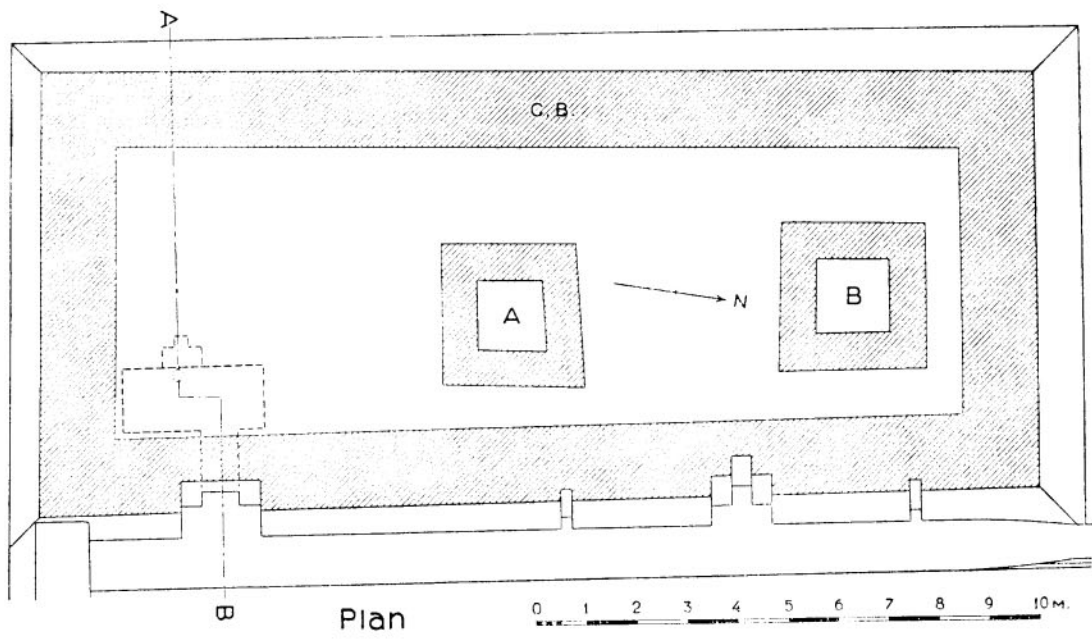


Fig. 12. G 1457

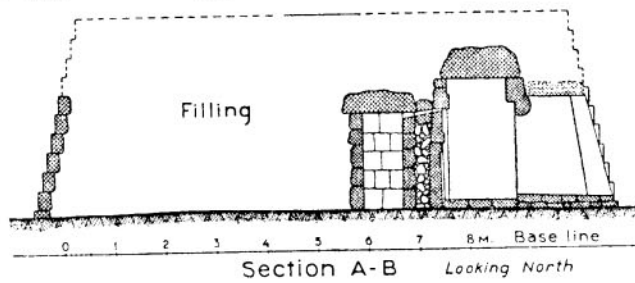
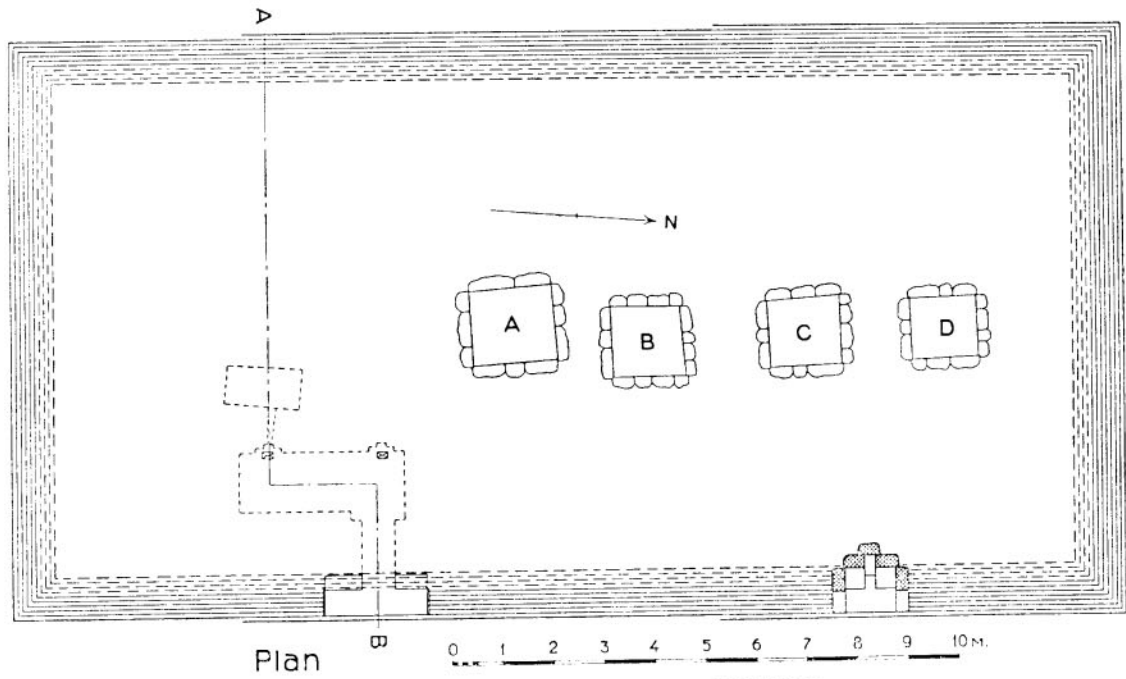
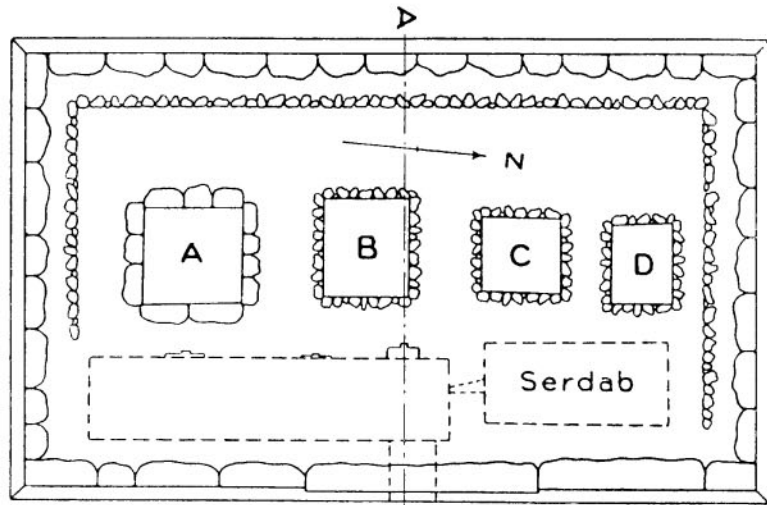
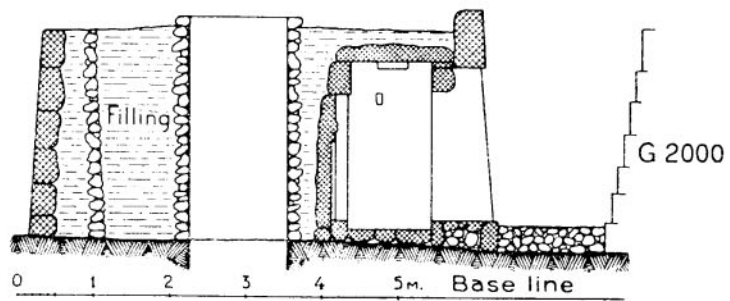


