Quoin Geometry in Aberaeron, Ceredigion, Wales

Laurie SMITH

HISTORICBUILDINGGEOMETRY
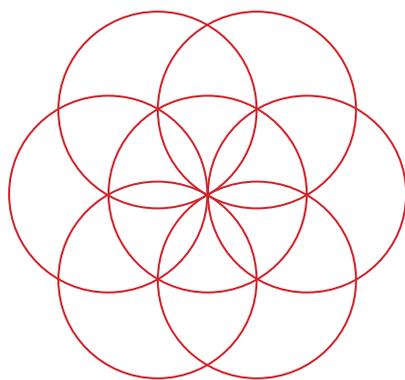
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Introduction

Construction of the harbour town of Aberaeron, on the Welsh coast in Cardigan Bay, began in 1807. The name derives from aber, which is Welsh for an estuary or confluence of streams, and Aeron, the name of the river that descends from the hills on its way through the harbour to the sea. The town's architecture is distinctive from many points of view, especially in its elegant symmetry and the comprehensive and often vibrant use of colour as a backdrop to the detailed stucco borders of doors, windows, skirting boards and quoins, characteristics evidenced on this and the adjacent page. Most of Aberaeron's quoins are simple, the vertical demarkation between neighbouring houses presented as rising alternations of long and short quoins. However, some quoins are decorated and, in one special case, rusticated quoins alternate with geometrical daisy wheel quoins. The geometrical daisy wheel quoins are the subject of this article and the following pages show how, as well as forming a visual image in its own right, the daisy wheel's geometry determines both the boundary of its own and adjacent quoins.
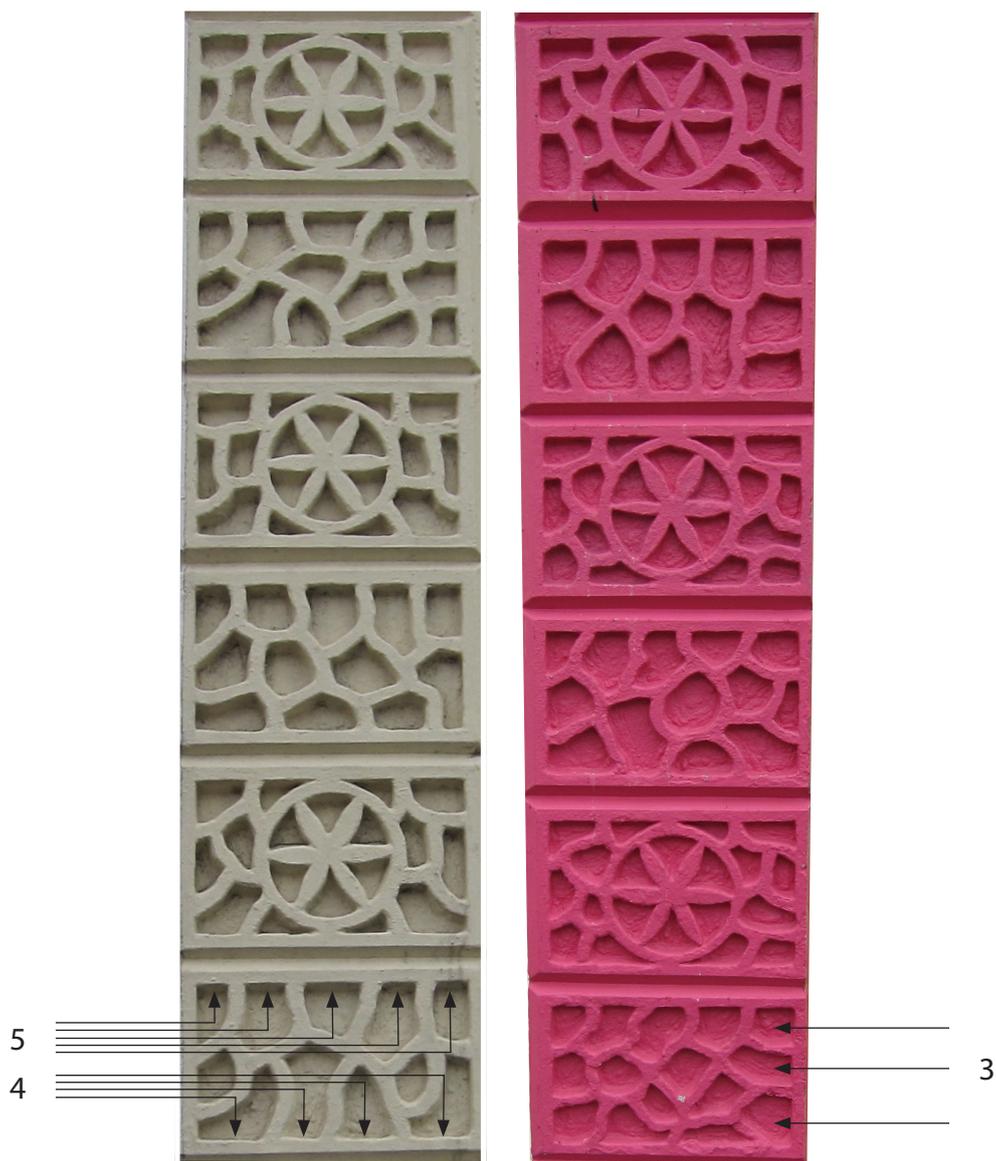
Aberaeron's Daisy Wheel Quoins

