

the centre for the **BUILT ENVIRONMENT**

CBE NEWS

Summer 2007

ART IN THE BUILT ENVIRONMENT

A BREATH OF FRESH AIR FOR AYRSHIRE
GREEN MESSAGES FROM THE USA
DESIGNING OUT CRIME



HACKINTOSH SCHOOL
OF ARCHITECTURE
THE GLASGOW
SCHOOL FARE



SCOTTISH EXECUTIVE



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EDITORIAL



*Branka Dimitrijevic,
Director*

Welcome to the summer issue of CBE News which focuses on the research and building design projects which contribute to a more sustainable built environment. The potential for micro-generation of renewable energy is being explored through the installation of a wind turbine on one of the buildings at the Mackintosh School of Architecture campus. The "Glasgow Greenhouse" office building project by the architect Chris Stewart for Scottish Enterprise Glasgow is introduced as an example of new approaches to more sustainable design of offices. Information on sustainable urban planning and building design in USA and Canada is provided in two articles.



*David O'Neill,
Administrator*

Projects for the regeneration of Irvine Bay and environmentally friendly development at the Meadows in East Ayrshire confirm that sustainability is seriously considered in new developments in Ayrshire. Public or occupants' participation in building design is addressed in the article on the Design for Learning Programme which involves pupils in generating ideas for school buildings. As the safety of the built environment is an important social issue for creating and maintaining sustainable environments, Strathclyde Police inform about their collaboration with architects, planners and developers to design out crime.



*Anne Blacklock,
Business Development
Manager*

The art in the built environment is an essential element in creating places that people enjoy and remember, in which they like to stay and to which they return. The sculptor Keith McCarter, whose work is on the front page, will talk on the role of art in the built environment at a forthcoming CBE seminar. The project Glimmers in Limbo focuses on personal experiences within the built environment by introducing site-specific art work and exploring its impact. The photographs which illustrate the article on new ways of forming concrete show how by using fabric as formwork the aesthetic potential of concrete can be explored.

CBE has further expanded its activities through collaboration with the HM Revenue and Customs, the Department of Architecture at the University of Edinburgh and the Glasgow Institute of Architects (GIA). As CBE's remit is to collaborate with all the organisations which support the construction industry and to spread its activities across Scotland, please do not hesitate to contact us if you would like CBE to provide its services (e.g. seminars, bespoke advice etc.) in your organisation or region. The applications for Knowledge and Technology Transfer in the Built Environment (KTTBE) awards scheme are always welcome - please do contact us if you need additional information on the scheme whose rules are published at www.cbe.org.uk.

MACKINTOSH SCHOOL OF ARCHITECTURE'S HIGH RISE WIND TURBINE



Installation engineers

The Glasgow School of Art's MEARU (Mackintosh Environmental Architecture Research Unit) has installed a wind turbine on top of the Newberry Tower as a wind energy pilot project.

This research project aims firstly to demonstrate the viability and simplicity of using wind energy to meet energy demands of high rise buildings in an urban environment and secondly, to examine the performance and impacts of such an installation and finally to make a useful contribution to the running costs of the Garnethill campus.

Whilst there have been developments in the use of building integrated solar technologies, there has been limited use of wind turbines in the built environment, despite its availability at night and during heating seasons. Although wind energy is a mature and viable technology in terms of rural wind farms, they have not been used extensively mounted on buildings within an urban context.

The project team, led by Dr Tim Sharpe, Co-Director of MEARU has spent the last 2 years researching, funding and gaining planning approval for the wind turbine given the sensitive location of the proposed project.

Glasgow has two key characteristics that suggest that use of wind turbines in the urban environment here may have significant potential. Not only does it have a high wind resource given its geographical location, but it also has a large number of high-rise buildings. Initial research indicates that high-rise buildings provide many of the key requirements for successful use of wind energy -for example, increased wind-speed with elevation, availability of thermal mass and storage heating, robust structure, good services infrastructure and available grid connections.

As such, MEARU identified the 10 storey Newberry Tower as the preferred location for the pilot study. As the tower is a rigid concrete frame building, of a similar structure to much of the multi-storey housing in the city, the technical feasibility of erecting a wind turbine could be investigated. Mounting a wind turbine on the tower required not only consideration of the tower's existing structural stability, the secondary structural support frame and the associated connections but also modification of the wind turbine itself to suit the required positioning.