Fig. 13. G 1020



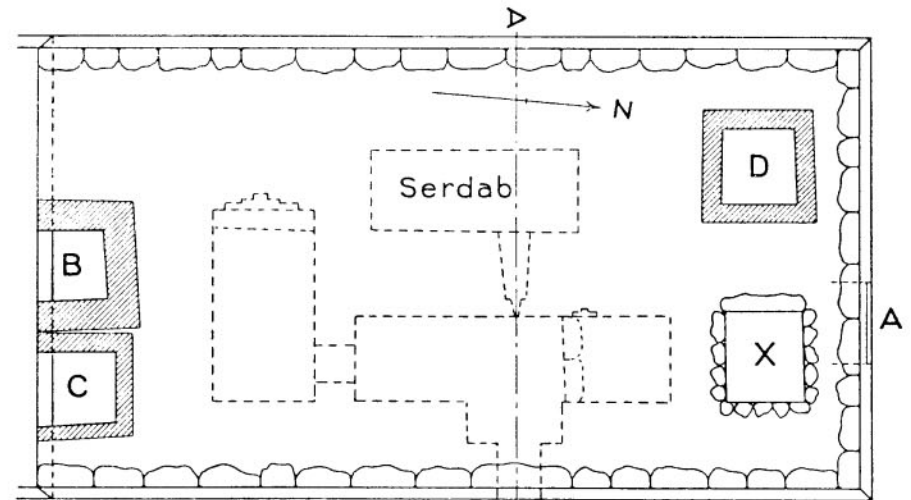
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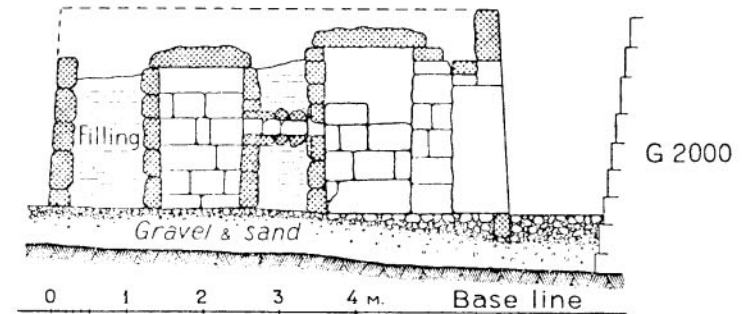
Section A-B Looking North