The daisy wheel quoins alternate with rusticated quoins. It is worth considering the rusticated quoins first. Looking at the boundaries of the quoins it can be seen that all follow a simple numerical division of five sectors along the upper edge, four along the lower edge and three along each side. These numerical spatial relationships may recall Pythagoras' famous 3 4 5 triangle but this is where geometry ends and a controlled chaos takes over for, apart from their numerical boundaries, every quoin has a unique and random division of internal space. Nonetheless, the patterns are visually coherent in that they all exhibit a related sense of asymmetric balance.

The daisy wheel quoins are determined entirely by daisy wheel compass geometry as the drawing on the opposite page shows.

INNER BOUNDARY OF QUOIN

BANDWIDTH OF DAISY WHEEL PERIMETER CIRCLE

INNER BOUNDARY OF QUOIN

W

E
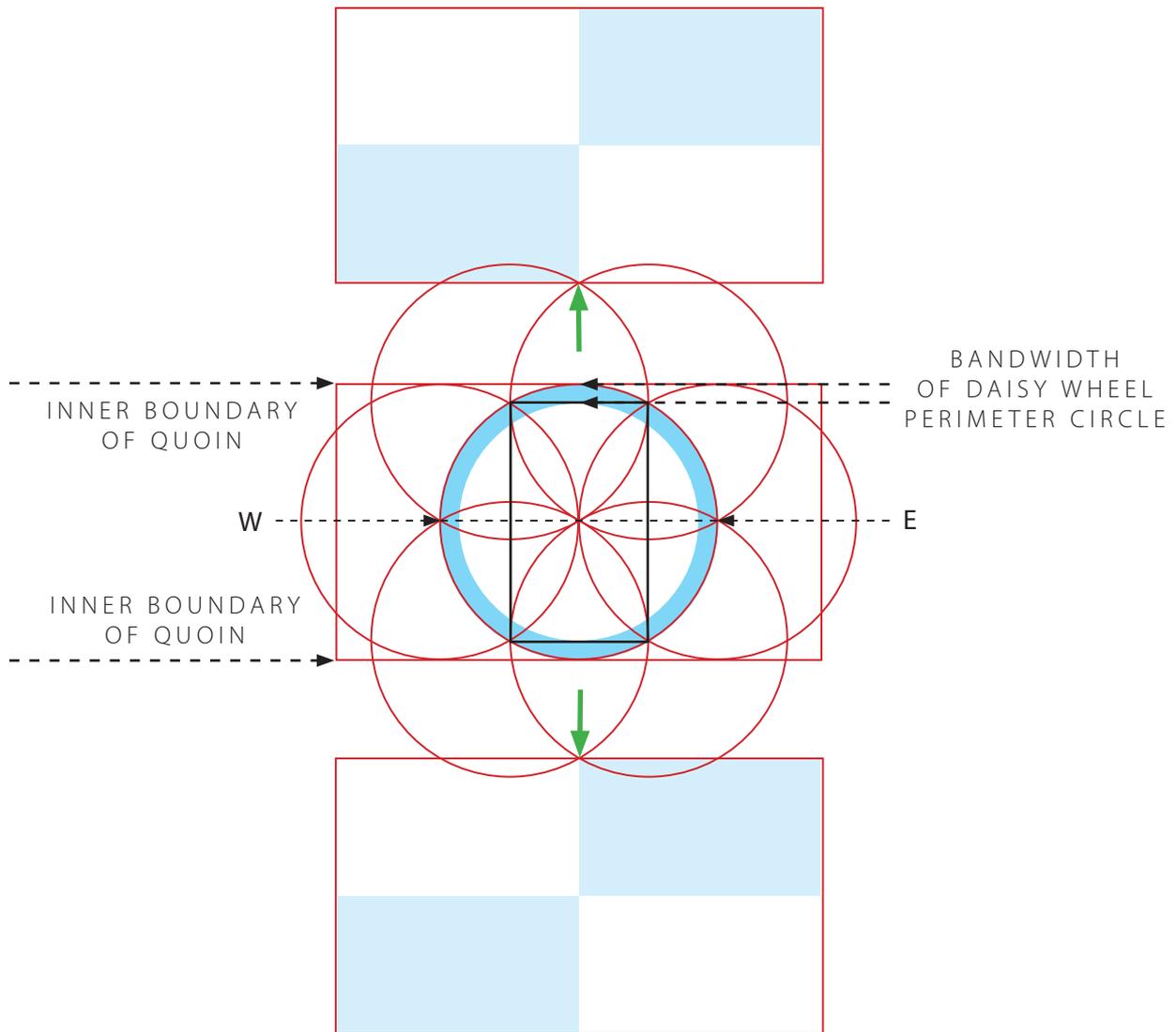
The Daisy Wheel Quoin Geometry

The primary (central) circle determines the circumference of the daisy wheel. Six secondary circles are drawn to the same radius from either the east or the west axis (indicated by black arrows) to form the full seven circle daisy wheel with the well known six-petalled daisy pattern at its centre.

Ignoring the east and west petal tips, the remaining four tips can be connected to form a vertical rectangle (shown in black line). The rectangle, rotated to a horizontal position and multiplied by four defines the full inner boundary of the quoin (two rectangles are shown in pale blue tone and two in white in the upper and lower rectangles).

The intersection of the daisy wheel's upper and lower circles (marked by green arrows) determines each adjacent quoin's inner boundary.

The quoin's daisy wheel perimeter bandwidth, shown in blue tone, is drawn between the wheel's primary circle circumference and the horizontal edges of the rectangle.

