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A Reconstruction of the Basilica of Constantine in the Roman Forum*

Part I

Location and Exterior

In 307 A.D. a great fire destroyed the temple of Venus and Rome and the building along the Via Sacra,[1] giving the Emperor Maxentius[2] an opportunity to re-construct and re-adorn this section. He rebuilt the temple according to the earlier plan but replaced the warehouses for oriental products which stood at the north of the Via Sacra[3] by a monumental basilica,[4] the ruins of which still dominate this part of the city. (Figure 1.)

The building extended along the Via Sacra which formed its southern limit, from the side street which ran north along the side of the so-called *Templum Sacrae Urbis,* to the open space in front of the temple of Venus and Rome. At the north, the basilica adjoined the side wall of one of the buildings of Nero's golden house[5] between which and the basilica a street passed so that the latter was isolated on all sides. (Figure 2.)

Plan

As designed by the architect of Maxentius and before the changes, which will be described later, were made, the main hall of the building had the plan of a Roman Civil basilica. (Plate I.)

It consisted of a nave flanked by aisles and was entered

* The writers wish to acknowledge their indebtedness to Senator Lanciani for the use of his notes and photographs of the earlier excavations to the authorities of the Uffizi at Florence and the Kunstgewerbemuseum in Berlin for placing early drawings at their disposal, to Dr. Ashby of the British School in Rome, and to Director Stevens and the other authorities of the American Academy for suggestions and criticism.

[1] Chronica Minora I, Ed. Mommsen, p. 148.

[2] Maxentius restored Rome to the position of capital of the west. Milan had previously been made the capital of the province by Diocletian. Conservator Urbis Suae appears on coins of Maxentius, Cohen, Monnaies, Vol. VII, p. 171. Maxentius, Nos. 48 and 49.

[3] Throughout this paper the conventional orientation for the Forum and adjoining areas is employed, *i.e.,* the Tabularium is described as facing east rather than southeast, and other structures are orientated accordingly.

[4] Chronica Minora I, p. 146.

[5] Lanciani in Mélanges, 1891, p. 763, also plate III; Nibby, Roma Antica I, p. 51. Canina, Indicator, p. 77.