Fig. 14. G 1029



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Section A-B Looking North

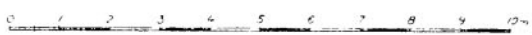
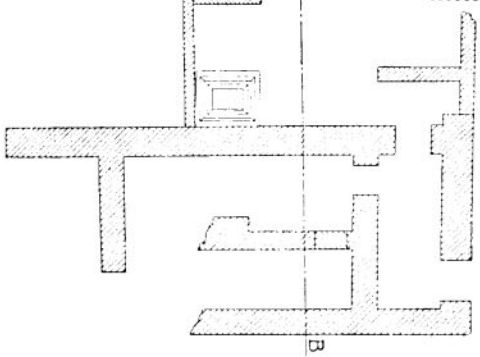
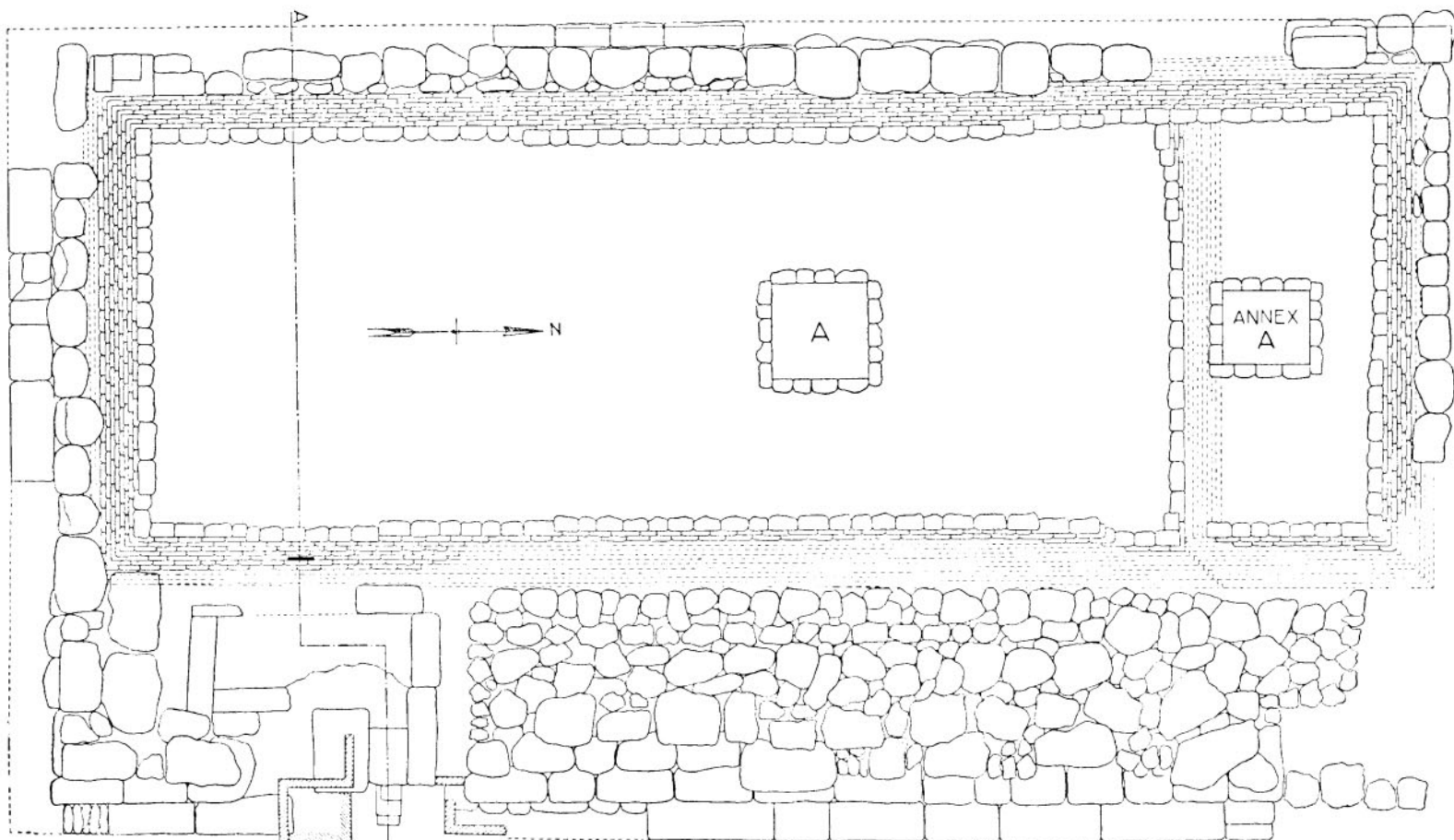
Fig. 15. G 1047

- (9) Type IX: with exterior chapels of type (8).  
 IX a: built of grey nummulitic slabs; G 5230.  
 IX b: built of z-masonry.  
 IX c: built of z- or zu-masonry.  
 IX d: built of rubble-faced core-work.  
 IX e: built of c.b.
- (10) Type X: mastaba with niches and open-air chapel; chapel type (9 a, b, or c).  
 X a: built of grey nummulitic blocks.  
 X b: built of z-masonry.  
 X c: built of u- or zu-masonry.  
 X d: built of rubble, plastered with mud.  
 X e: built of c.b.
- (11) Type XI: mastaba with no niches preserved, with exterior open-air chapel type (9 d).  
 XI a: built of grey nummulitic blocks.  
 XI b: built of z-masonry.  
 XI c: built of u- or zu-masonry.  
 XI d: built of rubble, plastered with mud.  
 XI e: built of c.b.

