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However where serious topographical constraints limited the maximum width feasible for a fortress in a particular location, as at Exeter, it would have been necessary to adapt the ideal plan by rotating one cohort-block in each quarter to lie per scannum. From the Flavian period onwards this seems almost always to have been achieved as described above, with the cohort-block at each corner being turned to face the stretch of the via sagularis flanking it. Why, then, was the fortress at Exeter not planned in this way?

The answer must be that in the pre-Flavian period the retention of a regular street grid was considered more important than having all the barracks at each end of the fortress fronting on the via sagularis. Given an over-riding requirement to preserve an uninterrupted line for the two lateral streets, the best option on a site too restricted to permit the ideal layout would have been to position the inner cohort-blocks in each quarter with their centurial ends fronting on the axial streets. In one way this layout is perfectly logical since it matches the arrangement of the barracks fronting on the via principalis which likewise lie just within the gates and in most fortresses have their centurial quarters facing the main street rather than the adjacent stretch of via sagularis.

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A test of this proposition would be to see whether any 'narrow' pre-Flavian fortresses are known in which the disposition of the barracks at each end conforms certainly to the pattern which became standard after the Flavian increase in the size of the first cohort made it more difficult to maintain symmetrically-planned lateral streets running continuously from one end of the fortress to the other. No examples come immediately to mind. It will be interesting to see whether other instances of the 'Exeter-type' plan come to light in the future.

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KING WILLIAM STREET EXCAVATION AND THE UNDERGROUND PASSAGES

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Introduction

In August 1983 John Allan excavated three trenches in advance of the construction of a multi-storey car park extension on a site in the suburb of St Sidwell's, outside the east gate of the Roman and medieval town. The site lies to the NW of St Sidwell's church on the steep upper slopes of the Longbrook valley. There is no reason to suppose that much of this ground was ever built on in the past, and the site would not normally merit archaeological investigation. A few hundred metres further up the valley, however, are the sites of several springs which supplied water to the system of medieval aqueducts known as the Underground Passages (Fig.15).

From the mid 14th century water from springs in the vicinity of St James's Park was conveyed into the town along aqueducts following the line of Longbrook Street. The authors of an archaeological survey of the Underground Passages made in 1931 put forward the suggestion that prior to the 14th century water may have been brought into the town along a different route, in a conduit which tapped St Sidwell's Well, situated lower down the valley near the corner of Well Street and York Road. It was with the objective of locating this putative Norman aqueduct that the trenches at King William Street were dug. It was also considered possible that a Roman aqueduct might be encountered.

St Sidwell's churchyard

The main excavation trench extended about 38m down the hillside from the pavement of King William Street (formerly Church Lane) (Fig.15). The natural subsoil was located next to the pavement at a depth of about 3m. Most of this depth was accounted for by a homogeneous deposit of dark soil retained by a revetment wall marking the boundary of a 19th century annexe to St Sidwell's churchyard. This part of the graveyard was deconsecrated and the graves removed in

1969 prior to the widening of King William Street in the early 1970s. Only a few gravestone fragments and a handful of human bones remained.

Early history of the Underground Passages

At this point it will be convenient to review the earliest documentary evidence relating to the medieval water supply of Exeter. This was summarised in a report on the Devon Archaeological Exploration Society's 1931 survey of the Underground Passages published in the Society's Proceedings for 1932.

The medieval water supply of Exeter is first mentioned in the Cartulary of St Nicholas Priory where it is recorded that in 1226 the dean of Exeter Cathedral granted to the priory one third part of the well of St Sidwell. This grant has been taken to indicate that by 1226 the Cathedral Chapter were already bringing water from St Sidwell's parish into the Close, whence it was probably distributed to the priory and to a town fountain at Carfax. When the supply was first brought to the Close is not recorded, but this is likely to have been in the second half of the 12th century, a period which saw a number of major ecclesiastical establishments first provided with running water - e.g. Canterbury Cathedral Priory in the 1150s and Lichfield Close in the 1160s. In both these cases the water was conveyed from springs in lead pipes laid in trenches.

The division of the Cathedral supply into thirds is mentioned in more explicit terms in an agreement of 1346 which states that the water was conveyed to an enclosed building in the Close and there divided between three branches supplying the Close, the town and the priory. A number of late 13th-century documents make it clear that the pipe bringing the water into the Close entered the town not at the East Gate but through a defensive tower which stood on the City Wall at the point where St Martin's Lane (now The Close) enters Southernhay.