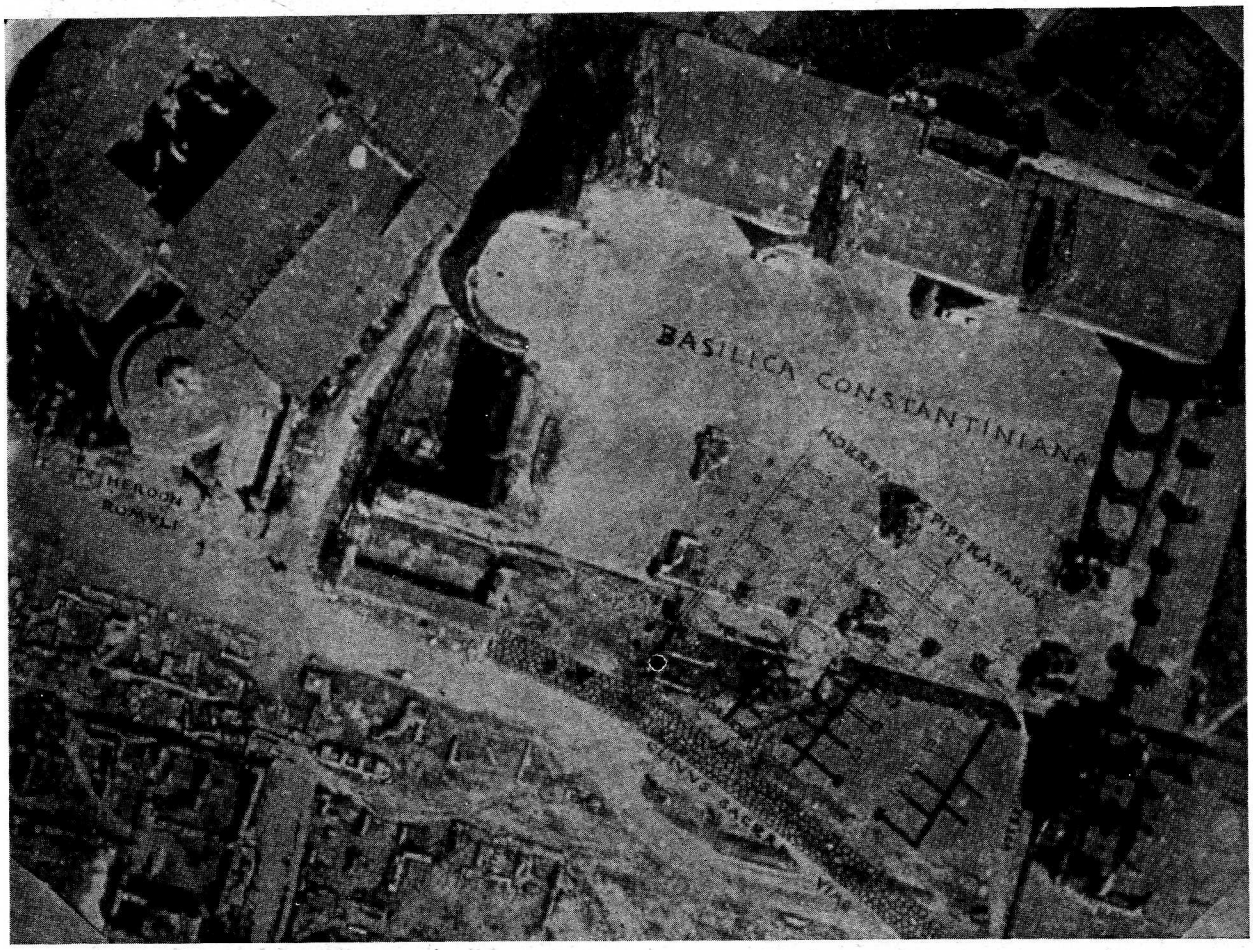

Fig. 1.—Photograph of Basilica From an Airship
Kindness of Senator Lanciani

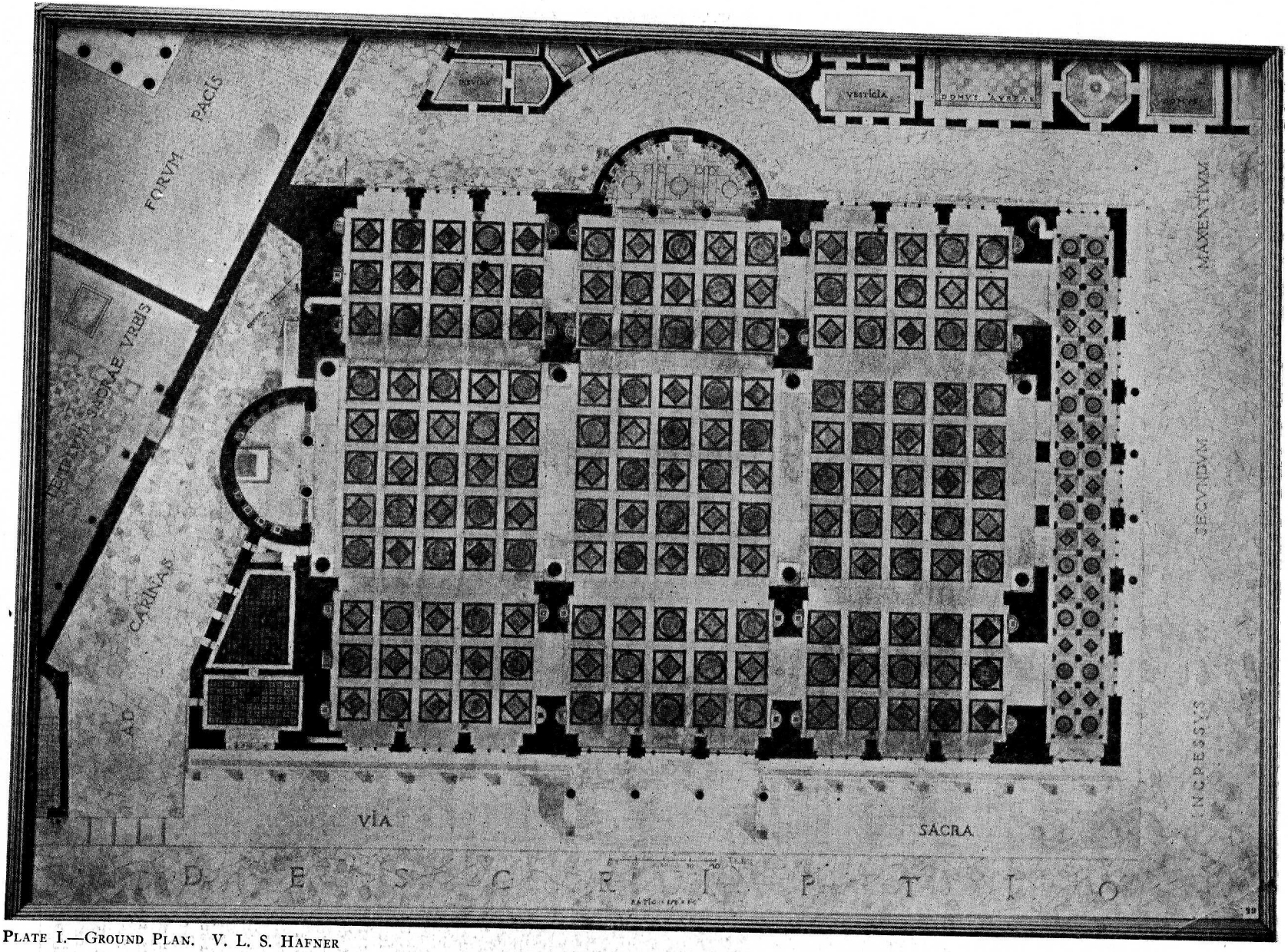

PLATE I.—GROUND PLAN. V. L. S. HAFNER

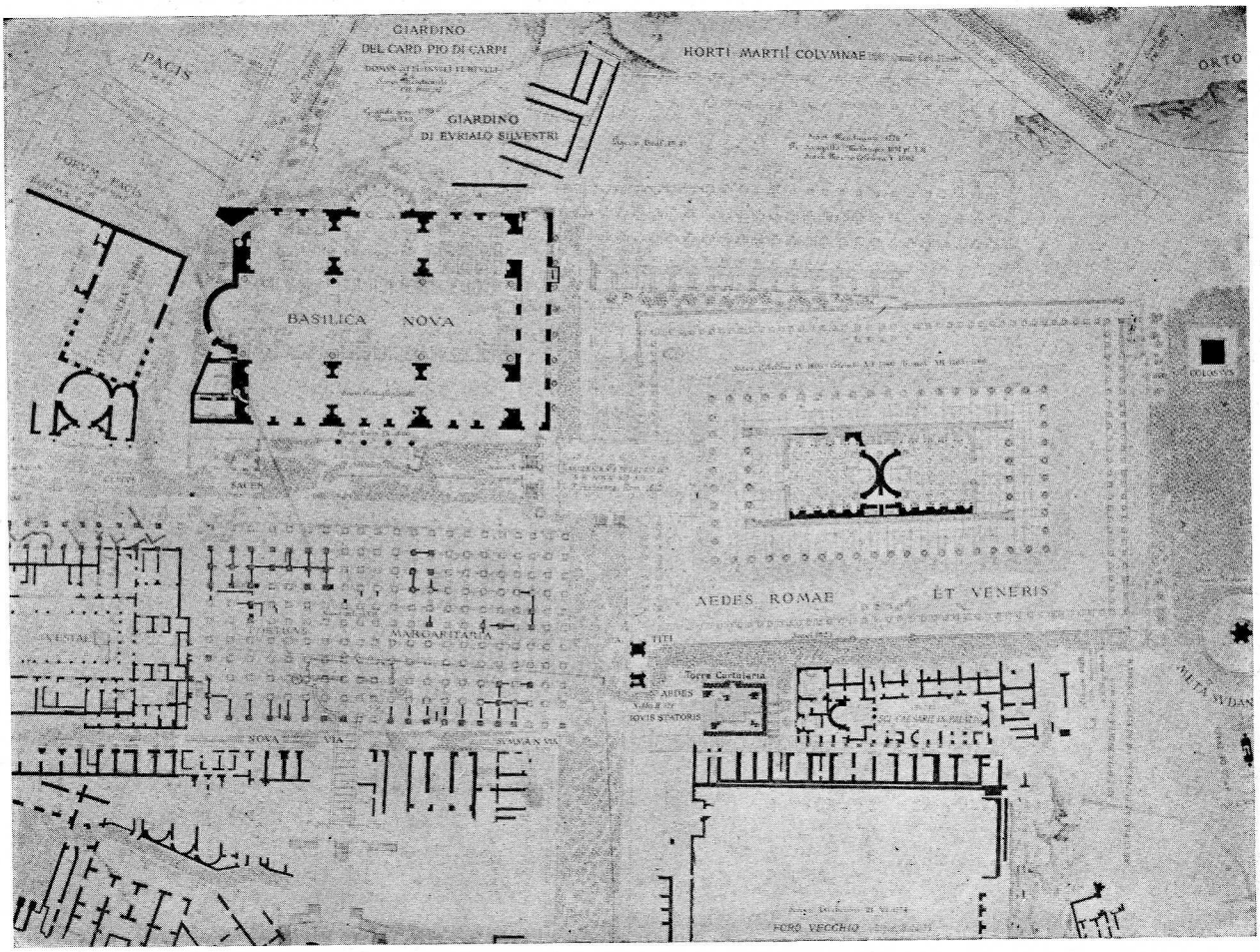

FIG. 2.—GENERAL PLAN OF THE EAST END OF THE FORUM AFTER HUELSEN

from a narthex which extended across the east end opposite the temple of Venus and Rome. The nave, which terminated in an apse fifty-seven feet in diameter, measured two hundred and eighty by eighty-one feet nine inches, wall to wall, with a height of one hundred and twenty-six feet. The aisles were fifty-two feet wide and seventy-nine feet high. The narthex, twenty-three and a half feet deep, was thirty-six feet high. The entire building covered a surface of about one and one-fifth acres, or about twice the area of the central room of the Pennsylvania station in New York.

ELEVATION ON THE VIA SACRA

The south façade of the basilica, as conceived originally by the architect of Maxentius, contributed to form a monumental approach to the temple of Venus and Rome. The retaining wall of the narrow terrace at the south of the basilica is nearly on a line with the north wall of the cella of the temple[6] which was rebuilt according to its earlier foundations. The substructures of the basilica followed the lines of pre-existing walls.[7] The Maxentian level of the Via Sacra was probably not much higher than that of the road which existed just before the fire of 307 A.D. It was undoubtedly widened and repaved by Maxentius. This pavement was discovered in 1882.[8] (Figure 3.)

The stones were worn as if from long use and showed signs of lack of repair. They were removed in 1901[9] to show the earlier line of the Via Sacra which is the road now visible. It dates from the first century B.C. The sides of the road were lined with dedicatory statues, pedestals of which were found in the course of excavations.[10] Probably a much greater number were converted into lime or used in buildings in later periods. The Via Sacra widened into an open space in front of the temple of Venus and Rome, where part of the pavement is still *in situ* in front of the church of Santa Francesca Romana. As the road ascended, it left uncovered a triangular portion of the face of the substructure of the basilica. Probably this was covered with stucco, as

[6] See the Engineer's plan of the Forum and adjoining areas, Section 6.

[7] The pre-Maxentian structures along the Via Sacra have been studied in detail by Dr. E. B. Van Deman. The results of her work will be published in the near future. I wish to acknowledge Dr. Van Deman's help in my study of brick-construction.

[8] Not. Scavi, 1882, p. 216.

[9] Huelsen, R. F., p. 227.

[10] Corpus of Latin Inscriptions VI, 1653, 1663, 1696. Not. Scavi, 1882, p. 219f. Some of the structures mentioned here had probably disappeared by the time of Maxentius.

FIGURE 3.—MAXENTIAN PAVEMENT OF THE VIA SACRA. KINDNESS OF SENATOR LANCIANI

there are no traces in the facing of holes for clamps which would have been required had a veneer of marble been used.

THE TERRACE ALONG THE VIA SACRA

The substructure projected beyond the wall of the basilica for its entire length forming a terrace 7 feet 4 inches wide. Then in the course of construction or soon after, the portion along the central bay, a distance of 66 feet, was widened to 16 feet 4 inches. The absence of bonding at the sides of this projection is apparent. The floor level here is about 6 inches below that of the rest of the platform, as is shown by a step in the layer of tiles which are still *in situ* to a great extent. The terrace could be reached directly at the east, from the square in front of the temple of Venus and Rome.

The end wall of the narthex at the east was balanced at the west by the slightly longer wall of a room adjoining the central hall, formed on the substructures of earlier buildings. This room concealed the lower part of the apse from the Via Sacra. The south façade, with the exception of the extreme ends, rose to a height of 79 feet above the terrace. It was pierced by two tiers of arched windows arranged in groups of three corresponding to the three bays into which the aisle was divided within, except in the center of the lower tier where three doors opening on the terrace took the place of the windows in the side bays. The three main divisions of the façade were carried out above the sloping roof of the aisle by buttresses. These received the side thrust of the three groined vaults which roofed the nave. The clerestory was 47 feet higher than the aisles and admitted light to the interior through three huge lunette windows at each side and one at either end. Each of the aforesaid buttresses is pierced with an arch to lighten the mass and to afford a means of circulation on the roof. Have we here the prototype of the flying buttress? (Figure 4.)

ROOF

The roof was covered with clay tiles, marks of which are visible in the concrete of the fallen portions of the vault. It has been stated[11] that bronze tiles were used as covering. This opinion is derived from a statement in the *Liber Pontificalis*[12] that Pope Honorius took the bronze tiles from the temple of Rome to use for the roof of old St. Peter's. The building mentioned is identified with the basilica; for it is argued that the roof of the temple of Venus and Rome would not have furnished a sufficient number of tiles. Yet there would have been enough if the colonnade which enclosed the temple area were roofed in the same manner. Besides, the wooden beams of the saddle roof of this temple would be more likely to require as protection from the weather a light

[11] Duchesne, Melanges, 1886, pp. 25-27.
[12] Lib. Pont., Vita Honorii, § 119, III.

metal covering, which would be entirely superfluous in the case of a solid concrete vault. Moreover, the measurements of the prints[13] of the tiles in the vault show variants in dimensions incompatible with the care which would have been taken in laying tiles of more expensive material.

The cornice of the roof was formed of travertine brackets, supporting tiles which were covered with mouldings run in stucco. Remains of this cornice are still visible at the east end of the building. Travertine water spouts were embedded in the cornices at the north and south to throw the rain away from the walls. Several of these are now lying on the roof of the north aisle.

Wall Decoration of Outside

The outside of the building was stuccoed in imitation of finished ashlar, part of which was seen on the east face by Nibby, one of the early archæologists.[14] A portion of one rectangle still clings to the fragment of the corner of the building which lies in the forum of Peace. An engraving of Rosini shows how the east face appeared a century ago. The combination of this decoration with a stucco cornice on a tile foundation is also still visible in the nearly contemporary senate house of Diocletian. Renaissance drawings show that this decoration was also employed in the baths which the same emperor constructed.[15] A second cornice of tile and stucco ran above the lower line of windows at the height of the cornice of the single story narthex[16] at the east. It probably joined the cornice of the marble entablature supported by the four porphyry columns which formed a portico above the wide part of the terrace on the south, and extended at the west along the roof of the single story construction which adjoins. The small room at the southwest corner of the basilica, as appears from a careful examination of the bricks, had a single arched window which balanced the door in the end of the narthex at the east. The flat wall which now conceals this arch from the front is a later addition.

At the bottom of the outer wall, just above the terrace, ran a marble base, as is shown by traces of concrete bedding which adhere to the lower part of the wall. This base served the purpose of protecting the stucco from damage by dampness or blows. At the edge of the terrace there must have been a balustrade, perhaps similar to that which stood at the foot of the steps leading to the temple of Venus and Rome, where the groove on which it rested is still discernible in the travertine pavement below the first step. The terrace was paved with marble for which there are traces of bedding on the levelling layer of roof tiles which are still in place to a great extent. The original level was later raised in front of the central bay by a layer of concrete composed largely of marble fragments, some of which are pieces of fluted pilasters. The original pavement was probably relaid at a higher level in this section of the terrace.

[13] The length is about 40 cm. (16 inches), the width varies from 25-35 cm. (10 to 14 inches) between the portions which overlapped.
[14] Roma Antica II, pp. 238-49.
[15] Rivoira, Arch. Rom., p. 243; Lanciani, R. & E., p. 44; Atti dei Lincei, 1883, Plate III; Du Perac, Plate 2, 26, 30.
[16] Not. Scavi, 1879, p. 264; Mélanges, 1891, p. 164.

Figure 4.—Photograph of Buttress

Central Portico

The portico at the center of the terrace was principally a decorative element, although the doors would serve to facilitate the entrance of large crowds and prevent congestion in the narthex. Across the front of the portico were four red porphyry columns with very wide intercolumniations. The axial unit is 17 feet. Architrave blocks of such dimensions were rarely used. The central architrave blocks of the Propylæa at Athens were 17 feet in length.[17] The century preceding Constantine was a period of gigantic structures such, for example, as the temple of Baalbek, the longest architrave blocks of which are ascertained to have measured 17 feet 11 inches.[19]

The capitals of the columns were probably of white marble.[20] Porphyry columns are used with white marble capitals in the Lateran baptistry. The latter were contracted for by Constantine under Pope Silvester but not set up until the time of Pope Xystus (432-440) according to the *Liber Pontificalis*. We have placed a statue above the cornice over each column. Behind the columns, between the windows, were probably pilasters, as there are places for the plinths, which were later removed, in the concrete poured over the original level of the terrace. That this porch was part of the original design is shown by what remains; for the foundations of the columns, torn away by the weight of the falling columns when the building collapsed, or hacked out in the Middle Ages, were embedded in the concrete mass of the substructures.[21] If the columns had been added later, it would not have been necessary to sink foundations in already existing concrete, as the weight which the columns supported was comparatively slight. The holes, left by the removal of the blocks of travertine which formed the original column-foundations, were filled in when the fragments of the columns were set up by the modern restorers.

