University of Fort Hare new teaching complex:

BACKGROUND

The historically renowned University of Fort Hare, Southern Africa's oldest historically black university, with alumni that include Nelson Mandela, Oliver Tambo and Chris Hani, has in recent times focused on developing its East London campus in order to meet a much needed demand for higher education in the city. Its new building project is clearly a 21st century initiative, with a focus on "green" building design and sustainability.

Native Architecture was sub-contracted to Ngonyama Okpanum Associates, who are the University of Fort Hare's contracted architects. Native Architecture did the whole design and documentation process in consultation with Mr. Sindile Ngonyama, principal of NOA.

THE CLIENT'S BASIC REQUIREMENTS

Some key relative factors or needs addressed in the client's brief. The building had to:

1. project a bold image for the University of Fort Hare, which has initiated a brave new approach to the development of their East London campus, as a stimulant for the revival of the CBD in East London, in cooperation with the Buffalo City Municipality.
2. be achieved with a very limited budget, which was slashed further during the project.
3. be as sustainable / environmentally appropriate as achievable on the limited budget.
4. be economical relative to conventional construction.
5. be durable
6. require low maintenance

Design Response incorporating the roof

The collection of water from the roofs is being stored in large tanks at ground floor level. It is pumped back up to storage tanks in the roof, from where it is used to irrigate the vertical garden to the passages on the south side of the building. It is also used to supply the toilet cisterns and urinals throughout the building. The external façade to the south walkway is faced with a permeable mesh screen which serves to break wind and driving rain. Immediately inside of this screen there is a vertical planting screen with timber planter boxes at each floor which are irrigated with harvested rainwater; this serves to provide evaporative cooling and oxygenation of natural air which is drawn into the building from the cooler side of the building

The choice of materials and their durability

East London, and in particular the precinct below Fleet Street, is on the receiving end of a particularly aggressive, salt-laden, wind-driven atmosphere. On the other hand the expression of materials in the university environment needs to also reflect the cultural aspiration of the city towards a 'knowledge society', but at the same time be robust enough to withstand the climatic and physical abuse that may be thrown at the surfaces.

The architects proposed that the following measures be applied:

1. Every reasonable attempt should be made to reduce the embodied cost of building materials by designing to reduce mass.

   → Al Stratford, the design architect for the project, developed a precast concrete flooring system which was manufactured in an industrial area close to East London under the Wintec brand.

   → This system consists of slotted, in-situ cast, primary beams at 8,4 metre centres in both directions, carrying holed, precast secondary beams at 600mm centres. These carry 600 x 600mm module floor and ceiling tiles, also of precast concrete. This system creates a generous floor void within a total overall structural depth of 525mm, which carries the fresh air as well as all horizontal services.

   → This system is essentially a modular, pre-cast concrete construction system with a completely flat soffit throughout. Normally a thick reinforced concrete floor slab would be used to achieve the required span, with an expensive access flooring system on top of that, which does not permit ventilation through the floor void.

   → This system resulted in the reduction in concrete mass used in the building by 47% compared with conventional construction. This not only saved concrete and labour, but also substantial transport costs and the carbon generated by all of these aspects.

→ At the end of the building's life, when it is to be demolished, it can be pulled apart element by element, much of which can be used in new structures. This fits in with the 'cradle to grave' principles of sustainability that are a priority for the university in this project.

→ It was a challenge for the construction team to get to grips with the Wintec flooring system. Approximately eleven thousand concrete ceiling tiles and ten thousand floor tiles weighing 30kg and 45kg respectively, plus kilometres of pre-cast primary and secondary beams, were installed. These had to be lifted, handled and placed to millimetre tolerances to deliver the final product to specification.

→ This is an industry first for this project, as it is the first time that the Wintec pre-cast floor system was used on this scale and in a multi-storey framed structure.

2. Durability of materials must be researched, understood and designed for, particularly in regard to corrosion of metals - exposed and imbedded, deterioration of surface and colour texture and toxic emissions.
3. Ongoing availability of materials needs to be evaluated for future extensions and alterations.

   → There should be no problem with sourcing any product used on the project.
4. Materials with low maintenance cost cycle need to be chosen – avoiding applied surfaces that have to be reapplied at short intervals, but rather opting for materials that may be easily washed down when required.

   → This principle was applied rigorously throughout the project, resulting in the buildings having quite a robust feel, too.
5. Design to ensure that all exterior surfaces are easily accessed – especially glazed surfaces, for cleaning and maintenance.

   → This was achieved by introducing walkways to the north façade to permit window cleaning and maintenance.
6. That all external building surfaces including solid walls and roofs should reflect heat back into the atmosphere unless required to generate heat energy into the buildings.

   → By using light-coloured, solar reflective surfaces wherever appropriate the architects have achieved this to a reasonable extent.

With regards to the roofing material specification, Alan Ter Morshuizen of Native Architecture said they chose Clean COLORBOND™ ULTRA steel "Amazing White" for the roof covering because they needed a roofing material that would:

1. be very durable and continue to look good in the aggressive sea air environment - the building is just one kilometre from the sea
   → With a zinc/aluminium coated steel the durability is far superior to that of traditional galvanized steel roofing options
2. be reasonably priced and cost effective
   → With a four times longer lifespan than traditional galvanized steel products means that Clean COLORBOND™ ULTRA steel will require less maintenance over the lifespan of the building
3. be able to be formed to a curve
   → Clean COLORBOND™ ULTRA steel has excellent formability properties
4. look great aesthetically
   → With an anti-dirt staining and anti fungal properties built into the paint finish meant that the surface will look newer for longer
5. Reflect heat away from the building
   → Solar reflectivity particles are added to the Clean COLORBOND™ steel paint to help reflect solar energy away from the roof allowing for a cooler building cavity. In fact the "Amazing White" colour specified on this project has an 84.1% Solar Reflectivity Index (SRI value) which meets most international green building standards.

.