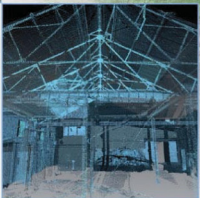
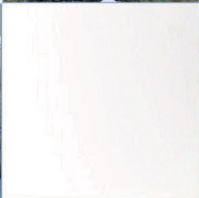
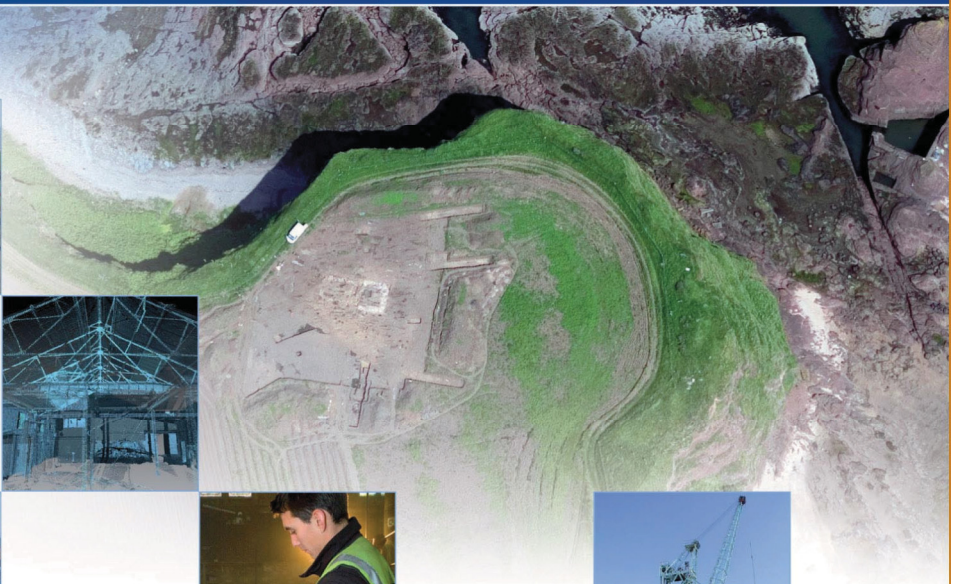
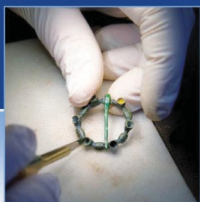


Cross base, Queen Mary's House, Jedburgh Laser scanning report

24th March 2010



ARCHAEOLOGY

HERITAGE

CONSERVATION

Laser Scan Survey of Cross Base, Queen Mary's House, Jedburgh

Introduction

1. In March 2010 a laser scan survey of a 9th century cross base, located at Mary, Queen of Scots' House in Jedburgh was commissioned by Scottish Borders Council. The cross base, thought likely to be related to the cross head now kept in Jedburgh Abbey museum is badly eroded, but the traces of designs are just visible. The relief for the most part is very shallow, only a few mm in places, so that discerning the decoration through the lichen and staining on the stone surface is now very difficult. Although controlled lighting and photography could help to enhance the decoration, laser scanning presents the most suitable methodology for recording the stone in its current condition.

Methodology

2. Given the very shallow nature of the decoration on the stone, a very high-resolution laser scan was required using a very accurate object scanning system. The size of the stone meant that a self-positioning system would be most appropriate, and as such, a Faro arm mounted with a laser line probe was used, controlled by Raindrop Geomagic Qualify 10.0. Scanning was undertaken from four stations, with over 25 million points collected from each station. Weather conditions during the survey were generally favourable, overcast and dry, although a few light showers passed over towards the end of scanning.
3. The data deriving from the laser scans was processed using Geomagic Studio 10. The point cloud was registered using a manual and iterative fitting method, and downsampled to remove outliers, overlap and to 0.5mm spacing. Each face was then meshed using a 1mm point spacing. Several mesh cleaning algorithms were used to repair data artefacts and stitch the individual meshes, before export to Blender 2.49a for rendering and animation. A series of static images and animations were rendered out at varying resolutions, in both orthographic and perspective views.