Windows

The windows were fitted with travertine sills. Some

[17] Praktika Athens Archæological Society, 1909, p. 115.
[19] Schulz und Winnefeld, Baalbek, I p. 66.
[20] Portions of the porphyry shafts were found in 1487, 1819, and 1878; see Not. Scav., 1878, p. 139. The top of the column set up at the west corner of the terrace has a vertical segment cut from it. This might suggest that it was used as a three-quarter engaged column against the wall. Clamp, dowel, and pour channels, however, visible on the upper surface, point to the fact that the column had been broken and restored by clamping on the portion to complete the drum.
[21] Fea. Bas. Const., p. 14, mentions these parts. One is at the right of the core of the steps.

of these were found in the debris and replaced in modern times in the windows made by partially filling in the doors of the central bay. The sills show sockets for the mullions which divided the windows vertically into three equal parts. The outer edges of the window screens were embedded in grooves which can be traced in the brick facing at the sides of the window openings at the east of the south façade. Here also occur at regular intervals the sockets into which the muntins were fitted. This shows that the screens were of heavy material, bronze or marble, which required a firm attachment.[22] In our restoration we have used bronze screens in harmony with the bronze doors, varying the tracery in the panels of each. The large size of the windows led us to adopt this variation rather than a uniform pattern. Varied tracery was used in the screens of the church of Santa Sabina, but these date from the eighth or ninth century and furnish no definite evidence for earlier buildings.[23] In a building of such magnificence we should suppose that the windows were glazed, although an unclosed public building would not have been impossible in ancient Rome, the inhabitants of which were accustomed to endure a greater degree of cold than we generally suppose, holding court out of doors throughout the year and living in unheated and open houses. Glass was used to some extent in windows as early as the time of Caligula in the first century.[24] Fragments of sheets of glass have been found in excavations both in Italy and in Roman provinces of more northern countries. The glass is thicker than the modern product and of a greenish hue. The largest of the plates found measures only 15 inches in width, but, set in the elaborate window screens, these dimensions would have sufficed. The excessive cost of the amount of glass required for the basilica of Constantine makes its use seem unlikely. Probably one of the substitutes, such as selenite or thin plates of marble, which were known to the Romans, was used in this case. Selenite, a metamorphic form of calcium carbonate, was used in the ninth century re-building of the church of Santa Sabina, referred to above. The same material has been employed again by the modern restorers; in this instance the amount of selenite quarried near Ravenna cost 12 lire for each window; a corresponding amount of glass would have cost 900 lire.

The Doors

The doors of the building were in all probability of bronze similar to those still in place in the so-called temple of Romulus, which is contemporary with the basilica. Of about the same period are the portals of the Lateran, which were taken from the senate house of Diocletian by Pope Alexander VII. In our restoration we have used, in the lunettes of the clerestory, screens painted to harmonize with the wall decoration of the interior. These screens were probably made of wood covered with stucco; in buildings of moderate size they are sometimes made of marble.

[22] The frames of the windows of the Villa of Sette Bassi were probably of wood fastened with clamps, and so there are no visible sockets for supports.

[23] Muñoz, La Basilica di Santa Sabina, pp. 29-30.

[24] Kisa, Das Glas in Altertum, p. 362.

Changes in the Facade Under Constantine

We are informed that after the overthrow of Maxentius the senate dedicated to Constantine the buildings which the former had erected,[25] namely the *Fanum Urbis* and the basilica. (The former has recently been identified as the building connected with the so-called round temple of Romulus.[26]) The use of the pluperfect tense of the verb *construxerat* in the passage referred to would seem to indicate that the basilica was completed or very nearly completed at the time. The inscription dedicating the round temple to Constantine was available in part in the sixteenth century when it was copied by Panvinius.[27] It seems probable that Constantine in taking over the basilica inaugurated the change in plan, which, as the construction shows, was very nearly contemporary with the main structure. Constantine made a new entrance from the Via Sacra and probably placed his inscription on the already existing portico.[28] A flight of steps was constructed against the front of the portico to the Via Sacra, making the terrace accessible from this street. The upward grade necessitated the use of ten full steps besides three at the left which extend only partly across the length of the flight.[29] The stairs were flanked on either side by a rectangular bastion. The coarse rubble core of the steps is simply built against the earlier brick facing of the terrace wall with no bonding. The steps and bastions were doubtless veneered with marble. We have crowned each bastion with a seated statue.

Previous Restorations of the Outside

Several authors[30] describe the outside of the basilica as decorated with one or more rows of engaged columns. They base these statements on a comparison with the remains of the basilica Julia and with the evidence afforded by a series of perspective plans of Rome dating in general from the fifteenth century. Since the structure of the basilica Julia differed organically from that of the building under discussion, its external decoration can afford no clue to the adornment of the latter.

Of the early plans of Rome,[31] all point to a common

[25] Aurel. Vict., Vita Const. 40.26.

[26] Whitehead, SS. Cosma e Damiano, Bull. Arch. Christ. XIX, 1913, p. 164.

[27] C. I. L. VI, 1147.

[28] Not. Scav. 1879, p. 313, reports the finding in the street between the basilica and the round temple of a marble fragment with four large letters which were originally inlaid with bronze. No dimensions are given. The letters are S T and beneath I O. As the S T fits the name of Constantine, this was identified by Senator Lanciani, who conducted the excavations, as part of the inscription of the basilica. I have endeavored to reconstruct it as follows. I O fits PIO only of Constantine's usual titles.

(a) IMP. CAES. FL. CON(ST)ANTINO
(b) FELICI. MAXIMO. P(IO). TRIUM
(c) PHATORI. SEMPER. AUGUSTO
S P Q R

(a) Inscription on arch of Constantine, CII VI, 1139.
(b) Unusual order, CII VI, 1140.
(c) CII VI, 1141, Caballus Constantini as quoted by the anonymous of Einsiedeln.

[29] The entrance of the basilica Julia is managed in the same way with seven steps at the east and only one at the west near the slope to the Capitoline.

[30] Middleton II, p. 228; Thédénat, p. 346.

[31] De Rossi, Piante Iconografiche di Roma antenore al secolo XVI 1879; four plans, supplemented by

1. Stevenson, Bull. Com. 1881, pgs. 74-105, Pl. III-IV, Di una Pianta di Roma dipinta da Taddeo di Bartoli (1413-'14);
2. Gnoli, ibid, 1885, pp. 63-76, Pl. IX-XV. Di alcune Piante Topografiche di Roma ignote o poco note;

original, possibly dating from the thirteenth century. They represent, in the neighborhood of the Colosseum, three contiguous arches with single or double columns between them. In a Paris codex of 1447,[32] the name of Templum Paris, as it was then called, assures us of the identification of the structures. Yet such an arrangement of the façade is incompatible with the evidence of what remains; for it shows neither the portico of the south face nor the single story narthex at the east. The north side of the building, which faced a narrow street, would have shown the projecting apse. Moreover, from the orientation of the plans, it is the south face which is represented. We must conclude that these drawings show what remained of the basilica after the collapse of the nave and south aisle, namely, the three arches of the north aisle with the adjoining columns of the nave. Somewhat similar to this is the view of the ruin with two columns still standing, though only one has a capital, in Bramante's sketch made about the year 1500.[33] We know that by this time the pavement was entirely covered.

East Facade

According to the original plan, the principal entrance to the basilica was at the east from a street which ran north from the Via Sacra with a slight upward inclination. The narthex was only one story high, as the front wall above it shows no traces of the roof of a second story built against it. Entrance was gained through three doors; there was a door in each end of the narthex—the brick facing at the north shows that a doorway, not a window, occupied this space, and the same was probably true of the opposite end, although here the original facing at the bottom of the piers has been restored; in the front wall of the narthex there was a single door with three windows on each side. At later periods the two windows at the north were filled in and the others cut down to form entrances, as the facing shows. The same type of window screens and doors were probably employed at the east as at the north and south.

Decoration of Exterior of Narthex

Along the roof of the narthex we have restored a stucco cornice. The fragments of granite columns found in the debris, which are of the same dimensions as the porphyry columns of the south portico, probably indicate the architectural adornment of the east face. On the principle of symmetry, we have assumed that there were four of these columns because of the existence of the four porphyry columns of the south portico. The use of only four columns also served to continue the lines of the nave at the façade. We accordingly reconstructed the portico with one column at either side of the central door and one between the first and second windows on each side. We used capitals of white marble, as in the case of the gray granite columns of the early tomb church of Santa Costanza, and a marble entablature, broken and extending back from each column to a corresponding pilaster against the wall. This method, first used in the Forum of Nerva, appears also in the arch of Constantine, in columns which were added by that emperor to the earlier concrete core of the structure. Above each column we place a statue. Renaissance artists solve the problem of these columns in verious ways,[34] using one between each two windows, eight in all, or sometimes more slender columns in pairs.

Nibby disclaimed the use of columns in this part of the building because he found no traces of foundations when he excavated in front of the narthex.[35] The travertine blocks on which the columns rested, were probably removed in the middle ages, as were those of the south portico.

The east face of the building was stuccoed to represent finished ashlar.[36] Above the narthex the front wall of the nave was pierced by three arched windows. The side of the one at the right can be seen in the edge of existing section of the front wall. The triangular front of the clerestory had a single lunette window similar to those in the triangles at the sides of the groined vaults. This façade, with the single story narthex, three arched windows above it in the front wall of the buildings, and a gable end of the roof surmounting this, is similar to the scheme adopted for the early churches, and, in fact, is still to be seen in Santa Maria in Cosmedin and others.

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3. Visconti, ibid, pp. 77-82, Pl. XVI, Una Pianta di Roma del Secolo XIV pubblicata dal Sig. Muñoz;
4. Huelsen, Bull. Comm. 1892, pp. 38-47, Plates II-IV, Di Una Nuova Pianta Prospettica di Roma del Secolo XV.

[32] De Rossi, plate II, 2.
[33] Uffizi No. 1711.
[34] Vasari Giovane, Uffizi No. 4809—three doors in center, ten columns. Baldassare Peruzzi No. 437, 543 and Lorenzo Donati No. 200, used eight columns as did Caristie in his restoration made after the excavations of 1819.
[35] Loc. cit.
[36] See above, p. 10.

(*To be continued*)

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A Reconstruction of the Basilica of Constantine in the Roman Forum

Part II

The Reconstruction of the Interior

As we have said in the previous paper,* the main entrance to the basilica was at the east by a single door in the center of the narthex. There was a secondary entrance at either end of the narthex. The ancient street pavement, as it passes across the axis of the east front of the building, is two feet above the floor level of the narthex, so that it was necessary to descend three steps on entering the building from this door. Three entrances led directly from the narthex to the nave and one to each of the side aisles: the central entrance is a foot wider than the others. Traces of cramps and of bedding for marble veneer have led us to sheath the narthex with this material up to the spring of the vaults with a marble base to a height of about two feet above the floor.

Wall Decoration

In the main hall the marble veneer ranged from the floor to the top of the main cornice, a fact to which the remains of cramps testify. The marble of the walls was probably arranged in geometrical patterns, with contrasting effects of the darker and lighter varieties.[37] The actual remains show that above the spring of all the arches stucco in slight relief was used as decorations.[38] A border of tendrils, in a pattern similar to that of the marble friezes of the fourth century temple at Spoleto and the shrine of the Clitumnus of the same period outlined, in some cases, the arches of doors and windows, as for example, over the door at the north end of the narthex. There are traces of yellow on the stucco still in place. Possibly the yellow garlands were thrown into relief against a colored ground with an effect similar to that of the fifth century mosaics. The room of the narthex consisted of seven small groined vaults. The ceiling was covered with oblong panels in stucco of which eight remain in the northeast corner. The panels enclose garlands and must have been colored as were those over the arches.

Pavement of Narthex

There was enough of the pavement of the narthex left a century ago to give the pattern. (See Fig. A, Part I.) It consisted of a double row of squares, separated by bands and alternately enclosing squares and circles. Angelini and Fea represent nineteen squares in each row in their plan. Nibby mentions giallo and cipollino as among the varieties used, and he states that the slabs are thin and poor in proportion to the height of the building. White Carrara, doubtless, was employed for contrast.