OUTER QUOIN
BOUNDARIES
in solid line

INNER QUOIN
BOUNDARIES
in solid line
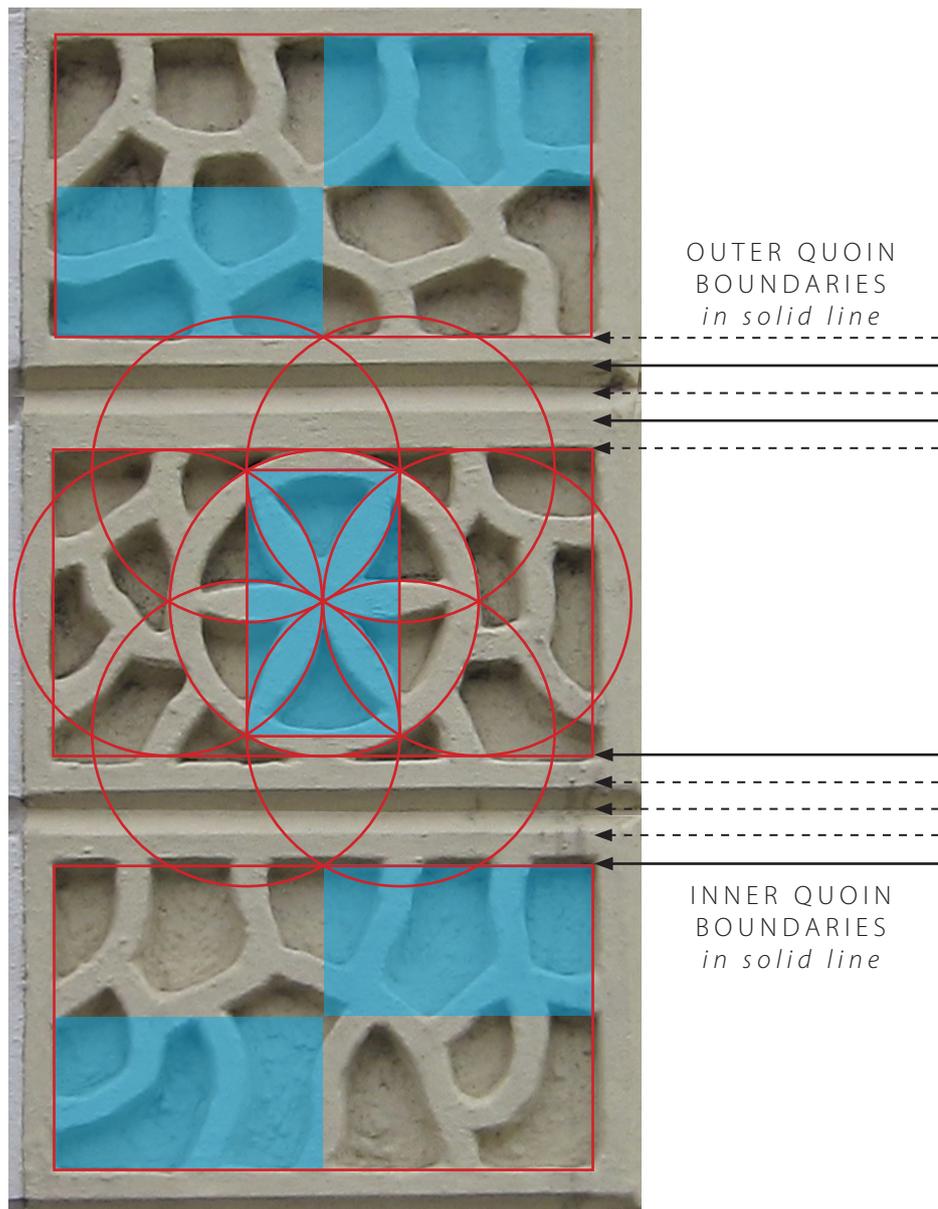
The Daisy Wheel Quoin Geometry

The drawing shows the daisy wheel geometry superimposed over a daisy wheel quoin and the rusticated quoins above and below it.