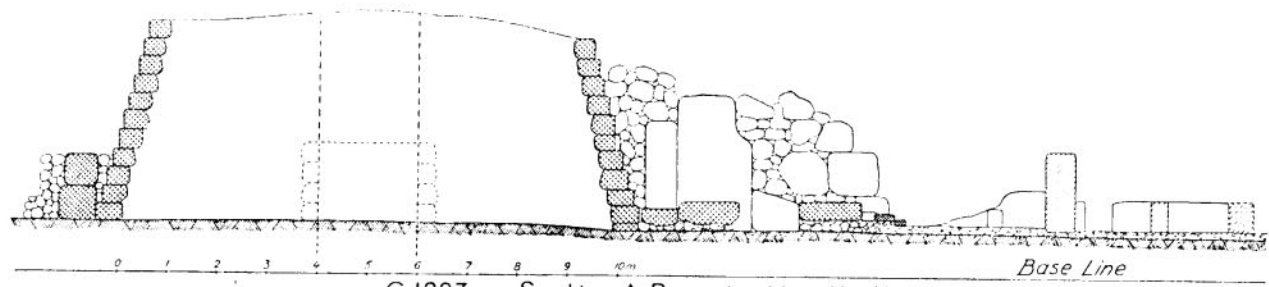
These types of cores (types I–VI) bear in themselves certain evidence as to their chronological order. The enlargement of core types I a and I b with additional core-work of type IV iii is decisive as to the order of those types (Fig. 16). The existence of types IV i, ii, and iii with the evidence of the addition of type IV iii to type IV ii in Cem. G 7000 proves clearly the order of these three subtypes. The use of low-stepped courses of small stones as the facing or retaining walls of types II a, II b, and III draws these three types into one group, for the stone and the construction of the stepped facing walls are clearly similar and are not found outside the Western Cemetery of Chcops (except G 7410 + 20, of type III). The use of the massive core-work in types III and IV draws these two types together.

All the cores in the Cems. G 1200, G 4000, and G 2100 have one 2-m. shaft except G 2100, G 4000, G 4860, and G 2150. The mastabas with two shafts are derived from twin-mastabas for husband and wife. Four of the one-shaft mastabas of types II a and III have an annex built against the north end to contain the burial-shaft of the lesser member of the pair (husband or wife), a modification of the twin-mastaba type. The two-shaft mastaba arose without doubt out of the twin-mastaba. The earliest examples at Giza, apart from the mastabas with annexes, were the eight twin-mastabas of Cem. G 7000. As reconstructed, the cores of these northern four consisted each of two original cores of type IV i, joined with massive masonry and remodelled with two recesses for two interior chapels (man and wife). The shafts as originally planned appear to have been one shaft cased through the filling in each of the original cores of type IV i. This shaft was just north of the place of the offering-chapel in the axis of the core, that is, shaft B in G 7110–7410 and shaft B in G 7120–7420. The B shafts of the northern part of the four twin-mastabas were those actually finished and used for burials as far as they were used (not used in G 7110). The B shaft in the man's part was never used, but when the two old cores were joined up to form the core of each twin-mastaba, a new shaft was constructed and used north of B shaft. This is the A shaft. The position of the burial-shaft was probably due to a shift in the position of the chapel. The old core had been intended for an exterior chapel close to its southern end. When the twin core was constructed and the new interior chapel built farther north, the new shaft was made in the proper relative position to the new chapel. The chapel of the wife's part was shifted a little to





G 1223.  
 MASTABA TYPE II $\alpha$ +N-iii  
 SHAFT TYPE 1b x  
 CHAPEL TYPE (3a) + (1f)



G 1223 Section A-B Looking North

Fig. 16

the south, and thus the old B shaft in the wife's part was left in a proper relative position and therefore used. The A shaft was not constructed except in G 7110, and that never finished. No A shaft was constructed in the northern part of the other three twin-mastabas.

Each of the four southern twin-mastabas had two large shafts both in the original core of the old nucleus cemetery. Added south of this was a large block of massive core-work (type IV iii) with recess for the southern chapel, and containing no shaft (Fig. 17). These mastabas were obviously designed as two-shaft mastabas and enlarged after the construction of the shafts. The peculiar character of the southern twin-mastabas was due apparently to the later date at which they were finished. It will be remembered that only one of them (G 7130+40) was finished with the fine white casing and the two interior chapels which mark the four northern twin-mastabas.