Stairway in Pier Between Narthex and Aisles

In the north pier, between narthex and main hall, a small door led to a circular staircase which reached the roof of the narthex. From this roof, further to the left, a second staircase in the wall continued to the roof of the aisle. All the buttresses contained straight staircases which led to the roof of the clerestory.

* This (Part I) appeared in the Journal for February, 1924.

[37] Collection Destailleur. Kunstgewerbe Berlin 4151 No. 6 shows decoration in marble from S. Adriano.

[38] Ibid. No. 4151 No. 11 Desgodetz pgs. 105-109 shows more stucco than is now in place.

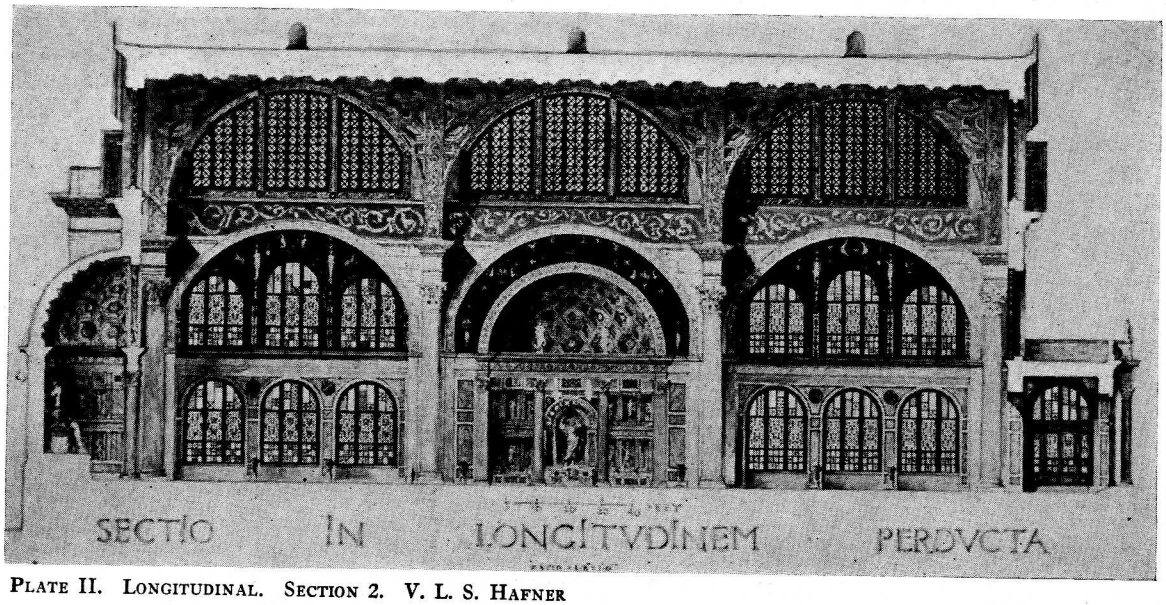

Plate II. Longitudinal. Section 2. V. L. S. Hafner

FIGURE 5.—COLUMNS FROM THE BASILICA OF SANTA MARIA MAGGIORE

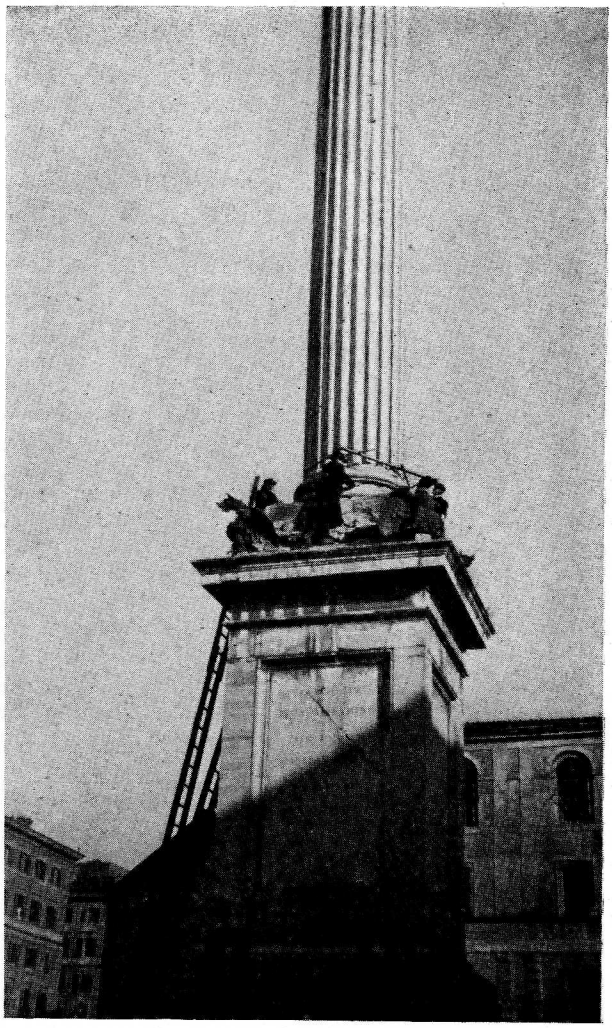

FIGURE 6.—MEASURING BASE OF COLUMN

LATER CHANGES

The upper portion of this stairway is still accessible from the level of the adjoining garden. The lower part was destroyed at some time and a place of deposit formed in its stead. Possibly to the same period as the destruction of the circular stairs is to be referred the addition of the small apse within the arch of the north doorway of the narthex and the walls which block off that end. The walls of this small apse would point to a date after the sack of the city by the Vandals in 455, when small tufa blocks were used as facing.[39] The blocking-up of the first and second windows at the north of the narthex is also late. The opening under the second narthex window from the north has been described as a stairway.[40] An examination of the recess shows that it did not extend high enough to have enclosed a stair. A segmental arch in the original wall facing, two and a half feet from the ground at the ends, spans the opening, the sides of which are formed by two parallel faced walls running through the thickness of the pier and continuing beyond the rear wall of the recess. The wall at the back is of course rubble and unfaced. It appears that these walls and the arch which spans them were constructed to lighten the pressure at this point. Probably the recess thus formed was filled in with non-bearing walls which were picked out at a period when the basilica was no longer intact. Perhaps a drain passes under the wall at this point, a branch of that which runs parallel to the short axis of the basilica at the left of the center.[41]

[39] Rivoira, Architectura Romana, p. 177.

[40] By Nibby, who also incorrectly restores circular staircases in the south piers.

INTERIOR OF HALL

The narthex led into the nave and the side aisles. The latter were divided into three bays by massive brick piers nearly eleven feet thick. These, together with the unusually thick walls of the ends of the building, carried the three groined vaults which formed the clerestory, and also supported the barrel vaults which roofed the aisles: the groined vaults were, however, partly supported by the eight monolithic columns which stood in the nave, in the corners and in front of all four piers.

Our measurements of the column were made from the single extant shaft now standing in the Piazza of Santa Maria Maggiore.[42] (Figure 5.)

[41] Lanciani, R & E p. 303.

[42] Removed from the basilica by Paul V in 1613.

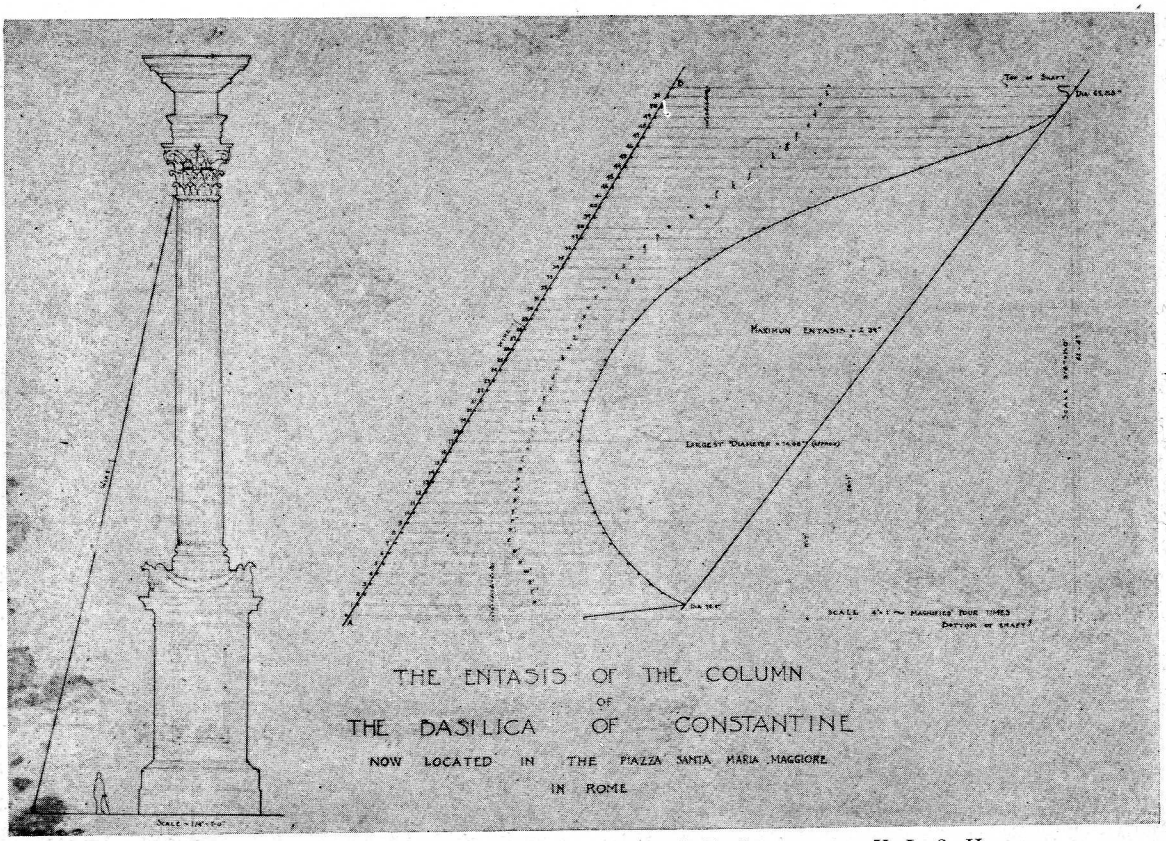

FIGURE 7.—DIAGRAM SHOWING ENTASIS OF COLUMN, DRAWN BY G. P. STEVENS AND V. L. S. HAFNER

Another small fragment is lying in the southwest bay. The column is a monolith of Proconnesian marble.[43] It has twenty-four flutes. The height of the shaft is fifty-two feet; the capital measured seven feet nine inches; the base, three and one-half feet. The capital which

[43] Porter, What Rome was built with. p. 87 for description.