Renders

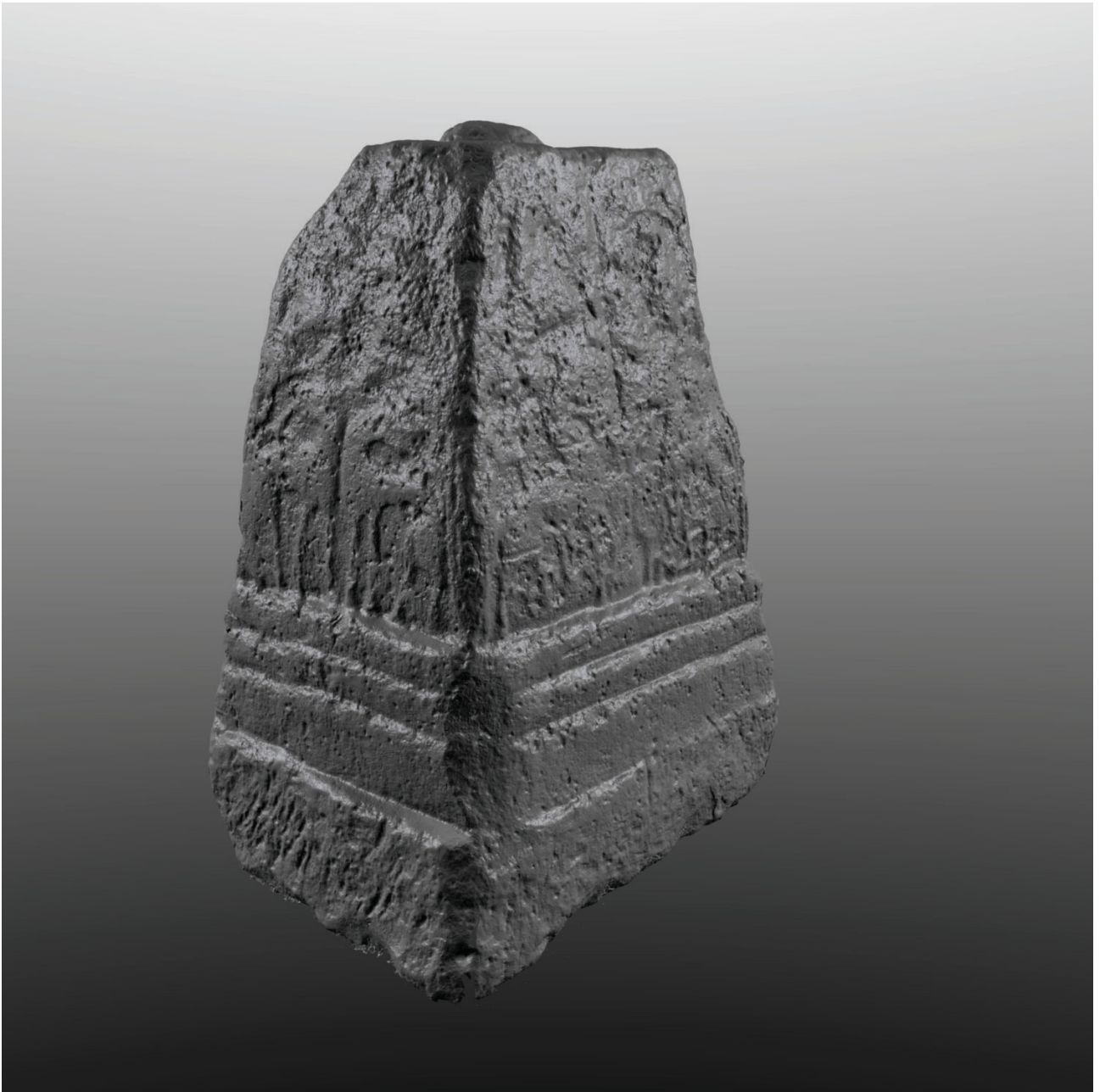
4. Renders were created as static images, in jpeg format, using standard Blender lamp lighting from the top left (full power) and from the left (lower power, ranging from 10 to 50%). The mesh was coloured to grey to remove distraction from the carvings, and given an enhanced specularly to improve reflectance. It was found that these conditions provided the best results for enhancing the carvings.
5. Animations were created in AVI format using the Radius Cinepak codec. Lighting was animated in relation to the stone and is not static.