It can be seen that the geometrical distance between the internal rectangles of the quoins is divided into four to generate the quoins' outer boundaries and the V chamfer that divides them. The upper and lower quarters define the quoin's rectangular boundary while the two central quarters define the V chamfer.
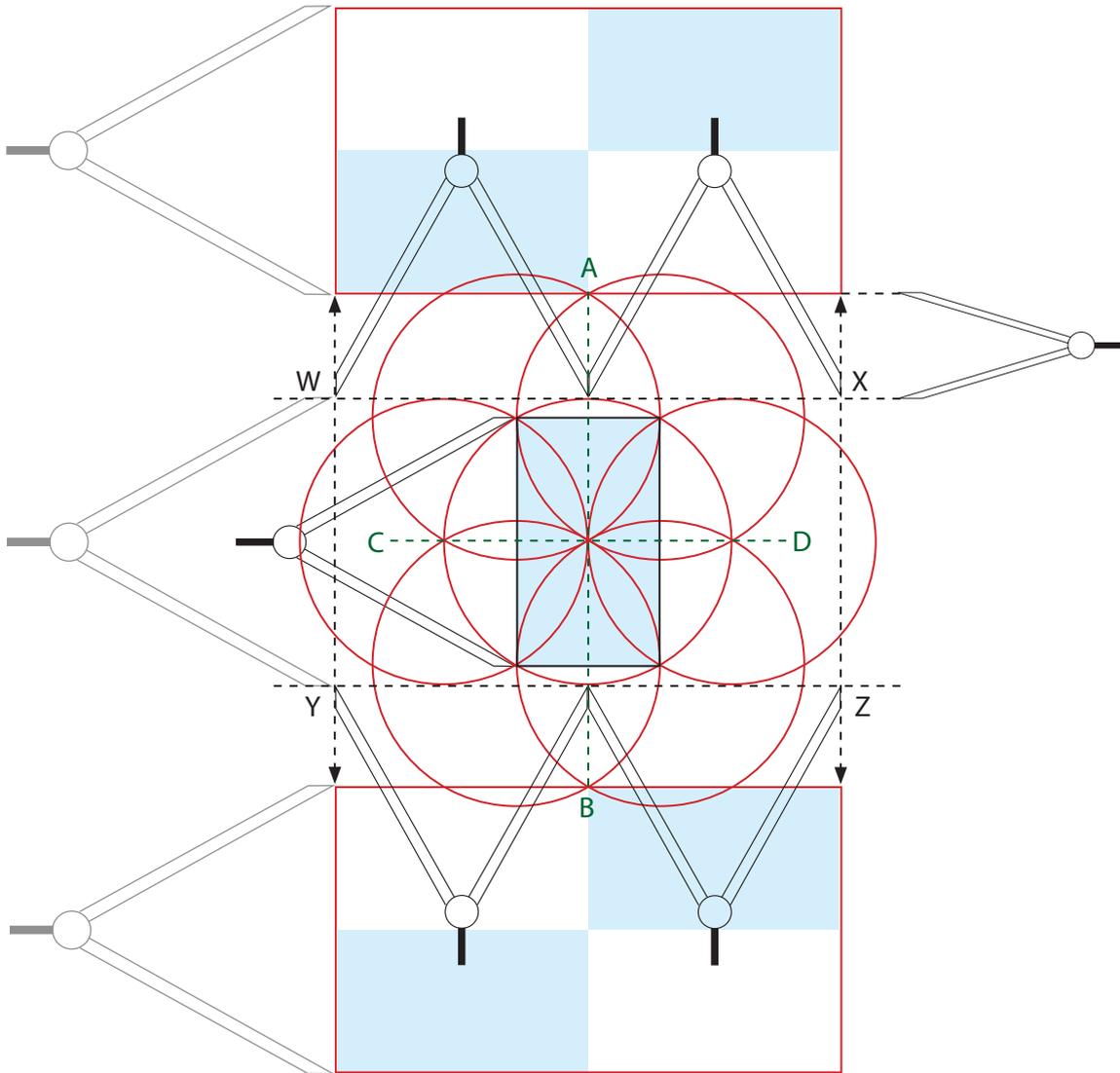
The Daisy Wheel Quoin: Practical compass Construction

The perpendiculars AB and CD are drawn first and the primary circle is drawn from their intersection. Two further circles are drawn on CD, from where the horizontal perpendicular cuts the primary circle, to form a line of three circles. The three circles intersect at four points, two above CD and two below it. Four further circles are drawn from these intersections. All seven circles are drawn to identical radius.

Tangents WX and tangent YZ are drawn across the three horizontal circles.

The vertical rectangle is drawn in the primary circle and a divider reading taken from its length. The dividers are set on the tangents either side of perpendicular AB to mark off the vertical lines WY and XZ. WXZY defines the Quoin's inner rectangle. Parallels drawn through A and B mark the horizontal boundaries of adjacent rusticated quoins and dividers set to WY establish their vertical boundaries. A divider reading between WX and A gives the distance between quoins.