#### LIST OF ONE-SHAFT MASTABAS:

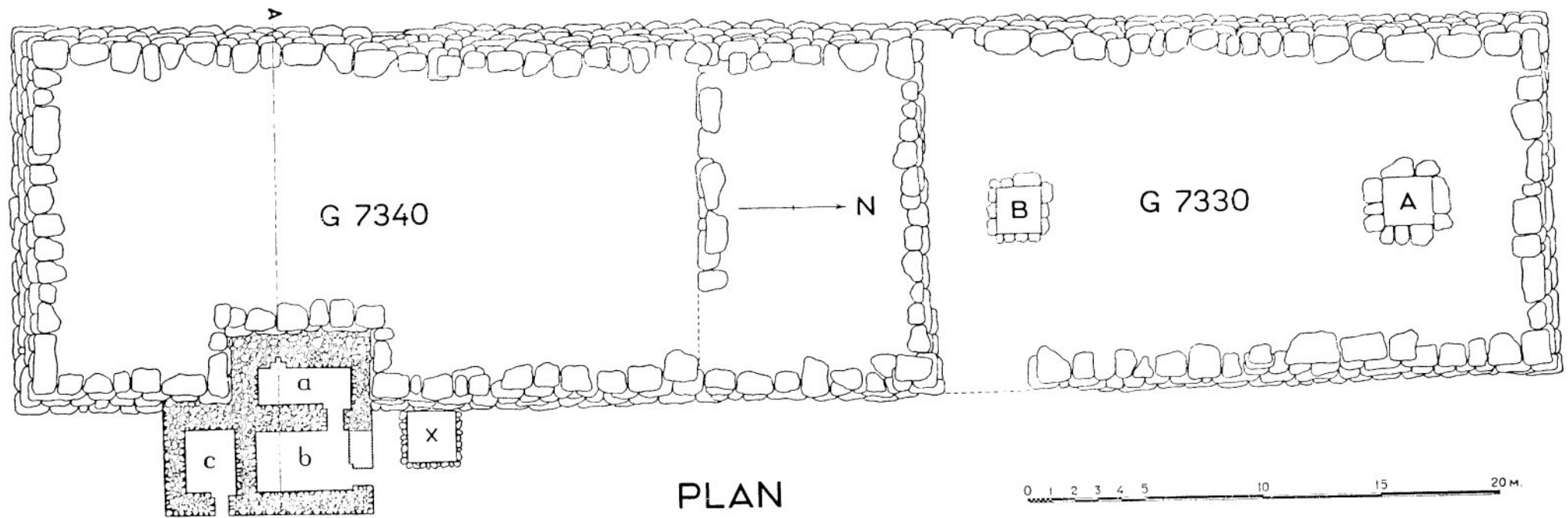
- G 1203, 1205, 1207, 1209, 1227, 1233, 1235; type II a.
- G 1201, 1223, 1225; type II a+IV iii.
- G 2110, 2120, 2135, 2140, 2155, 2160, and 2170; type II a.
- G 2130; type II b.
- G 4160, 4260, 4250; type II b.
- G 4150; type II b+IV iii.
- G 4350, 4140; type III.
- G 2000; type III ii; one shaft but designed for two shafts.
- G 4360-4760, 4450-4850, 4240, 4340, 4540-4840, 4330-4830, 4320-4820, 4310-4710; type IV i.
- In the Échelon Cemetery, G 4970, 4990, 5060, 5160, 5170; type II a.
- Cem. 7000, the 12 original cores; type IV i.
- Cem. G 7000, the 4 northern twin-mastabas as finally used; type IV ii.
- G 7510; probably intended as two-shaft mastaba; type IV iii.
- G 7050; Queen Nefert-kauw; type V.
- G 7690; type IV iii.
- G 5110; type IV iii.
- G 5210; type IX a (1).
- G 2210; type II a+IV iii.

#### LIST OF TWO- AND THREE-SHAFT MASTABAS:

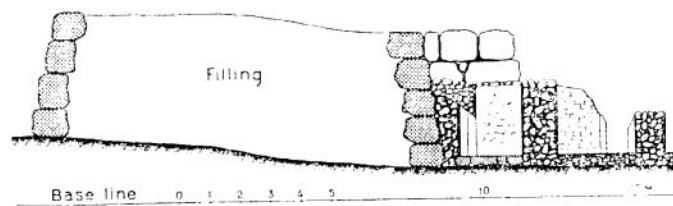
- G 4000; type II b+IV iii; originally one shaft with unfinished S shaft added as afterthought.
- G 4860; type II a; on north, 2-m. shaft on south smaller shaft.
- G 2100; 3 shafts; two shafts made later; type II a.
- G 2150; type II a: 1 2-m. shaft; altered to type VII b with smaller shaft added on south.
- G 2220; 3 pits (?); type IV iii.

The above seven mastabas, excepting G 4860, were planned as 1-shaft mastabas.

- G 4910-4940, 4950-4960 (?), 4980, 5010-5050, 5070, 5080 (3 pits), 5090, 5130, 5140, 5150 (3 pits), 5180, 5190; type II a.
- Cem. G 7000: southern row of 4 twin-mastabas; appear to have two shafts in the northern part; type IV ii+IV iii.
- Cem. G 7000: 7650; type IV iv; 3 pits (1 unfinished).
- G 7450; type IV iii; one shaft unfinished.
- G 7350: 3 pits; type IV iii; two shafts, one shaft unfinished.



PLAN



Section A-B Looking North

Fig. 17. G 7330 + G 7340

G 7060, 7070, 7550, 7660, 7760, 7750, 7810, 7820 (?); type VI; two shafts.

G 7670; type VI; two shafts.

G 5230; type IX; two shafts.

Most of the cores in Cem. G I S.

In Dyns. V and VI the multiple-shaft mastaba was in common use, but cases still occurred of 1-shaft mastabas. In the nucleus cemeteries the two- or three-shaft mastaba was introduced after the reign of Cheops.