Archive

6. The scan data is provided in a range of formats. The original Geomagic files containing the full scan archive of around 110 million points is provided, along with the downsampled version of each face, registered to a common coordinate system. The 1mm individual face meshes, a 2mm overall model and a 0.5mm mesh of the detail of face 1 are provided in

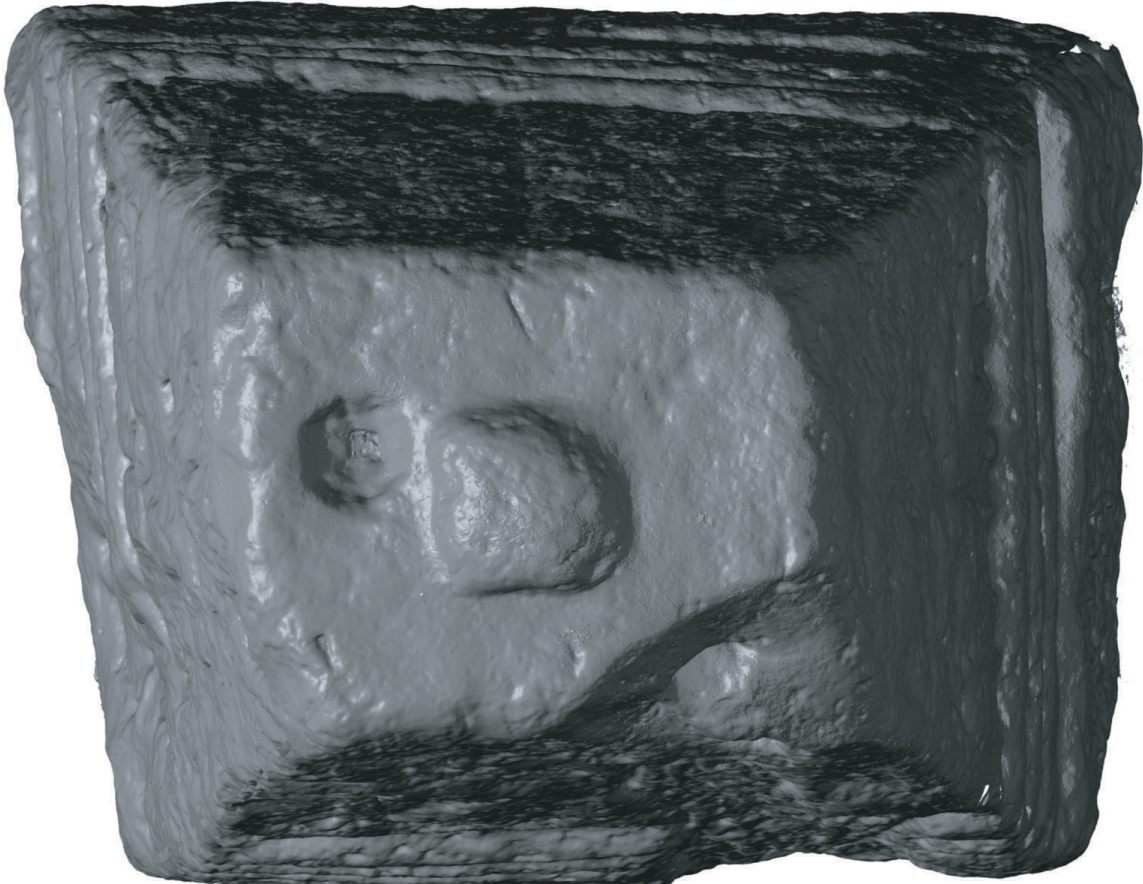
Alias Wavefront .OBJ format (the most versatile cross-platform geometric format). The scan data is also provided as a point cloud in neutral ascii format (.asc) with the file structure X, Y, Z.

Renders



General view of the cross base, showing faces 1 and 2.