PLATE III.—CROSS SECTION, HAFNER (FULL PAGE)

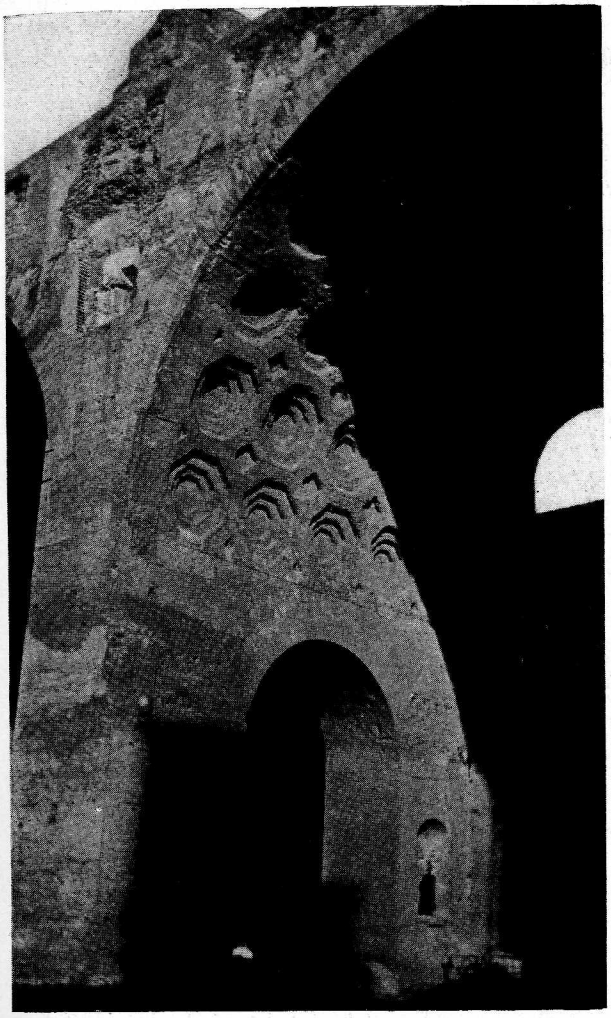

FIGURE 8.—PHOTOGRAPH OF INTERIOR

FIGURE 9.—SECTION OF BARREL VAULT

now supports the statue of the Virgin is not the original, than which it is somewhat lower. We have drawings of the fourth century capital, made before the removal of the column from the basilica.[44] Part of the marble architrave still embedded in the wall of the central hall gives the measurements of this element. The entasis of the shaft was described as "fortissima" by Nibby. We made measurements of the entasis of the column under the supervision of Professor Stevens, Director of the American Academy in Rome. The method employed was as follows: The upper and lower diameter were obtained by specially constructed callipers, as shown in the photograph (Figure 6) which were set at the column and then taken to the ground and the distance between the arms measured. These measurements were checked with those of the circumference of the column measured with the tape. The bottom diameter is 72.9 inches; that at the top 65.88 inches. The shaft from the base to the necking was then marked off on an arris at intervals of a foot. A spike was driven between the shaft and necking of the capital, and from this a wire was stretched to a point on the street level and strained as much as possible. This wire formed a line of reference from which horizontal measurements could be made. The horizontal distance from the point marked on the arris to the wire was measured in each case. Thus it will be seen that the shaft and the wire may be drawn out at a convenient scale, and the entasis itself plotted by means of the horizontal offsets from the wire. The maximum entasis of 2.39″ occurs at a height of 28 feet 1 inch above the bottom of the shaft. (Figure 7.)

The maximum diameter of the column is 74.88 inches and occurs at a distance of 17 feet 7 inches above the bottom of the shaft.

PIERS WHICH DIVIDE AISLES

In the piers, at either side of the archways by which the bays communicated, were niches for statues, giving the scheme of a triumphal arch. (Figure 8.)

The arch motive was repeated on a larger scale by the arched section of the aisles and the vaulting of the nave. Thus to the observer, a realization of the size of the

[44] Bramante, Uffizi No. 1712, Antonio da Sangallo No. 32 capital.

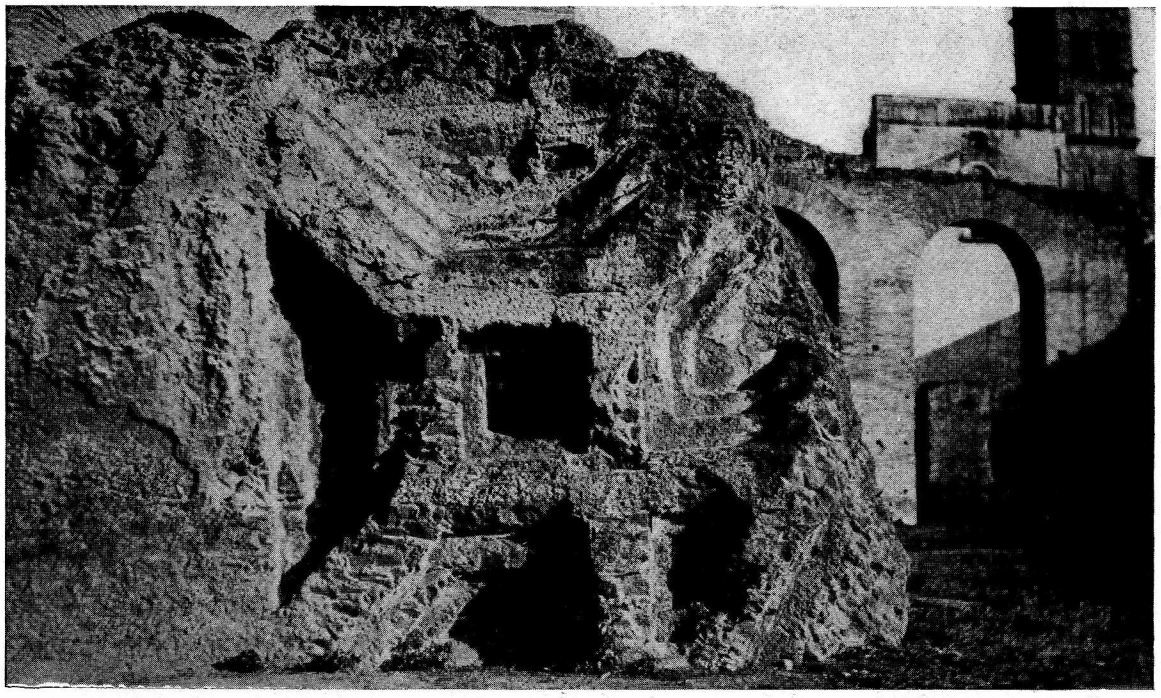

FIGURE 10.—GROINED VAULTING

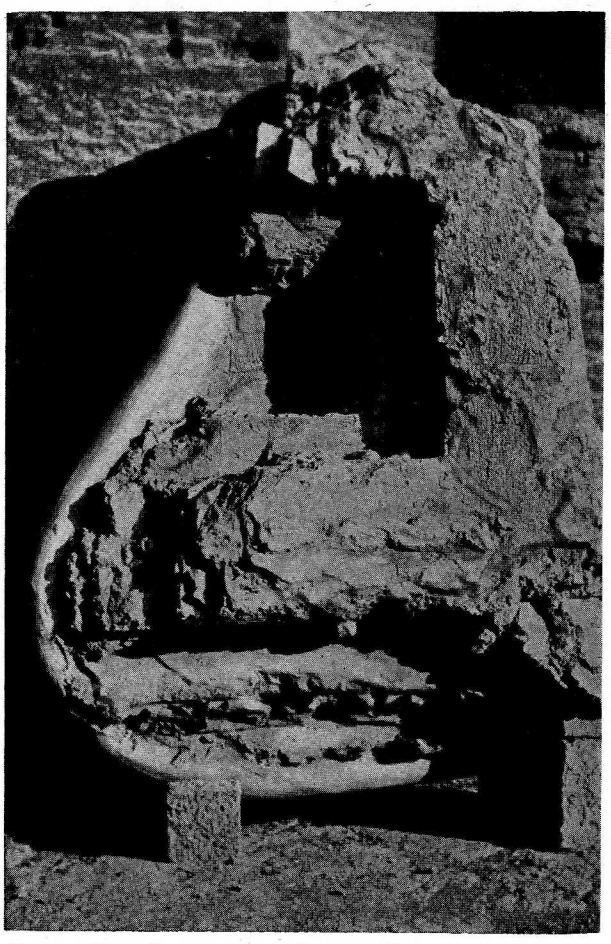

FIGURE 10A.—FRAGMENT OF GROINED VAULTING

building was admirably given by the fact that the statues in the niches were only slightly larger than life-size, about seven feet in height. From these niches, the eye traveled to the arches between them, then to the larger arches at the entrance to the bays and finally to the top of the groined vaulting of the nave. In the end piers at the west, where there was no door, a square niche occupied the space between the circular niches. There are no traces of the existence of brackets supporting columns at either side of the niches, so we must conclude that the marble facing was the only decoration of the piers.

COFFERS

The coffers in the ceilings served both to ornament and to lighten the vaults. From the barrel vaults (Figure 9) in place and fragments of the groined vaults, which are still available, the method of constructing the coffers can be ascertained.

The coffers in the barrel vaults are octagonal, receding in three depths, with rows of smaller square coffers of uniform depths accompanying them. The vaults were constructed by erecting two sections of roof scaffolding to roof the bay, as far apart as the axial unit of the coffers. This wood served to support the brick ribs of the vault. When the ribs had set, the line of inverted moulds for the coffers was suspended between them. About the moulds bricks were laid following the form of the coffers, and the concrete of the vault poured on them from above. The wooden moulds could then be removed and used for adjoining rows of coffers. The smaller square coffers were hacked out of the brick ribs between the larger coffers. In the groined vaults, the brick ribbing of the groins and the brick ribbing across the nave were laid

first and moulds for coffers placed between them in small sections at a time. The coffers of the central portions were octagonal in three depths. In the lower part, where the groined vaults rested on the roof of the aisles, coffers of squares and irregular hexagons fitted into the form. The semi-dome of the apse is indented with hexagonal coffers in four depths: these were constructed in horizontal rows as the curved wall was built up.

The inner surface of the coffers was roughened with the chisel to hold the stucco lining. The edges of the different depths of the coffers were adorned with stucco mouldings in the egg and dart and various leaf patterns. Small wrought-iron dowels, still visible in some of the fragments, were used to hold these projecting ornaments. Traces of yellow and an indistinguishable darker color are found on the stucco. It is probable that rosettes of gilded stucco adorned the fields of the coffers in the main groined vaults: we have colored the fields blue. The thin layer of stucco which clings to some of the coffers in the barrel vaults is gone at the center as though a rosette had originally occupied the space. Gilt rosettes are used in the coffered vaults of St. Peter's and other churches which show an imitation of the basilica, more of the decoration of which was *in situ* in the sixteenth century.[45]

Lighting

Lamps may have been suspended by chains from some of the central rosettes of the coffers. It is generally agreed that the bronze rosettes in the ceiling of Santa Maria degli Angeli, which date from the original construction of Diocletian, served this purpose. Other artificial light could, doubtless, have been supplied by standing candelabra. On clear days, the thirty-nine windows of the nave and aisles, together with the lunettes of the clerestory, must have furnished abundant light.

Floor

The nave and aisles were paved with colored marbles. Large portions of the concrete bedding with bits of marble laid in it for levelling still cover the floor. Parts of the pavement were found intact in the excavations of 1819, and a few fragments reconstructed at the west of the south aisle are still available. Nibby, who conducted the early excavations, observed that much of this marble had been re-worked since the backs of some slabs were fluted or incised.[46] Fea[47] mentions, among the varieties used, giallo, cipollino, porphyry, serpentino and pavonazzetto. The pattern was composed of large squares,[48] enclosing alternately circles and squares laid with the sides parallel to the diagonals of the larger squares. On the plan of Angelini and Fea, the unit of design does not fit an exact number of times into each bay; sixteen in all run along the length of the entire hall without regard to the position of the dividing piers. Caristio has seventeen squares along the axis of the building. We have restored the pavement with five squares in each bay and bands three feet wide between them since it does not seem probable that symmetry was absolutely neglected in the laying of the floor.

Caristio represented the pavement of the central bay of the north aisle as differing from that of the rest of the floor, and as composed of small double squares. Recently the removal of grass in this part of the building revealed traces of cement foundation for a pavement, the units of which correspond in size with those of the other bays. Hence we must conclude that originally the entire pavement was of the same pattern and that the excavators of a century ago were led astray by the traces of a later superimposed pavement.