The mastaba-cores of the Échelon Cemetery with a few exceptions have two shafts, and also all cores of type IV iii and type VI. It is obvious that the two-shaft type, except in twin-mastabas, is later than the one-shaft type.

Taking all the factors so far described, the order of the types of cores would appear to be as follows:

- (a) Types II a and II b of the one 2-m. shaft type.
- (b) Cores of type III, with one 2-m. shaft.
- (c) Cores of type IV i, with one 2-m. shaft.
- (d) Mastabas of type IV iii, with two shafts.
- (e) Cores of type II a, of poor stone with two burial-shafts.
- (f) Mastabas of type VI, with two or more shafts.

### 3. THE SIZES OF THE CORES AND THE WIDTH OF THE STREETS

#### a. The Sizes of the Cores

The beginning of the Giza Necropolis is represented by the mastaba cores of the five nucleus cemeteries. In the examination of these nucleus cemeteries it is necessary first of all to determine the relative sizes of the original cores and the width of the streets and avenues which separate them. The measurements which I use are those taken on the foundation-line of the cores. These are subject to individual variations owing to the slope of the rock-surface. The ancient Egyptian masons measured on a fixed base-line (*nfrw*), on which they co-ordinated the measurements of the mastabas of each group, but these base-lines are not now determinable. It may be assumed that the foundation measurements of the mastabas are a little greater than the *nfrw* measurements of the block in which they occur. There are also variations in the width of the cores, due apparently to arbitrary departures from the plan on the part of the masons.

The following table gives the mean measurements of the original cores of the four western cemeteries, excluding four mastabas of unusually large size, two mastabas of smaller size, and two mastabas of type III i (see below):

	N-S	E-W	Prop.	Area
Cem. G 1200: 9 mastabas, type II a . . . .	23·9	10·5	1/2·3	251 sq. m.
G 1203, 1205, 1207, 1209, 1223,				
G 1225, 1227, 1233, 1235.				
Cem. G 2100: 7 mastabas, type II a . . . .	24·0	10·87	1/2·2	261·21 sq. m.
G 2135, 2140, 2150, 2155, 2160,				
G 2170, 2210.				
Cem. G 4000: 4 mastabas, type II b . . . .	23·4	9·8	1/2·05	230 sq. m.
G 4150, 4160, 4250, 4260.				

	N-S	E-W	Prop.	Area
Cem. G 4000: 34 mastabas, type IV i . . . . .	23·4	9·9	1/2·05	231 sq. m.
G 4360-4760, 4450-4850, 4240-4840,				
G 4330-4830, 4320-4820, 4310-4710.				
Cem. G 4000: 1 mastaba, type II b . . . . .	24·4	11·2	1/2·2	279 sq. m.
G 4860.				
Échelon Cem.: 25 mastabas, type II a . . . . .	23·5	10·4	1/2·3	244 sq. m.

Leaving out the two mastabas (G 4350 and 4140) of type III i, the mean for the remaining eighty mastabas is 23·5 × 10·22, 1/2·17, 240·5 sq. m. This final mean of eighty mastabas of three different types presents an approximation of the size on which all these mastabas were laid out. It is obviously not the exact size as measured on the *nfrw* base-line, but it proves without doubt that all these mastabas were designed to the same size. In the absence of the *nfrw* measurements, I am obliged to take the mean measurements as the nearest attainable approximation, and I designate it as the size of the normal mastaba core of the Western Cemeteries.

The two mastabas of type III i consist of a massive core similar to IV i, but faced with a stepped wall of small stones similar in appearance to the retaining wall of types II a and II b. The measurements of these two mastabas are as follows:

G 4350: massive core . . . . .	22·4	9·2	1/2·4	206·0 sq. m.
faced core . . . . .	25·2	11·6	1/2·2	292·3 sq. m.
G 4140: massive core . . . . .	22·55	9·6	1/2·35	216·48 sq. m.
faced core including annex . . . . .	29·4	11·45	1/2·57	336·63 sq. m.

A comparison of these measurements with those of the adjacent massive cores of type IV i indicates that the massive core of G 4350 was built smaller with the intention of facing it with the small-stepped masonry, but by a natural miscalculation of the width of the facing the faced core was slightly wider than the adjacent cores. In the case of G 4140 the massive core is not smaller than the other cores of the same row, while the faced core is larger. It is probable, therefore, that in this case the facing was added to improve the massive core. The slab-stela was set in the facing and a casing of white limestone of type y had been begun. It is possible that the cores in row 4 immediately east of G 4140, which are also of small size, were intended to receive a facing like that of G 4140 which was never carried out.

In addition to the 80 mastabas of normal size there are 7 mastabas which depart from the norm, 5 larger and 2 smaller. The measurements of these 7 mastabas are as follows:

(1) G 1201	38·8 × 17·2	1/2·1	667 sq. m.	type II a
(2) G 2000	104·8 × 52·8	1/2·0	5,533·0 sq. m.	type III ii
(3) G 2100	21·6 × 12·0	1/1·8	259 sq. m.	type II a
(4) G 2110	21·6 × 12·0	1/1·8	259 sq. m.	type II a
(5) G 2130	31·2 × 12·8	1/2·43	399·36 sq. m.	type II b
(6) G 2120	28·0 × 12·4	1/2·25	347·2 sq. m.	type II a
(7) G 4000	47·2 × 24·0	1/2·3	963 sq. m.	type II b

These departures from the normal have a significance which will be considered in dealing with the grouping of the mastabas.

