



12d® Model Case Study

Mecca Saudi Arabia

Designer:	Buro Happold
Client:	Jabal Khandama Development Company
Location:	Khandama, Makkah, Saudi Arabia
Completion Date:	Est 2014

“Buro Happold were commissioned to produce Earthworks, Road Design and to create a 3D landform model for master planning...”

Outline:

This case study is based on the urbanisation project covering 60 ha in the immediate neighbourhood of Mecca.

The site is on the western side of Khandama mountain, which overlooks the Holy Mosque of Al-Haram and the royal palaces. The proposed development includes a range of hotels, seasonal services and permanent residential apartments and retail shopping complexes. It creates efficient and safe pedestrian links to the Holy Mosque and compliments the surroundings of the Al Haram.

Background:

Buro Happold were commissioned to produce Earthworks, Road Design and to create a 3D landform model for master planning. Other services included utility coordination and geo-technical studies. Due to the extremely high number of Muslims that visit the Al Haram, be it for the annual pilgrimage to the Holy Mosque (during Ramadan) or simply daily prayer, there has become a need for long-term accommodation in the adjacent mountains.

Khandama, with a prime location looking down onto the Mosque, is ideal for both visitors and investors.

Methodology:

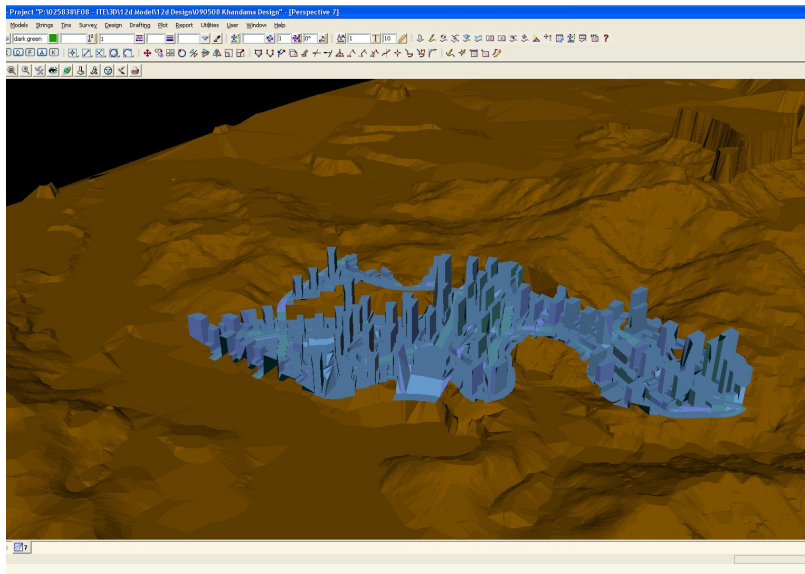
As the project is at the master planning stage, some of the design was of high-level and therefore did not require too much detail. The topography, required a detailed 3D model to understand the sites constraints, as well as the complexity of the project. 12d Model was used to create both an earthworks tin, as well as a finished surface tin.

With height differences across the site of up to 120m, both the Architects and Engineers used this model to help with the design.

Issues:

A number of issues were evident before the actual project began, main points are as follows:

- The sheer volume of people that visit Mecca. This requires access to and from the holy mosque year round.



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- The steepness of the site. Levels varied so much that rock cuttings of up to 50m are required in the design. This also leads to a huge amount of excavation.
- A number of road tunnels exist underneath Khandama mountain, a minimum clearance of 14m must remain to avoid any damage from foundations
- Existing watercourse running under the proposed site (holy water)

Saudi Highway Standards state that no road shall have a maximum grade of more than 8%. This became an issue right from the planning stage, with existing slopes of up to 40%. 12d helped us find the best alignment for each road to keep within these strict guidelines.

Proposed access to the hotels / apartments will be through a number roads and pedestrian radial spines. These spines, facing in the Al Haram direction, will give pedestrians free-flowing access to the mosque and provide a safe environment □ something that lacks at present. An existing river runs beneath Khandama mountain.

This river contains holy water, known as Zam Zam water. The water is extremely sacred in this area, as thus no buildings works are to affect it. For this reason, and depending on the location, a maximum excavation level was adopted to prevent any such contamination.

Evidence of Success:

This project is currently in planning stage and currently this is difficult to determine.

Reflections:

Greater efficiency could be achieved by creating different 12d projects and sharing models for mainline, service roads and visualisation.

Accreditation:

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