Wall Decoration

The walls of the hall were veneered with marble to the top of the main cornice. Here are obvious remains of the concrete bedding in the northwest corner of the building. Some of the bronze clamps which fastened the slabs are also still affixed to the wall. Part of a white marble base about two feet high is *in situ* at the right of the north apse. The marble veneering was probably arranged in a geometrical design,[49] as is shown by the imprint of slabs in the concrete bedding and also the cramps already referred to. We have been led to adopt a broad pattern, in view of the large dimensions of the building and the consequent ineffectiveness of fine details.[50] Above the spring of all the vaults stucco was used, as is shown in many places by the stucco remains. Moreover, such a combination of marble and stucco was general in the later centuries of the Roman empire. The stucco must have been painted in the so-called floral style in vogue at the same period.[51]

West Apse

Of the decoration of the original apse at the west we have no traces. In our restoration we have supposed that the decoration of the earlier tribunal was not altered. As the consols in the so-called house of Crescentius are in the same general style as those found in the north apse, we offer the suggestion that they may have formed originally part of the ornamentation of the west apse.[52]

The west apse is somewhat smaller than the north one. We have, therefore, concluded that the smaller entablature of the two found on the site and still preserved there probably adorned the front of the smaller apse, forming a characteristic architectural screen. As the west apse was badly destroyed and then restored after the earthquake which overturned the entire south-

[45] Cf. the ceiling of S. Venantius' chapel in the Lateran baptistery; also drawings in the collection Destailleur of the basilica.
[46] loc. cit. 2 p. 243.
[47] Bas. Const. p. 12.
[48] Gauckler, Bas. Chrét. p. 16—similar floor decoration used from the fourth to the seventh century.
[49] For contemporary decoration of this type see Part I.
[50] The private basilica on the Esquiline, erected by Junius Bassus who was consul in 317 A. D., and which is therefore exactly contemporary with our building, shows panels of elaborate intarsia work. This structure was converted into the church of S. Andrea in Catabarbara and finally destroyed in the seventeenth century after it had stood neglected for several hundred years. At this time some of the panels representing animals were removed to the Conservatore palace where they are still preserved. A sixteenth century drawing of the entire wall is reproduced by Marucchi in Bull. Com. 1893 pgs. 89-114 plates IV and V. See also De Rossi, Bull. Christ. Arch. 1871 pgs. 5-29.
[51] For late wall painting at Ostia, see Calza in Mon. Ant. 1920, 26 pgs. 405, 6. Rostowzeff, J. H. S., 39, 1919, p. 162, Ancient Decorative Wall Painting, pgs. 144-163.
[52] Rivoira, Lombardic Arch. I p. 121.

west corner of the building, we have assumed that a similar construction to that which is visible today in the north apse was adopted here: that is, piers, not bonded into the walls, supporting the ends of the entablature.

It is generally assumed that when the north apse was built and the tribunal placed in it, the place of the earlier tribunal[53] was occupied by a statue to be viewed by the spectator who entered from the narthex.

The portions of a colossal statue in the cortile of the palace of the Conservatori are now generally ascribed to a colossus of Constantine which was placed in the west apse.[54] These fragments were found in 1487[55] at the right of the stairs leading from the basilica to the Via Sacra. The head was formerly called that of Domitian and the inscription on the modern base is to that effect. Bernouilli[56] suggested that it represented Constantine on the basis of its resemblance to coin portraits of that emperor.[57] He did not press the identity further, because he considered the style too good for the fourth century and in view of the insufficient resemblance to the Constantine of the Lateran, which he believed the best portrait of the emperor. Helbig adopted this identity in the second edition of his guide to the museums.[58] The statue is fully discussed by Peterson,[59] whose opinion is accepted by Mrs. Strong.[60]

The fragments now in the palace of the Conservatori consist of the head, the lower part of the right leg, the right knee bent outward at an obtuse angle, part of the muscles of the thigh, the two feet, the right arm bent at the elbow, and the right hand. The hair had a metal wreath or diadem attached to it. The head was made of several pieces of marble. The locks of hair in front of the ears, which characterize the coin portraits of Constantine, were put on separately. A second right hand of the same size as the one found in 1487 but broken off at the second joint of the thumb is placed in the museum. This has been in the collection only since 1820 and was not found with the other fragments.[61] The two hands are finished differently. The one found near the basilica has a piece of marble left under the bent little finger, and is finished with a socket into which the lower portion of a spear was probably fitted. The position of the raised hand indicated that it held a similar object. The other hand has the marble cut away under the little finger. This hand may have been originally planned for the colossus—the measurements of both hands are the same—but it may have been rejected for some reason and left with other waste material at a place where it was found later by mere chance.

Peterson[62] points out the fact that the carriage of the head and the position of the feet, with the left heel raised, show that the figure was seated. The undraped knee points to a short tunic as part of the dress. The pose with the right hand holding a spear and the left arm bent at the elbow and outstretched is similar to that of the Zeus of Pheidias and as such Constantine appears on his coins.[63] The same author concludes that the statue was acrolithic:[64] i.e., the flesh parts only were of marble, the body of wood covered with bronze drapery. He bases this argument on the form of the dowel holes which joined the limbs to the body, visible in the section of the thigh; the fact that the use of several sections for the body, as was the case with the limbs, would have made too patched an appearance; and the disappearance of all traces of the torso, which would hardly have been the case had the statue been of stone. Moreover, the weight of a stone figure forty-two feet high would have been enormous. Wood alone would have been insufficient to support the weight of the stone head, which surely must have rested on a solid support within the body. The metal spear would have held the right hand. It is probable that the outstretched left hand, which, as the arm muscles indicate, held some object, perhaps a globe, rested on a column, as was the case of the Zeus at Olympia. No traces of any such supports are apparent.

Though Bernouilli[65] thought that the style of the head was too good for work of the fourth century, Petersen does not hesitate to assign it to this period.[66]

On the general assumption that the colossus stood originally in the west apse, the figure was drawn to scale with a pedestal in proportion to its dimensions. We found that the head of a seated figure of this size would have touched the semi-dome of the apse.

We cannot believe that anything so contrary to the laws of proportion was allowed, even in the fourth century; nor could the statue have been placed on the floor of the apse without a pedestal. The construction of the cellar of the apse does not seem to indicate that it carried any great weight. The suggestion was offered that the statue was placed not in the apse but before it in the nave. The placing of the colossus at this point would have ruined the effect of the proportions of the hall; neither are there traces of a foundation at this point. In our restoration we have placed in the apse a statue similar in pose but smaller than the colossus. (Plate III.) The latter probably stood on the Via Sacra near where it was found, though there are no visible foundations in the vicinity of the basilica. Perhaps it stood just beyond, under the present church of Santa Francesca Romana. It does not seem likely that so much of the statue would have been found together if it had been carried a great distance in the middle ages; for the size of the pieces would have made it difficult to transport many at a time. The head fell or was dragged on the left side as this part is broken more than the right.

E. P. FRANKLIN, *Fellow in Classics.*
VICTOR L. S. HAFNER, *Fellow in Architecture.*
American Academy in Rome.

(To be continued)

[53] Nibby, Foro Romano, says that remains of the tribunal were found within the west apse. This appears to be a misinterpretation of the remains of horrea still visible in this position.
[54] Huelsen, R. F. p. 230.
[55] Michaelis Röm. Mitt. VI 1891, Storia della Col. Capitolina, fig. 143; pgs. 1-61; Fea, Pianta del Foro Romano 1827.
[56] Röm. Ikonographie, 2, iii, pgs. 220, 221.
[57] Ibid, Münztafel VIII esp. No. 15.
[58] 1899 I p. 372 repeated ed 3. 1912 I p. 502.
[59] Atti dell'Accad. Pont. ser. II 7 (1900) pgs. 159-182. un Colosso di Costantino Magno.
[60] Roman Sculpture, p. 385.
[61] Peterson, Op. cit. p. 162.
[62] op. cit. p. 166.
[63] Maurice, Numismatique Constantinienne Vol. III, Plate III, 10, 23.
[64] op. cit. p. 168-170.
[65] loc. cit.
[66] op. cit. p. 174.

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a form of failure often observed in buildings where moisture charged with mineral salts can seep to the surface and evaporate there. I could have avoided trouble on that building if I had only known this.

CERAMICS. Here they can produce ceramic materials and have been studying glazes for terra cotta and the like. Weathering tests, studies of effects of expansion, and so on *ad infinitum*. Oh me! Oh my!

WINDOW GLASS. And they are studying window and plate glass: such things as measuring the pressure required to burst glass of different thicknesses, and assistance in preparing window glass specifications.

FIRE TESTS OF ROOFING MATERIALS. Tests going on to find out the relative fire resistance of different kinds of materials.

Just at this minute, with a thoroughly dazed mind, the Secretary stepped into a mud puddle and Fortune's Overshoes came off, and he found himself standing on the outside of one of the buildings with a party of delegates waiting for the bus to come and take them on to Arlington. And then came the idea that he would try to give a little picture of what he saw, and then the query as to how all this work could be used, and how the information could be made available to those who wanted it. A note is appended telling anyone interested how to go about getting such information.

36. The Secretary claims this 57th Convention was one of the best. He regrets one thing very much, and that was the enforced absence of the Secretary of Commerce, Mr. Hoover, because of illness, and also that of the Director of the Bureau, Dr. Burgess, out of town on urgent business. The Secretary is happy to know that Mr. Hoover's indisposition was but a brief one. He wishes to extend to the Department of Commerce and to the Bureau the thanks of all those who were so fortunate as to make the delightful trip of inspection.

NOTE: The equipment of the Bureau of Standards laboratories is probably the finest in the world for investigational work. It is housed in 14 permanent and several temporary buildings located on a 35 acre tract of land a short distance beyond the more thickly populated portion of the City of Washington. It is easily reached by the Chevy Chase car line or by automobile along Connecticut Avenue.

The Bureau is required by law to carry out tests or investigations requested by the National or State Governments without charge. In the case of private individuals, certain investigations are undertaken the results of which would seem to be of benefit to the public, the Bureau reserving the right to use the data thus obtained as it sees fit. Some routine testing is likewise done for private individuals and manufacturers where no commercial laboratory is fitted to perform the work. In these cases nominal fees are charged for testing which are turned in to the Treasury Department.

Results of the Bureau's investigations and researches are made available to the public through its publications. These comprise five series entitled: Scientific Papers, Technologic Papers, Circulars, Miscellaneous Publications, and Handbooks. They may be bought from the Superintendent of Documents, Government Printing Office, Washington, D. C. Circular 24 of the Bureau of Standards with its supplements comprises a list of all the publications issued by the Bureau to date. Those interested in scientific work in general will find this circular useful for reference purposes. Others desiring lists of the Bureau's publications along specific lines may obtain mimeographed lists of this sort from the Information Section of the Bureau. A great many of the reports are briefed in the Structural Service Department of THE JOURNAL OF THE AMERICAN INSTITUTE OF ARCHITECTS.

EDWIN H. BROWN.

A Reconstruction of the Basilica of Constantine in the Roman Forum*

NORTH APSE

Contemporary with the construction of the entrance on the Via Sacra was the addition of the apse at the north. That this is not part of the original structure is shown by the absence of bonding into the wall, and by the fact that the edges of the openings which originally pierced the rear wall of the central bay, can still be traced in the brick-work which was cut through when the apse was built. As the lines of these openings run to the floor we must conclude that at some period in the construction three doors were planned to open into the central bay at the north from the street which bounded the basilica on this side. This would have necessitated some adaptation to the steep grade of the street. The apse is not a true semicircle, but a segment on a chord 57 feet long. Possibly the objection to blocking the street at the rear prevented the construction of a true semi-circular apse, though the flattened type occurs occasionally in other buildings such as the large hemicycles of the forum of Trajan. The basilica-like structure found at Ostia was planned to have two hemicycles in adjacent walls[67].