Face 1



Face 4

Face 2

Face 3





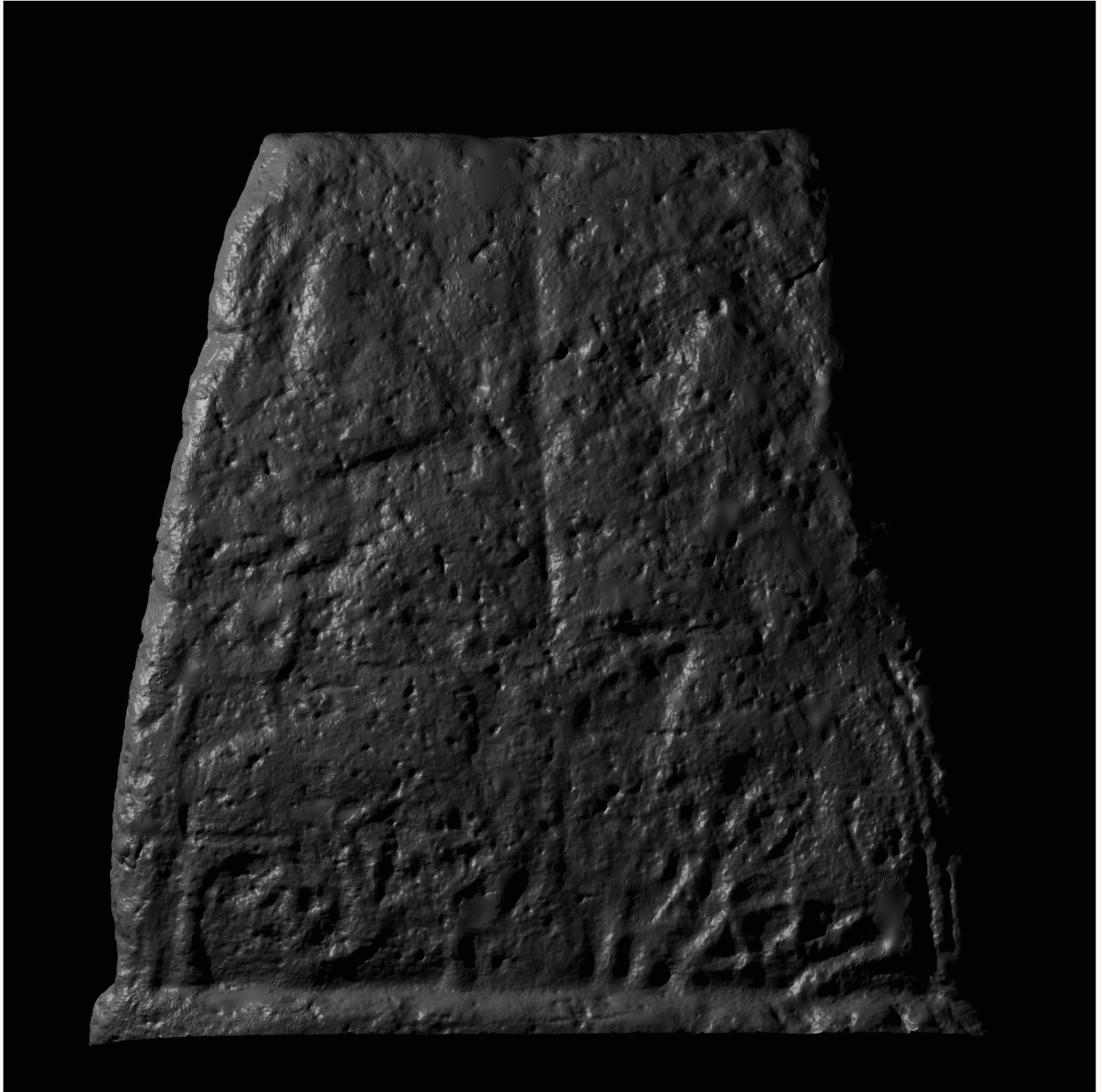


0.0 0.5m

A scale bar consisting of a horizontal line with alternating black and white segments, indicating a length of 0.5 meters. The text "0.0" is at the left end and "0.5m" is at the right end.







Detail of face 1; lit from top left.

