



Project background

Chester Zoo is located in the north of England and is the most visited wildlife attraction in Britain, with around 1.4 million visitors per year. As part of the zoo's Natural Vision Masterplan, it is in the process of creating one of the largest zoo developments in Europe. The new attraction, known as 'Islands', will showcase the zoo's international conservation work and take visitors on a journey to the south-east Asian islands of the Philippines, Papua New Guinea, Bali, Sumatra, Sumba and Sulawesi, immersing them in the sights, sounds and smells of these diverse and exotic cultures. Work on site is expected to begin in 2013 and be completed ahead of the 2015 summer season.

Structural design brief

The project required the design of a number of themed animal and visitor facilities, each reflecting the vernacular architecture of the island from which they originated. The main challenge of this project was therefore to devise cost-effective structural forms which retained the appearance and character of the traditional buildings (typically constructed using relatively primitive techniques) whilst satisfying the requirements of modern structural design codes and building regulations.

The intricate roof structures found on the islands of south-east Asia have been replicated using pitched timber roofs clad with artificial thatch or corrugated metal sheeting, with the walls of each structure typically featuring a co-ordinated palette of bamboo or timber rainscreen cladding. Since the design brief required that the internal space of each building be column-free where possible, a series of timber trusses have been integrated into the roof structures, allowing loads to be distributed to the supporting perimeter blockwork walls.

Use of Scia Engineer

The primary advantage of using Scia Engineer for this project was that it allowed the modelling, analysis and design of complex three-dimensional roof geometries which would have been difficult and time-consuming to assess by hand calculation. The roof structures were modelled as three-dimensional frames formed of

one-dimensional beam elements, and assessed for a variety of permanent and variable loads, making use of Scia Engineer's ability to generate relevant load combinations according to BS EN 1990 (Eurocode 0) and BS EN 1991 (Eurocode 1).

The design process also made extensive use of the new timber module in Scia Engineer, which allowed the rapid sizing and checking of members at both the ultimate and serviceability limit state according to BS EN 1995 (Eurocode 5). The ability to easily extract support reactions from the roof models saved considerable calculation effort and time when designing other aspects of the structures outside Scia Engineer, such as the supporting walls and foundations.

Finally, by exporting the analytical models from Scia Engineer to Autodesk Revit, the design intent for each structure could be clearly communicated to AECOM's CAD technicians and provided a basis from which they could construct physical models of the buildings.

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Project information

Owner	Chester Zoological Gardens
Architect	Dan Pearlman
Engineering Office	AECOM
Location	Chester, United Kingdom
Construction Period	06/2013 to 04/2015

Short description | **Chester Zoo "Islands"**

AECOM were appointed by Chester Zoo to provide the structural design for a number of themed animal enclosures and visitor facilities as part of their 'Islands' development. The new attraction will showcase the zoo's international conservation work and take visitors on a journey to the islands of south-east Asia.

As part of the design process, a number of complex roof structures have been modelled, analysed and designed as three-dimensional frames in Scia Engineer, making extensive use of the new timber module for sizing and checking members according to Eurocode 5.