After careful consideration, the locally produced Proven Energy 2.5kW turbine was selected due to its reliability, performance and power output. The turbine's polycarbonate blades have the ability to bend inwards in strong gusts to protect themselves. This bending also changes the aerodynamic qualities of the blades and allows the turbine to operate at its rated value, even in very high wind speeds.

MEARU's research primarily focussed on the issues relating to the installation of a turbine given the constraints of a city centre location and within a busy and active building. However, now that that turbine is in place, detailed information regarding performance, maintenance and environmental issues such as noise, vibration and visual impact will be examined through a programme of monitoring of the installation.

Given the proximity to the Mackintosh School of Architecture, students can now take inspiration from this model of building integrated sustainable energy. This inner city installation proves that it is not only rural areas that benefit from wind energy and it is envisaged that this pilot installation will encourage more city based housing associations and businesses to investigate the potential of wind harnessing.

This project was supported by the Scottish Community and Householder Renewables Initiative, funded by the Scottish Executive and managed by the Energy Saving Trust, Scottish Power Green Energy trust and Glasgow City Council.

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WINNERS OF A KTTBE AWARD

CBE would like to congratulate the Mackintosh School of Architecture and DRC Environment Trust Ltd, Glasgow, on their recent award for a Knowledge and Technology Transfer in the Built Environment (KTTBE) award to write a feasibility study focusing on the integration of wind turbines into high rise housing.

GREEN MESSAGES FROM USA¹

Dr Branka Dimitrijevic
The Centre for the Built Environment, Glasgow



Architectural heritage in Portsmouth – the inspiration for new local architectural design.

Carbon emissions from USA which are the highest in the world (over 1,600 Million Metric Tons/year)². The prevailing scientific view is that carbon emissions contribute to global warming and climate change which will affect the whole planet. Reducing carbon emissions in USA, as well as in other countries, is in everyone's interest. However, USA has not yet ratified the Kyoto Protocol, aimed at combating global warming by assigning mandatory targets for the reduction of greenhouse gas emissions to signatory nations. Not long ago, USA was the leader in environmental awareness. In 1969, USA was the first country in the world to introduce Environmental Impact Assessment (EIA) legislation. Many speakers at the Build Boston Convention and Trade Show in November 2006 acknowledged that European countries were leading the trend towards a more sustainable development. This article highlights some renewed efforts in developing a more sustainable built environment in USA.

Urban Regeneration

An example of local initiatives for a more sustainable development is the Massachusetts Smart Growth Alliance. The Alliance is a collaboration of housing, community development, conservation, and planning groups. Working with many other interested citizens and organisations, they seek to improve poorly conceived developments, preserve their built and natural heritage, fight for high-quality neighbourhoods for residents of all incomes, expand choices in housing and transportation, and promote fairness for people of all backgrounds.³

At the Build Boston seminar on Quantifying the costs of sprawl and the benefits of smart growth, delegates heard how the MetroFuture team developed four scenarios to demonstrate what Boston's growth and development could look like through 2030. At MetroFuture's working sessions, more than 500 people explored each scenario and identified the option that they prefer for the region's growth.⁴ The Office for Commonwealth Development (OCD) oversees and coordinates policies and programs of the agencies responsible for housing, transport, environment and energy, which are working together. They have established a score card with 27 categories for identifying smart growth initiatives, aiming to achieve denser town development.

One of the main messages is: NO NEW HIGHWAYS. The main barriers identified for smart growth are property rights and "Not in my back yard" attitude (NIMBY-ism).⁵

"The Big Dig" in Boston is the largest civil engineering project in USA to replace an elevated steel highway by ground and underground motorways, and to create a string of parks and green areas along the former highway. The highway was called Central Artery and cut through Boston City centre. With its 6 lanes, it was still one of the country's 10 most congested urban highways. It displaced 20,000 residents when it was built and cut off Boston's North End and Waterfront neighbourhoods from the downtown, limiting these areas' ability to participate in the city's economic life. The decision to remove the Central Artery was made in 1971, but the works started in 1991 and are still going on.⁶

An example of the initiatives for better public transport is the Fairmont Line Rail which links Boston suburbs and should raise the quality and accessibility of public transport to over 200,000 people who live close to this line. The line runs through the densely populated area where there is no rapid transit access. It does not, however, make any stops in the area. At one time, there were eleven stations, but all of the stations in the heart of the city were eliminated. In 2004, approximately 400 apartments were built along the Fairmont Line. In 2005, the \$40 million first phase of the Fairmount Line renovation project began. The project will renovate the existing stations and open four new ones.⁷