For the years 1347-9 the Cathedral Fabric Rolls record the expenditure of over £50 on the construction of a new aqueduct. From the nature of the payments entered in the accounts it is evident that this took the form of a stone-lined and -roofed conduit containing a lead pipe. This conduit can be identified with the section of the Underground Passages which runs up the east side of Longbrook Street as far as the point where the passage makes a sharp turn to the SW before curving round to run across the front of the East Gate. It is this abrupt change of alignment at the top of Longbrook Street that was thought by the authors of the 1931 survey to mark the point at which a hypothetical earlier conduit from St Sidwell's Well could have joined the system.

Norman aqueduct

The hillside below the old churchyard wall at King William Street was covered with garden soil up to 0.5m deep which was removed by hand to expose the weathered Permian subsoil. A little below the 45m contour, at a point where the slope starts to steepen markedly, a feature about 1.1m wide was located cutting across the line of the main excavation trench. This proved to be a trench 3.25m deep with sides sloping inwards to a narrow bottom lined with yellow clay. The fill of the trench consisted of very clean redeposited natural material probably dug out from the trench and then filled back again. It yielded one or two Roman finds, two early medieval cooking-pot sherds and a once partly-melted lump of lead. The trench was also located in two further cuttings and its course traced for of about 17m on a line close to the 45m contour.

The prediction made in 1931 for the line of the first aqueduct supplying water to the Cathedral Close seems to be confirmed by the excavation carried out at King William Street more than 50

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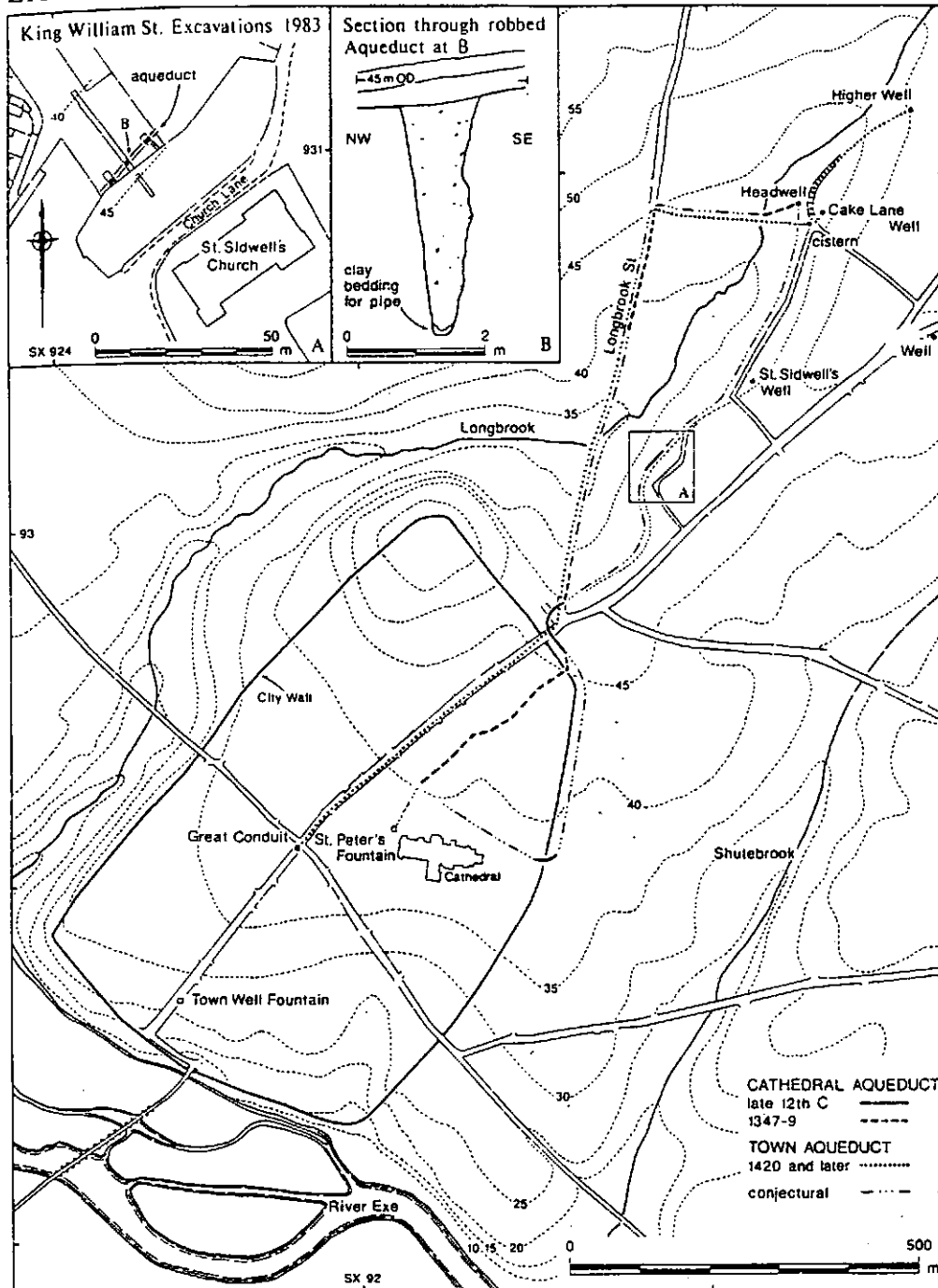