At the entrance to the north apse, on the line of the original rear wall, a marble threshold is still in place. This shows spaces for the plinths of two columns which divided the entrance into three parts.[68] A cutting in the sills between the places for columns shows that the tribunal was separated from the hall by a screen, probably of marble.[69] The portions of cipollino shafts lying

* The two preceding parts of this article appeared in the JOURNAL for February and April, 1924, respectively.

[67] Not. Scavi, 1916, pgs. 405-408.

[68] Rivoira, Arch. Rom. p. 202 cites similar decorations in the basilica of Atricoli.

[69] Middleton, Op. Cit. of marble; Ashby, mss. of Top. Dictionary, bronze.

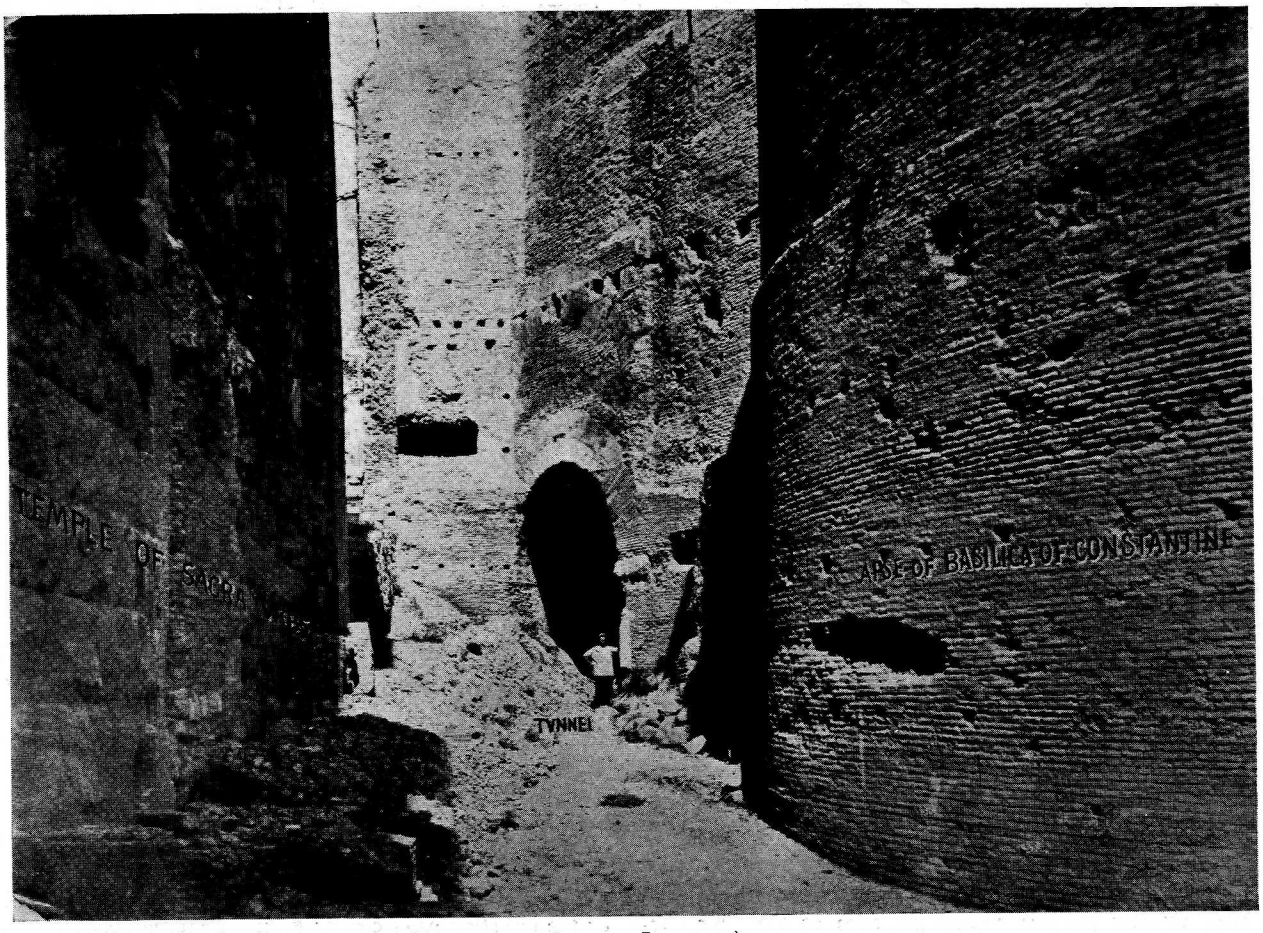

FIGURE 11—NORTH FROM THE EXTERIOR (KINDNESS OF SENATOR LANCIANI)

at the southeast of the basilica are of suitable size to have stood at the entrance to the apse. The ends of the wall into which the apse cuts were finished with pilasters. A capital of proper dimensions and base are lying nearby. (Figure 12.)

The position of the architrave which the columns and pilasters carried is shown by breaks in the wall ends at the height of the top of the columns.

Three blocks of a marble architrave sculptured with mouldings on both sides and therefore planned to stand free are lying against the north wall. These are of the dimensions required for the architrave over the columns at the entrance to the apse. Two of these architrave blocks were separate from the blocks of the frieze. The third is in one piece with the frieze block which is, however, cut back for the insertion of the sculptured slabs. A portion of one of the latter has been found and affixed to the wall. (Figure 13.)

The workmanship is crude but spirited. It is carved with a putto in a garland and with a palmette. Nibby[70] pointed out that this is similar in design to the decoration of the porphyry sarcophagus of Santa Costanza now in the Vatican. We have also a portion of the cornice which modern excavators have set up as a part of the entablature. That the various sections of the entablature were cut differently according to the size of the blocks available is the case not only here but also in the entablature which rested on columns along the rear wall of the apse. Architrave and frieze are cut in single blocks in some sections, in two in others. One is pieced along a diagonal break from top to bottom. The ancient clamps show that this break is not due to a fall from the wall. We have placed statues above the entrance, one over each column, a frequent Roman practice.

The marble blocks of the architrave and the column fragment show various cuttings. The large architrave blocks have rectangular cuttings in the centers of the ends. These probably served for the insertion of metal to which chains could be attached for hoisting or in which tongs could catch. The smaller pieces show lewis holes undercut on both sides. The clamps were of the hook variety; the dowels of the pour-channel type. Pry holes of the ordinary type were cut in the top surfaces of the stone courses to pry the stone above into position. The sizes of all these cuttings vary according to the uses for which the blocks were intended.

No description of the pavement of the apse is given by the early excavators. A close examination of the concrete bedding at the original floor level furnishes a clue to the pattern. A disk enclosed by a square occupied the center

[70] Del Foro Romano, p. 206.

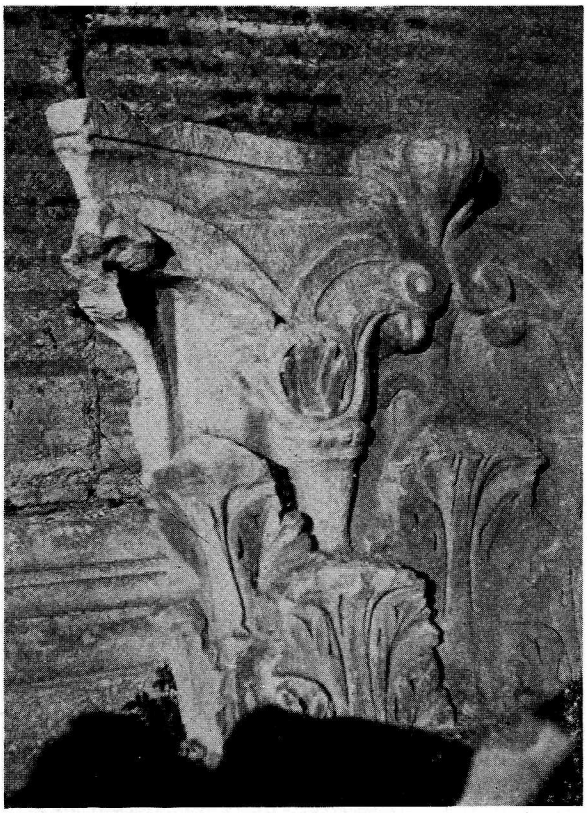

FIGURE 12. PILASTER CAPITAL

FIGURE 13. SLAB OF FRIEZE

of the space. Oblongs adjoined the sides of the square with smaller squares enclosing circles at the four corners. There are no definite traces to the right of this central design. To the left the space was divided into squares and rectangles in the largest of which there was a circle. Possibly the smaller units were also subdivided by the insertion of circles or diamond shaped slabs.

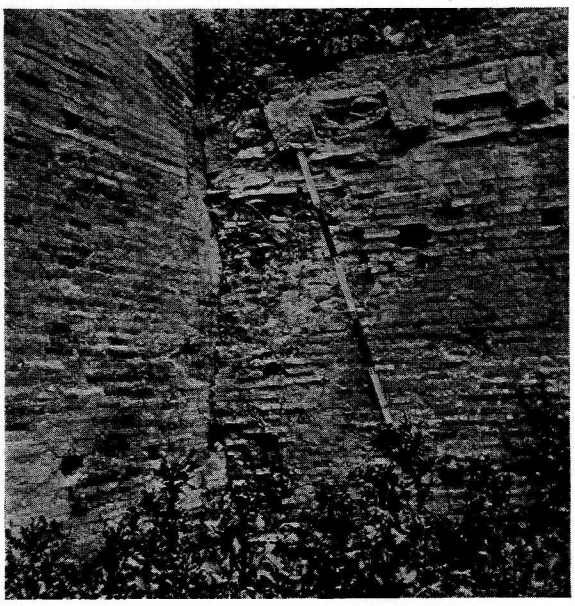

FIGURE 14. TUNNEL (KINDNESS OF SENATOR LANCIANI)

Around the wall of the apse ran a platform two steps above the floor level. There are a few small fragments of the serpentine veneer of the wall of the apse in place above the platform which served as a base for the judges' seats. In our restoration we have placed marble chairs here. The spaces between the brackets which adorn the wall are each three times the average width of ancient thrones. The pedestal-like construction in the center could not have been a dais for the prætor's seat as is generally assumed, since the brackets at the sides are too close to the platform to have allowed for the construction of a stairway which would have been required to make the top of the platform accessible. The curving wall at the front of the platform is part of the original construction which probably supported a statue in the large niche in the center of the wall. We have assumed that the movable currule chair[71] of the prætor was placed on a lower platform which projected in front of the curved wall. The present platform with the smooth thick slab of marble embedded in the concrete and the others which cover it was probably modified to this form to serve as an altar when a chapel was constructed in this part of the basilica in the Middle Ages.

The sockets on either side of the top of the larger central niche probably contained brackets which supported statues. Originally there were an arched niche of nine

[71] Abbott, Rom. Pol. Inst., p. 343.

feet in the center and two tiers of niches, five feet high, in the wall, probably containing statues, somewhat on the principle of the exedrae of the Forum of Augustus. Between the lower niches were small Ionic columns of cipollino resting on brackets. Many of the shafts and capitals are still available. The brackets which were found have been re-set. They are carved with putti or victories and garlands. There are palmettes at the sides. The columns supported an architrave, all of the blocks of which were found in the excavations. Five small windows, filled in at a later period but clearly traceable in the brick facing above the higher niches, gave light to the apse.[72] We have fitted these with bronze screens.