Trolley Square in Cambridge, Massachusetts, is new affordable mixed use housing with sustainable features. The residents will receive the Living Green Manual to learn how to maintain sustainability of the housing development.⁸ Pond View Village in Gloucester, Massachusetts, is a redevelopment of a former factory. In the winter of 2002, a group of residents came together to buy the former glue factory. Their vision was to create attractive and varied housing built on the principles of smart growth and environmental sustainability. At Pond View Village, 118 housing units will be created. Energy monitoring will be provided. The village is located a quarter of a mile from the train station, to which a sidewalk will be built.⁹



Out-of-town shopping malls are now considered as icons of anti-smart development. There are 2,000 regional shopping malls in USA of which 18% can be classified as “grey”, i.e. they bring less than \$150 of sales/m². There are fewer families with a housewife staying in home and it is more convenient to shop on the way from work or near home. Costs of running shopping malls are high; cost for the maintenance of walking area is equal to the cost of rental of retail space. The Massachusetts Smart Growth Alliance has produced a briefing book for redeveloping shopping malls (“ghost boxes”). The trend is to redevelop them by building above them and the adjacent car parks, and in the vicinity. They are now transformed into mixed developments which include housing, businesses and retail. Emeryville Town Centre, San Francisco¹⁰, Lakeline Mall, Austin, Texas¹¹, and Assembly Square, Boston¹² are such redevelopment projects.

Tools and initiatives for more sustainable buildings

The USA rating systems for more sustainable buildings is named Leadership in Energy and Environmental Design (LEED). LEED for new buildings assesses building site, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design process. Architects can obtain LEED certification after learning how to apply LEED and sitting an exam¹³.

At the meeting, which the Glasgow delegation had with local architects in Portsmouth, New Hampshire, one local architect said that architects in Boston had not succeeded in the competition for four hospital projects in Boston region. The projects have been won by architects from California who have strong green credentials in building design. This was a wakeup call for all the architects in Boston area. The architect who told the story said that he had asked all the architects working in his firm to obtain LEED certificates.

Along with the tools for more sustainable building design, there are various other initiatives for assisting the design and building process. The Green Roundtable initiative in Boston started as a monthly meeting of building professionals, clients and developers, focused on sustainability of the built environment.

Currently, the initiative is a hybrid of non-for-profit and for profit organisation. The aim is to provide leadership in creating and implementing market transformation programme. The Green Roundtable provides a range of services for profit such as sustainability consulting to architects, contractors, building owners and developers by focusing on Integrating Green Process, Site Planning and Building Systems, High Performance Optimization and Administration of LEED exams as an affiliate of the US Green Building Council. It is also supported by a number of foundations. NEXUS is a project which has recently been initiated by the Green Roundtable. It will generate revenue by offering educational contents and by charging fees for a green building trade show (manufacturers will pay fees for exhibition space on monthly basis).¹⁴

Steven J. Strong, President of Solar Design Associates (SDA)¹⁵, talked at the Build Boston event about the projects realised by the firm since 1974. SDA provides consultancy for the application of electricity producing solar panels, energy conservation and efficiency. Among the projects presented were Carlisle House (1980)¹⁶ Impact House 2000 (1983) which was the subject of a national television series on energy-efficient construction, Georgetown University Intercultural Centre, Washington (1984), homes in Gardner, Massachusetts (1985), Natatorium for 1996 Summer Olympic Games in Atlanta, Maine Solar House (2000), and a Field of Electric Sunflowers for a private client, providing solar-generated electricity to a 750-acre vineyard which includes a main house, guest house, property manager’s house, a number of accessory buildings, and substantial irrigation loads.¹⁷

To increase the use and further development of solar technologies, the Million Solar Roofs Initiative has been established. It is a public-private partnership whose aim is to overcome barriers to market entry for solar technologies. The goal is to install one million solar roofs by 2010. The initiative includes 822 partners within 89 partnerships.¹⁸

GREEN MESSAGES FROM USA



Mixed use development in Portsmouth, New Hampshire

Conclusions

Local governments, mayors, businesses and engineers have been leading the way towards a more sustainable development in USA through urban regeneration and conservation of architectural heritage, smart growth which aims to increase the density of new and existing settlements, a more energy efficient building design and the use of renewable energy. As of 2006, more funding has been promised from the central government for research in renewable energy production. USA is moving towards more sustainable, low carbon society. Possible outcomes will be a mass production of technologies for renewable energy (for running buildings and cars) which could become affordable to the general public, lower carbon emissions from USA and lower dependency on fossil fuels from overseas.