Fig.15: Cathedral and town medieval aqueduct (E. Kadow, B. Jupp)

years later. The deep trench which crosses the site certainly represents a medieval aqueduct. Its profile and the nature of its fill indicate that it was not an open watercourse and the provision of a clay bedding has been noted in medieval pipe-trenches elsewhere - e.g. at Friernhay Street in 1981. We may safely conclude that the trench originally contained a buried lead pipe. As noted above, the most likely period for the creation of this sophisticated system of water supply is the later 12th century.

But why was the pipe laid at such a great depth? Comparison of the absolute levels in the King William Street trench and the earlier section of the Underground Passages outside the East Gate is informative. The floor level in the passage was recorded in 1931 as equivalent to 41.36m OD.

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The bottom of the trench discovered in 1983 some 250m to the NE is at about 41.45m OD. Hence the two sections of aqueduct are very nearly on the same level. In the Roman and earlier medieval periods it was usual for aqueducts to be built wherever possible with a relatively gentle gradient, even when the water flowed in a sealed pipe.

Exeter's Norman aqueduct seems to have been constructed in this way. A considerable expenditure of labour would, however, have been required to achieve a reasonably constant, gentle gradient over the whole length of the pipeline. The Cathedral Close is around 5m lower than the springs in the Longbrook valley; moreover, the aqueduct had to negotiate a low ridge in the region of the East Gate. These factors made it necessary to lay the pipe several metres below ground over much of its course.

The 14th-century conduit

The Norman aqueduct was probably at least 150 years old when in 1347-9 the new conduit was built along Longbrook and Catherine Streets to tap springs in Headwell Mead, just below St James's Park near Lions Holt, where the London and South Western Railway (Waterloo Line) now cuts across Well Street.

There were several important differences between the old aqueduct and its successor. As we have seen, the Norman pipeline was probably buried and relatively inaccessible over much of its length. The pipe of the new aqueduct lay in a covered stone-built passageway that rendered all parts of the system accessible for repairs and maintenance. Whilst the 12th-century aqueduct flowed down a relatively even gradient, the conduit built to replace it in the mid 14th century rose and fell according to the local topography along its course. Thus until it reached St Martin's Lane in the Cathedral Close the earlier aqueduct traversed open ground along a line selected to allow a gradual fall from one end of the pipe to the other. By contrast, the later system took a longer and more difficult route, mainly confined to roads, which involved two crossings of the Longbrook and in several places required the action of a siphon.

But what became of the lead pipe in the King William Street aqueduct trench? The answer must be that it was dug out when the old conduit went out of commission. This conclusion is of some interest in itself, since it gives an indication of the value of lead in the 14th century. Evidently this was high enough to make it worth while employing labourers to dig down over 3m to reclaim the pipe.

Source of the medieval aqueducts

It is far from certain that the spring known in post-medieval times as St Sidwell's Well was in fact so named in the medieval period. The height and line of the Norman aqueduct found at King William Street and documentary evidence relating to the Headwell in the 13th century suggest that the Norman aqueduct is most likely to have tapped the same springs in Headwell Meadas fed the late medieval and early modern Cathedral aqueduct.