Stairway at Northwest

In the north pier of the west wall, a small door between the first two niches from the nave gave access to a circular staircase. This continued directly to the roof of the nave where it turned as did the corresponding stair at the east. The falling of the upper section of this stairway makes it available for only 52 steps. It is lighted by small splayed windows in line at regular intervals on the outside of the wall. The broken section of masonry lying on the floor of the Forum of Peace shows how the transition from the spiral to the straight stair of the buttress was managed. There were no similar stairs in the south piers of the building as is sometimes stated.

On either side of the west apse a small door led out from the central hall; that at the right opened on an exterior staircase to the street level, the door at the left communicated with the subsidiary rooms, which are to be described.

Use of Remains of Earlier Horrea-Rooms at the West

Since the main hall of the basilica did not extend along the Via Sacra as far as the oblique street to the Carinae, the triangle space bounded by these streets and the end wall of the basilica as far as the apse (see ground plan) was utilized for the construction of small rooms, reached from the main hall, and probably used to keep the records of the court which met in the basilica. The floor level of the hall is more than 19 feet above that of the warehouses which formerly occupied this part of the site, so that cellars were left under the rooms and were probably accessible from them by a temporary wooden stair. The cellars may also have opened directly on the side street. The rooms above the cellar were one story high, and seen from the Via Sacra, balanced the single story narthex at the other end of the main hall. The extended front wall concealed the outline of the lower part of the apse from the street.[73] A large arched window in the front wall, now visible from the inside of the wall but blocked along the Via Sacra, gave light to the room. The cellars may have had windows at the side.

The brick walls of the warehouses of the Severi can be traced in the embedded small rooms of the construction of Maxentius. He thickened the earlier front wall by building on both sides of it, filling in part the space between the piers which were wider than the connecting walls. The end wall of the basilica is built against older transverse walls. This wall shows by the bondings that it was modified after its original construction. Two walls parallel to the Via Sacra, which divided the rooms of the warehouses into rows, exist in part, so that it is probable that the same divisions were retained in the cellar of the small rooms of the basilica. We have assumed that the upper room was also divided. The outer wall of the smaller room ran straight back from the front wall to the depth of two of the rooms of the warehouses, then diagonally joined the wall of the cellar of the apse at what had been the rear corner of the fourth row of earlier rooms, which was shorter than the two front lines of rooms along the Via Sacra.

The wall which formed the rear of the fourth row of rooms is partly built into the cellar wall of the apse.[74] This cellar was entered directly from the street and did not communicate with the cellars of the other rooms. The door is outside the end wall of these rooms. It is part of the original structure for the arch, while the use of *bipedales* (large flat bricks) as voussoirs proves its Roman origin. The pavement is of tile.[75] The roof rests on two piers of the earlier buildings, which were strengthened with an additional thick enclosing coat of concrete. The space between these two piers is roofed with a short barrel vault intersecting another which forms the outer portion of the ceiling. This circumambient vault is wider at the rear of the apse than at the sides, [76] giving an elliptical section parallel to the main axis and a semi-circular section at right angles to the main axis. A flat wall closes the cellar along the diameter of the apse. The vaulting was constructed on a wood centering over which a thatch was placed before the concrete was poured, as may be seen by the marks of reeds still plainly visible on the under surface.[77]

The originally small doorway at the right of the apse from within the building, at the level of the floor, was later filled in, but it can be traced on both sides of the wall. We have restored this as opening on a flight of steps leading to the level of the side street. At this point a tile pavement fills the angle between apse and wall, though partly concealed by later debris.[78]

Tunnels

Since the west portion of the north wall of the basilica came close to the wall of the Forum of Peace, the street to the Carinae was entirely blocked. To obviate this, a tunnel (Figure 14) was built in the substructures of the basilica at the northwest and a gigantic buttress constructed to carry the superincumbent corner. Structural arches to relieve the weight of the superstructures

[72] These were recognized by Desgodetz, op. cit., p. 107.

[73] In the early Christian basilicas of North Africa the apses are sometimes flanked by square sacristies so that the side walls of the buildings form a continuous straight line. Gauckler, Basiliques Chrétiennes, pgs. 8 and 10.

[74] Senator Lanciani has kindly shown me a drawing made at the time of the excavations, when this could be seen.

[75] Not. Scav., 1879, pgs. 312-313.

[76] This shows an adaptation of the circular barrel vault springing from a central pier which roofs the basement of the tomb on the estate of the Cordians near the Torre degli Schiavi, and the chamber under the Heroön of Romulus near the Circus on the Via Appia.

[77] This was noticed by Middleton, Remains I, p. 67; Ashby, P. B. S. 1, pgs. 158, 9; Lugli, Bull. Comm., 1915, pgs. 160-164.

[78] Not. Scav., 1879, l.c.

are visible in the wall over the entrance from the street to the Carinae and also at both sides of the rear wall of the basilica under the windows of the northwest bay. These structural arches as well as the close and well-fitted bricks of the arch which roofs the tunnel, show that it is part of the original construction.[79] The tunnel is about 12 feet wide, 50 feet long[80] and 20 feet high. It has the same level as the Maxentian cross-street. The lower courses of the walls are formed of blocks of travertine. Those at the entrance project inwards from the wall. They are joined together very unevenly and were probably covered by an original ornamental framework for the entrance, or they may have served to keep wagons away from the walls. The hub marks at the right where the block projects further, are less deep than those at the left. The floor is paved with tiles, some of which bear the inscription OFF SRFOCEN.[81] This level was original, but it could not have been kept for a long period as the lowest line of hub marks is 44 inches from the ground. This would have been made by wheels eight feet high if they passed on the level of the tiles. A second line of marks is 27 inches above the first. The floor is level, so that the slope to the north at this point must have been negligible. The road along the north of the basilica was, however, steep, as its level at the west, at the exit of the tunnel, is 22 feet below that of the road which meets it from the Via Sacra at the east; the rise is more than 7%.

Material

The construction of the basilica represents the greatest daring in ancient Roman times in the use of brick and concrete,[82] although the facing lacks the finish of the earlier periods. Irregularities in the thickness of the walls were trued up by the mortar coating which served as a backing for the marble veneer. The concrete core of the foundations has a rubble of selce and refuse material. In the walls broken brick, laid in irregular rows, are used. The rubble of the vaults shows a large proportion of lighter pumice.

There is also a quantity of marble, charred brick and even bits of wood in the concrete. We have not been able to find any traces of jars in use in the available portions, although Rivoira says that they were employed in the basilica.[83] The mortar is characterized by fine lumps of red pozzolana and fairly good white lime. The facing of the walls consists of bricks of various types.[84] Many of those found have the stamps of Domitian. Broken tile bricks of the period of Severus are also frequent. The general color of the bricks is a dull red with a conspicuous admixture of bright orange and clear lemon yellow bricks of the time of Aurelian. The yellow bricks are generally only about six inches wide. The height of the bricks varies from one and three-eighths to one and five-eighths inches. The length rarely exceeds a foot. The horizontal joints are wider than the bricks themselves in some cases and very irregular. The vertical joints are somewhat narrower. Bonding courses of thick yellow tiles occur at an average distance of 56 inches.[85]

Method of Construction

The line of the barrel vaults is behind the walls between the bays: the projecting portions of the piers behind the columns thus afford stability in case of earthquakes.[86] The Sessorium, in ruins near Santa Croce, a slightly earlier building, was so unstable that Constantine had to add buttresses to prevent its collapse.[87]

The walls were built with the aid of scaffolding. The holes for the horizontal supports of the successive platforms generally occur above each bonding course, at intervals of nearly five feet, the greatest height that a workman can conveniently reach in laying bricks.[88] As already stated, wood centering was doubtlessly used for the vaults. The bricks were laid on the lines of the groining in double rows with larger bonding tiles at intervals. The space was then filled with rubble. When the man ribs had set, they served to support the centering for the intervening sections.

It has been the fashion to disparage the basilica of Constantine as the characteristic product of a period of decadence. Aside from the fact that it displays the highest technical skill in the use of brick and concrete to which the Romans attained—namely, in the construction of the great groined vaults—the building was not ungraceful. It is true that it does not follow the proportions of length to width (one-third or one-half to one) laid down by Vitruvius. It is clear, however, that the Augustan architect was influenced by the type of basilica consisting of a central hall surrounded by a two-storied colonnade. Crudeness in detail was not noticeable in much of the decoration because of the height above the spectator at which it was placed. The costliness of the marble employed, the gilding and the numerous statues, 57 according to our restoration, contributed to form a magnificent ensemble. The three ruined bays are impressive today as they tower above the Forum, visible from many parts of the city. The proportions of the nave, with its eight huge columns, when viewed from the narthex at the east, could not but have impressed the spectator with its dignity and grandeur. Finally, the structure is of great interest in the history of architecture as practically the last great monument of pagan Rome[89] and the prototype of many of the great churches of Europe.[90]

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[79] Lanciani, Storia Scavi II, p. 218-19; Not. Scav., 1879, pgs. 312, 313.

[80] Measurement of length is given by Thédénat. Tunnel is now inaccessible beyond entrance.

[81] Lanciani's record made at time of excavation. Those near the front are now nearly illegible.

[82] A century later buildings were constructed entirely of brick as S. Giovanni in Ravenna (a. 425) and the Mausoleum of Galla P'acidia (a. 440); Rivoira, Lombardi, Arch. I, p. 22, 28.

[83] Op. cit. p.

[84] In the Circus of Maxentius on the Via Sacra, built in 309, tufa blocks alternating with rows of bricks are used as facing for the first time. This method became general a century later.

[85] Rivoira, Arch. Rom., p. 95, bonding from 8 to 56 course.

[86] Durm, p. 261. Nibby considered it a defect that the arches are not semi-circular.

[87] Rivoira, Arch. Rom., p. 185.

[88] Rivoira, Arch. Rom., p. 111 reproduces a picture from the tomb of Julius Justus on the Via Latina, showing masons at work.

[89] The baths of Constantine on the Quirinal are slightly later.

[90] Rivoira, p. 250, states that Santa Sophia in Constantinople was modelled after the Basilica of Constantine.

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Public Information

As the season draws to a close, Public Information activities in many of the Chapters seem to decrease. This ought not to be, as the reading public is just as approachable in the summer as in the winter and in some instances even more so. Business men who have been rushed to death in the winter often find time hanging heavy on their hands either in the deserted city or over the weekends with the family, and they devour the newspaper from title to want-ads.

Chicago reports that it is continuing its publication of articles in the *Chicago Sunday Tribune* and the *Chicago Herald and Examiner.* The papers show willingness to publish this matter and everything sent to them has been set up in type. But the time of publication is sometimes deferred. Paid advertisements govern the quantity of reading matter issued by the paper and as these articles have always been placed in the Real Estate and Building Sections, pictures and descriptions of new buildings have taken precedence over the material contributed by the Chapter.

Indiana has sponsored two lectures on "Elements of Modern Architecture Applied to Commercial Buildings," delivered by Fermor S. Cannon, the Chapter's Secretary, and dealing with the evolution of building, leading up to the zoning laws. Appropriate diagrams were discussed and reproductions of the buildings were displayed. The Chapter feels much encouraged by the result of this work.

New York has been keeping up a steady fire of notices and articles in the local press, sending out an average of eight to ten a week. In some instances, short articles and notices have been written by the Committee. In other cases, they have given the information to a newspaper reporter and he has written the story.

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