Notes and links

(1) This article includes information from the visit of a group of architects, engineers and designers from Glasgow to the Build Boston Convention and Trade Show in Boston, Massachusetts, and Portsmouth, New Hampshire, USA, in November 2006. The visit was organised by Glasgow City Council and sponsored by a European grant. A complete text of the seminar on Green Messages from USA, held on 30/01/07, is available on the CBE website www.cbe.org.uk/news

(2) <http://www.globalwarmingart.com>

(3) <http://www.ma-smartgrowth.org>

(4) <http://www.metrofuture.org>

(5) <http://www.mass.gov/ocd>; Other related links suggested by the speakers at this seminar are as follows: www.lincolnst.edu, www.formbasedcodes.org, www.placemakers.com, www.policylink.org, www.iceclt.org, www.mrsc.org, www.buildbrooklyn.org, www.mainstreets.org, www.tcah.org, www.anthonylint.net

(6) <http://www.masspike.com>

(7) <http://ksgaccman.harvard.edu/hotc/DisplayPlace.asp?id=11685>

(8) <http://www.gellerdevellis.com>

(9) <http://www.pondviewvillage.com>

(10) <http://www.icsc.org>

(11) <http://www.simmonsvedder.com/projects/lakeline/lakeline.html>

(12) <http://www.goodyclancy.com>

(13) <http://www.usgbc.org/LEED/>

(14) <http://www.greenroundtable.org>

(15) <http://www.solardesign.com>

(16) <http://www.nrel.gov>

(17) <http://www.iea-pvps.org>

(18) <http://www.nrel.gov>

EAST END SET FOR GLASGOW'S FIRST 'GREEN' BUSINESS CENTRE

Glasgow's first purpose built 'green' business centre is set to form part of the City's east end regeneration. The 'Glasgow Greenhouse' will be built on a Scottish Enterprise Glasgow owned site between Duke Street and the Gallowgate and will play an important role in the rebirth of this area of the city.

The planned three storey, 40,000 sq ft building will provide 34 new office and workspace units. It will make use of the latest green technology to make it the most energy efficient business centre in the City.

"The design of the building will mean it makes the most of natural light and high tech insulating materials, in fact every detail of its design will be driven by resource efficiency," said SE Glasgow's sustainability manager, John Crawford. According to Mr Crawford good design is one of the easiest ways of cutting down fuel bills. The Glasgow Greenhouse aims to achieve an "excellent" BREEAM rating.

"Simply by using innovative design we won't have a need for air conditioning in this building, thereby cutting fuel bills in comparison to mainstream offices." he said. Most commercial buildings use more energy in the summer for air conditioning than they do for heating in the winter. The natural ventilation built into the new development means it is not only better for the environment but also healthier for the people working there.

Regulations are also pushing the construction industry down the road to improved resource efficiency. "In 10 years time, we'll probably reach a point where developers & landlords can't let their buildings unless they achieve a high environmental standard. The industry is beginning to wake up to this and green buildings are attracting a lot of attention" commented Mr Crawford.

Long term it is hoped that the Glasgow Greenhouse will also become a centre for the fast expanding environmental industries sector.

"The market for renewable energy, waste management, water management, land reclamation and other so called green industries will be worth an estimated £250 billion over the next 40 years," said Mr Crawford, *"This building will give Glasgow a head start in providing the type of accommodation companies in this sector will want to move into helping the city develop as a truly 'dear green place' for businesses of the future."*

SE Glasgow is currently under negotiations with a number of project partners to take the project forward.



For more information on development opportunities contact, John Crawford, Sustainable Development Manager on 0141 242 8278.

A 'RENEWABLE' EXPERIENCE OF PV MASS CUSTOM HOUSING IN CANADA

Dr Masa Noguchi
Mackintosh School of Architecture

The Solar Decathlon is a competition, in which teams of college and university students compete to design, build, and operate the most attractive, effective, and energy-efficient solar powered house. In 2005, the Canadian Solar Decathlon Team composed mainly of engineering students at Concordia University participated in the competition and showcased their low energy house. This solar photovoltaic (PV) house was the only Canadian entry to have competed in the Solar Decathlon that took place in Washington, D.C. in October, 2005 (Fig.1). The house was featured not only by a 7kW PV system that covers the rooftop area of approximately 74.25m² (13.5m x 5.5m). The 40BP PV solar module (1.595m x 0.79m) is rated at the conversion efficiency of 13.9% and featured by 175W output with a maximum voltage of 35.7 V and a maximum current of 4.9 A. In addition to the generation of electricity, the roof was also designed to capture the heat generated by the PV arrays in order to supplement the indoor space heating (Fig.2).