Daisy Wheel Facade Geometry

Like quoins, like facade? In focussing on the visual evidence of the daisy wheel quoins the proportions of the house facades can easily be overlooked, a fact encouraged by the succulence of the town's uniquely beautiful colour schemes. There is a need for further research into the facades of the Aberaeron houses and a first step is shown on this and the adjacent page. The photographs were taken head on from eye level and therefore have some parallax error but, while recognising this, the facade proportions hint strongly at daisy wheel design. Linking four petal tips between the eaves, sills and quoins generates the same proportion as the daisy wheel quoins themselves.
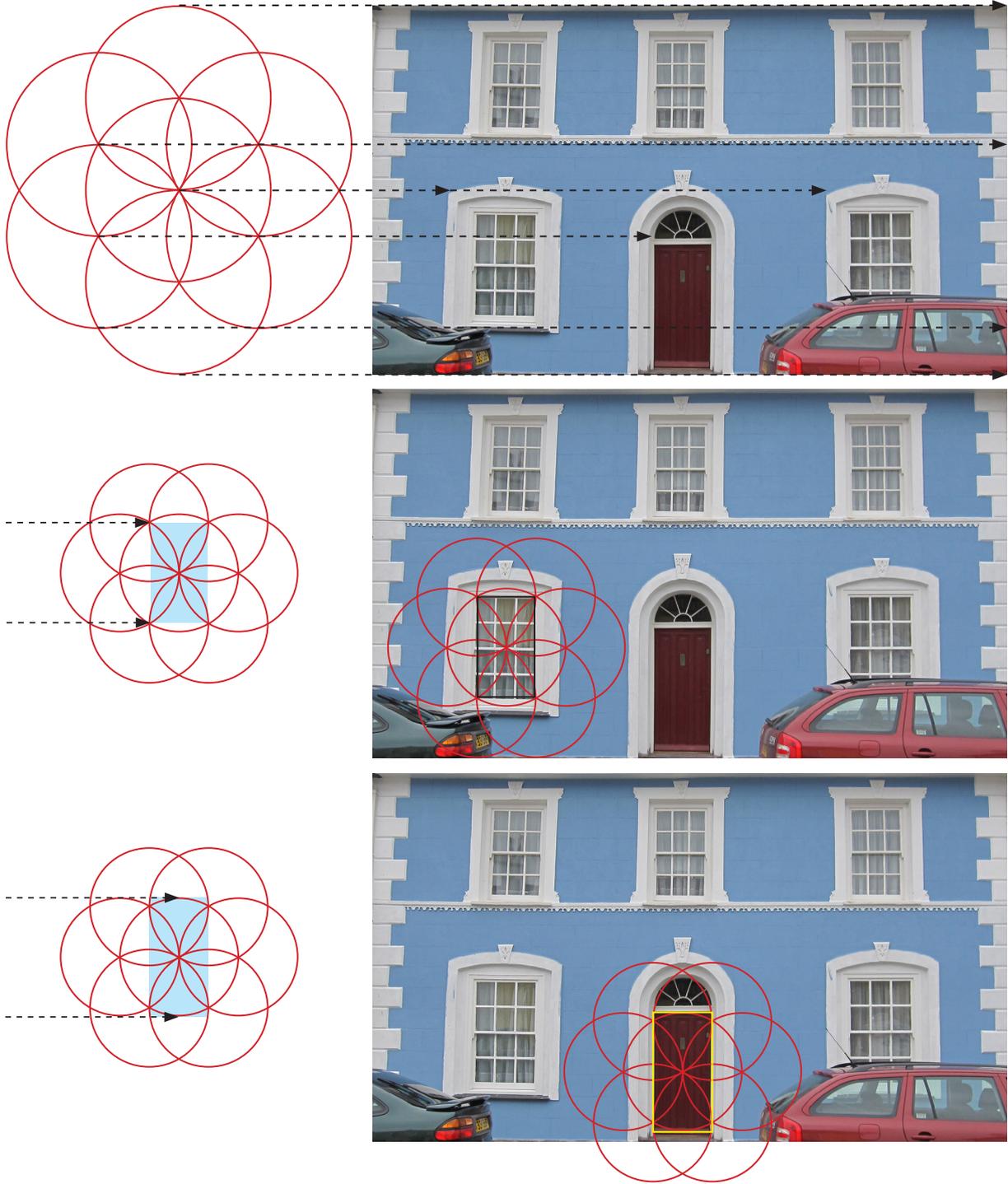
Daisy Wheel Facade Geometry

Trial horizontal alignments, derived from cardinal points within the daisy wheel's geometry, can be tested against a house facade. The upper and lower circumferences of the full seven wheel daisy wheel are set level with the eaves and sill of the facade. The wheel is then proportionaly related to the facade and the remaining alignments, from the wheel's petal tips and central axis, can be tested. The top drawing shows that the four internal alignments define the string course, lower window heads, door head and lower window sill levels. Although at a different scale, the window and door proportions in the central and lower drawings follow the same daisy wheel geometrical guidance.

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