Later medieval water supply to the town and priory

From 1387 St Nicholas Priory obtained its own piped water supply from a well in Paul Street. Commencing in 1420 the City built an independent conduit which ran parallel with the Cathedral's along Longbrook Street before turning under the East Gate to carry the supply down High Street to the Great Conduit at Carfax. Part of the town aqueduct can still be seen in the Underground Passages under East Gate and at the top of Longbrook Street.

The main aqueduct for the Roman fortress is believed to be represented by an early Roman wall found in the cellar of 41-42 High Street in 1980 (Fig.14). This aqueduct supplied

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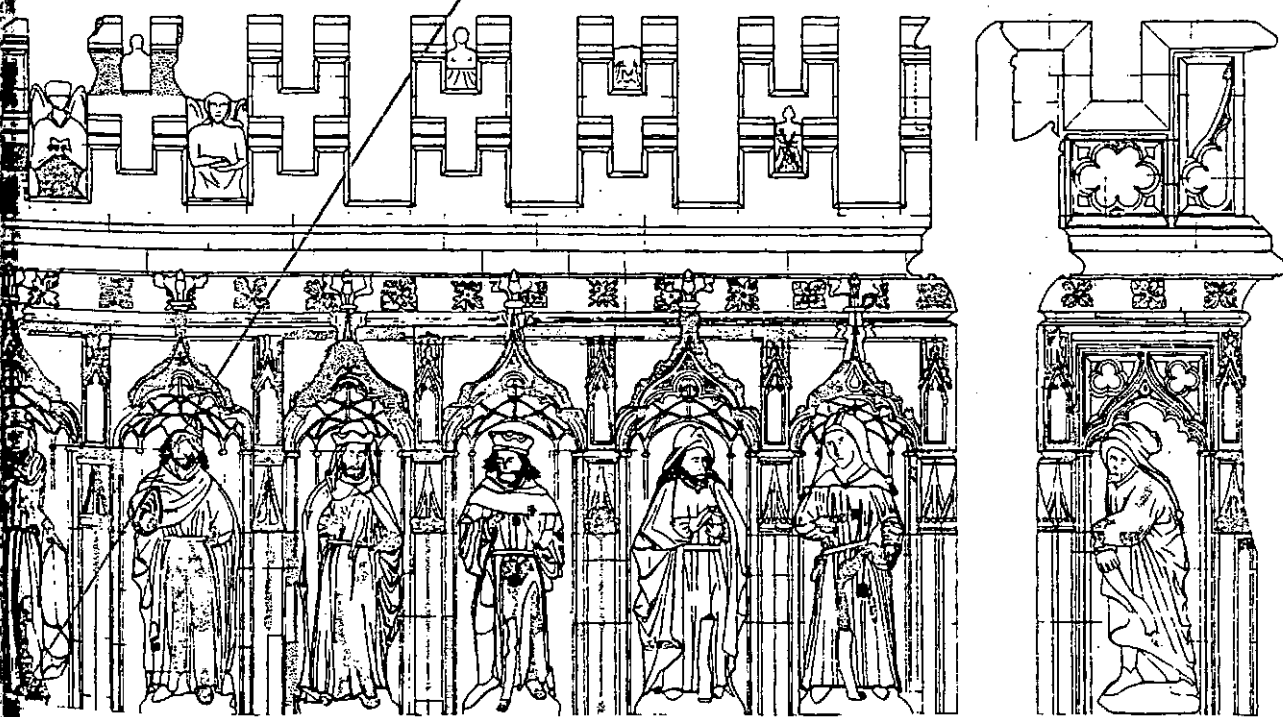
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41.45m OD. Hence considerable volume of water to the fortress baths. It almost certainly tapped a well at the Roman and earlier top of Sidwell Street (Fig.15) and this no doubt remained the primary source of water throughout with a relatively the Roman period. Why it was not exploited in the medieval period is unknown.

RECORDING EXETER CATHEDRAL

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Introduction
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restoration programme faces us with an obligation to record the medieval masonry that is being replaced and also the position and extent of the modern replacements, since evidence for the former character and building history of the church is inevitably destroyed by repairs, and it is important that the medieval work can be distinguished from the modern. In the last two years work has concentrated on the West Front and the South Tower. The archaeological recording has now cuts across the area funded by the Exeter Cathedral Preservation Trust and undertaken with the full co-operation of the Dean and Chapter and their staff.

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Exeter Cathedral : Image Screen, north sector, heightening of c.1460-80 (S. R. Blylock, J. P. Allan)

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