Turning to the later cemetery of more important tombs east of the Cheops pyramid, a marked increase in the normal size is to be noted. The twelve original cores, which were afterwards

incorporated in the eight twin-mastabas, the tombs of the important children of Cheops, are here given in detail:

Mastaba	N-S	E-W	Prop.	Area	Type
G 7110	36.5	17.25	1/2.11	629.62 sq. m.	IV i
G 7210	36.0	17.0	1/2.11	616 sq. m.	IV i
G 7310	35.0	16.5	1/2.12	577 sq. m.	IV i
G 7410	34.5	15.0	1/2.3	518 sq. m.	IV i
G 7120	36.5	17.5	1/2.08	638.75 sq. m.	IV i
G 7220	36.0	17.0	1/2.11	616 sq. m.	IV i
G 7320	35.0	16.5	1/2.12	577 sq. m.	IV i
G 7420	36.3	15.6	1/2.3	566 sq. m.	IV i
G 7130	37.0	17.4	1/2.1	644 sq. m.	IV i
G 7230	36.5	15.25	1/2.39	456.62 sq. m.	IV i
G 7330	36.0	16.0 (?)	1/2.2	576 sq. m.	IV i
G 7430	35.8	15.0	1/2.4	537 sq. m.	IV i

The mean measurements of these twelve cores are:

$$35.93 \times 16.25 \quad 1/2.19 \quad 579.59 \text{ sq. m.}$$

The slope of the ground towards the SE results in an increase in size in the southern row over the *nfrw* size as originally planned. The mean is, therefore, undoubtedly larger than the *nfrw* measurements of the original plan. The normal size of the twelve original cores built by Cheops in the Eastern Cemetery presents a doubling of the area of the normal mastaba of the Western Cemetery. This increase did not, however, satisfy the desire for ostentation manifested in the latter part of the reign of Cheops; and the eight northern cores were incorporated in the four very long, narrow twin-mastabas. The measurements of the cores of these twin-mastabas are as follows:

Northern row: type IV i altered to type IV ii:

G 7110+7120	79.8	14.3	1/5.6	1,141 sq. m.	
G 7210+7220	79.5	14.5	1/5.5	1,153 sq. m.	
G 7310+7320	79.2	13.6	1/5.8	1,077 sq. m.	
G 7410+7420	80.8	15.5	1/5.2	1,252 sq. m.	type III ii
Average	79.8	14.5	1/5.5	1,156 sq. m.	

These four northern mastabas were finished as twin-mastabas with two burial-shafts. The southern part containing the husband's shaft had an interior chapel and a subsidiary northern niche. The northern part, containing the wife's shaft, was also finished with interior chapel and subsidiary niche. The measurements of the cores cannot, therefore, be compared with the measurements of the normal one-shaft mastaba in either the Western or the Eastern Cemetery. The southern row of original cores had been increased in size by the addition of core-work of type IV iii, and the mastabas were slightly shorter, as follows:

G 7130+7140	65.5	17.4	1/3.8	1,140 sq. m.
G 7230+7240	66.5	16.3	1/4.0	1,084 sq. m.
G 7330+7340	63.5	15.5	1/4.1	984 sq. m.
G 7430+7440	64.8	15.5	1/4.2	1,004 sq. m.
Average	65.1	16.2	1/4.0	1,053 sq. m.

These twin cores are more irregular in size than those of the northern row, and G 7330+7340 is certainly more carelessly measured and built than the first two or the last.

The above measurements give the sizes and proportions of all the mastaba-cores contained in the five nucleus cemeteries, which I call the Cheops cemeteries because they were either built by that king or on the lines established during his reign. The examination of the sizes of these cores leads to the following definite conclusions:

- (a) All the cores in the Western Field, except 7, were built on a fixed normal size which is approximately  $23.5 \times 10.22$ , prop.  $1/2.17$ , area 240.5 sq. m.: the significance of this normal size is emphasized by the fact that it includes 80 out of 87 cores and that these 87 cores present all the types of cores (II a, II b, III, and IV i) observed in these nucleus cemeteries.
- (b) The 7 mastabas of abnormal size all lie outside the blocks arranged in rows and lines, but 6 of them are clearly attached to blocks of cores. The seventh core (G 2000) stands alone. Three of the larger mastabas and one smaller mastaba are known to have been the tombs of royal children.
- (c) The 12 original cores in the Eastern Field were of twice the size of the Western norm:  $35.05 \times 15.04$ , prop.  $1/2.35$ , area 530.16 sq. m. This exact size does not appear in any other cores of the Eastern and Western Fields, but a slightly larger core used in mastabas later than Cheops is obviously based on this size.
- (d) The cores of the 8 twin-mastabas of the Eastern Field fall into 2 rows of 4 mastabas each. The northern row includes in each twin core 2 of the original cores joined by massive masonry, and the cores are therefore of larger size and different proportions:  $83.0 \times 20.0$ , prop.  $1/4.2$ , area 1,660 sq. m. The southern row of 4 includes, in each, 1 of the original 12 cores and a large addition of massive core-work, and these cores are a little shorter:  $68.0 \times 18.4$ , prop.  $1/3.7$ , area 1,251 sq. m.

The chief fact to be remembered is that the cores of the Western Field present a norm smaller than that used in the twelve original cores of the Eastern Field. Both of these normal sizes were established by cores built in the reign of Cheops, and the smaller norm was established for the Western Cemetery some time before the larger norm was set up in the Eastern Field. The change indicates clearly that the whole Eastern Cemetery was planned for persons more important than those buried in the Western Cemetery.

Keeping these two normal sizes in mind, we may now examine the core-mastabas lying outside the nucleus cemetery. The five massive cores constructed in the Eastern Field, east and south of the nucleus cemetery of twin-mastabas, have the following sizes:

G 7510	101 × 52.0	1/2.0	5,278 sq. m.	type IV iii
G 7650	36.5 × 15.5	1/2.4	565 sq. m.	type IV (with addition of filled casing on south)
Completed mastaba	52.0 × 18.0	1/2.8	936 sq. m.	type IV iv
G 7530+40	36.5 × 16.0	1/2.3	574 sq. m.	type IV iii
Completed mastaba	49.0 × 20.0	1/2.4	980 sq. m.	type IV iv; shifted southwards
G 7450	50.8 × 18.0	1/2.8	914.4 sq. m.	type IV iii
G 7350	51.75 × 17.25	1/3	892.68 sq. m.	type IV iii
Completed mastaba	55.0 × 22.5	1/2.4	1,238 sq. m.	type IV iii

The core G 7510 is the largest in the Eastern Field and of about the same size as the largest core in the Western Field. The two cores, G 7650 and 7530+40, which were of about the same size, were built on the norm of the twelve original cores of the Eastern Field. The other two cores,

G 7450 and G 7350, have been lengthened in construction and so present a greater area and different proportions.

It is of interest at this point to follow out the influence of the larger normal size of the Eastern Cemetery in the sizes and proportions of the filled nummulitic mastabas built for members of the Cheops family in continuation of the nucleus cemetery. These mastabas are six in number, with the following measurements:

G 7750	36.0 × 18.5	1/2.0	666 sq. m.	type VI a
G 7760	52.0 × 18.0	1/2.9	936 sq. m.	type VI a
G 7660	36.5 × 18.5	1/2.0	638 sq. m.	type VI a
G 7550	37.0 × 18.0	1/2.0	666 sq. m.	type VI a
G 7810	38.5 × 19.5	1/2	750.75 sq. m.	type VI a
Zaty				
G 7820	43.0 × 24.0	1/1.8	1,032 sq. m.	type VI a
Iy-nefer...				

Four of these mastabas are approximately of the same size as the original twelve cores of the Eastern Cemetery. Another (G 7760) (52 × 15 m.) is about the same size as the two massive cores G 7450 and G 7350. The Iy-nefer... mastaba, G 7820, is of odd size (43 × 24 m.), but this is probably due to the fact that the mastaba is built on sloping ground and the figures may represent *nfrw* measurements similar to those of the four mastabas built on the eastern norm.

In addition to these six mastabas there are three others south of the small pyramid G I-c, which belong to Queen Nefert-kauw, daughter of Sneferuw and a wife of Cheops (?), her son Prince Neferma'at, and her grandson 'Prince' Sneferuw-khaf, G 7050, 7060, and 7070. The queen's mastaba is of peculiar construction. It is a filled mastaba with a retaining wall of white limestone backed by nummulitic blocks, and was constructed course by course and filled in *pari passu* with the construction of the retaining wall. The other two mastabas are of the nummulitic type. It is to be noted that all three of these mastabas approximate in size to the old western norm:

G 7050, white limestone facing (type V)	26.25 × 13.1 m.	1/2.0	343.87 sq. m.
G 7060, nummulitic type VI a	26.25 × 11.9 m.	1/2.2	312.37 sq. m.
G 7070, nummulitic type VI a	26.0 × 12.85 m.	1/2.02	334.1 sq. m.

These three mastabas, which form a family group, were obviously built one after the other on the western norm adopted for the queen's mastaba (G 7050).

The other mastabas in this cemetery are later in date and built one by one according to specifications laid down by the owner. Any relation they may show to the eastern norm is therefore fortuitous.

In the Western Field the later mastabas fall into three divisions: those made by casing old cores of the nucleus cemeteries, those in the streets, and those outlying on independent sites. The mastabas built around old cores show necessarily measurements larger than those of the cores and often considerable increase in length. The mastabas in the streets are of odd sizes, usually adapted to the space available. The outlying mastabas on independent sites are three in number and their sizes are instructive:

G 5110, core type IV iii	. . .	48.0 × 22.4	1/2.1	1,075 sq. m.	
cased mastaba	. . .	51.5 × 24.5	1/2.1	1,261.75 sq. m.	height 6.85 m.