The house consisted of a small-sized bed room, a living room and a kitchen/dining space and was constructed by making use of a prefabricated modular system that helps lessen exposure to site nuisances such as bad weather, theft and vandalism. In order to enhance the innovativeness of the architectural design approach, the author was assigned to mass-customise this ready-designed PV solar house and develop an interactive mass custom design (MCD) communication tool. In the scenario, this solar housing model is used as a display home, where potential homebuyers are allowed to examine the product quality, while the MCD communication tool assists the end-users in selecting standard design components given for the customisation.

In this project, the design options were confined to the volume and exterior components. In consideration of disabled wheelchair access, the volume design components included two options for the entrance: ramped or porch entrance (Fig.3). Moreover, a skylight that affects both the interior volume and the natural day-lighting was featured as a solar option.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8

Figure 1 & 7. Solar Decathlon 2005 held in Washington, D.C.
 Figure 2, 3 & 8. Canadian Solar Decathlon Housing
 Figure 4. MCD Communication Tool: Volume and Solar Options
 Figure 5 & 6. MCD Communication Tool: Exterior Component Options

As for the exterior components, standard design options concerned materials, colours and textures applied to the walls, fascias, and window/door frames. Also, additional choices for the colour of PV modules that were integrated seamlessly into the rooftop were given to enhance the architectural attractiveness and integration (Fig.4&5).

The use of the MCD communication tool encourages housing suppliers to standardise the design components, yet the high level of customisability in housing is still maintained. In subdivision developments (and export housing sales), the houses tend to be monotonous due to the mass-production for economies of scale; however, they can also be customised when the MCD tool that facilitates the user choice of standard design components is brought into effect. In short, homes need to be designed to meet the wants and needs of individuals and society. PV mass custom housing can be considered as a prototype of sustainable homes that also appeal to the Scottish market, where the pressure to adapt affordable, customisable, and sustainable measures to housing is being intensified.

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THE PV ZERO-CARBON MASS CUSTOM HOME MISSION TO JAPAN

3RD – 5TH SEPTEMBER, 2007

This mission to Japan 2007 is aimed at offering construction industry professionals, academics and government officers opportunities to visit not only the state-of-the-art production facilities of four leading housing manufacturers in Japan, but also the sales centre (or housing park) where a number of model homes are displayed allowing potential homebuyers to examine the quality. The mission also extends its visit to an existing solar community that consists of 100 prefabricated homes that are usually equipped with solar photovoltaic (PV) power generating systems.

The PV ZERO-CARBON MASS CUSTOM HOME MISSION TO JAPAN 2007 corresponds with the global market needs and demands for housing of today and tomorrow and helps the participants gain the knowledge of contemporary housing technologies being implemented for the commercialisation of marketable and reproducible zero/low-energy houses. Furthermore, it also includes a post-mission strategic meeting that promotes the knowledge transfer between the participants. The mission is organised by the Centre for the Built Environment and the Mackintosh Environmental Architecture Research Unit, Glasgow School of Art.

COST (APPROXIMATE)

- Airfare: £800
(*according to departure city*)
- Hotel: £360
(*£90 x 4 nights*)
- Meals: £80
(*£20 x 4 days*)
- Registration fee: £200
(*Bus, interpreter & lunch box arrangements*)

N.B. Funding may be available through your local Business Gateway-International office. Glasgow companies can visit Glasgow City Council's website <http://www.glasgow.gov.uk> for information on eligibility and funding.

For more information on funding, please contact the Trade Development Team, Glasgow City Council, at 0141 287 7236.

REGISTRATION for PV ZERO-ENERGY MASS CUSTOM HOME MISSION TO JAPAN

To book a place, please complete and send the form you will find on the flyer for the event on the CBE website www.cbe.org.uk

**MACKINTOSH SCHOOL
OF ARCHITECTURE
THE GLASGOW
SCHOOL OF ART**

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KIT-OUT THE PARK

(KNOWLEDGE, INNOVATION AND TECHNOLOGY OUT OF UNIVERSITY INTO TOURISM)

IS YOUR BUSINESS IN THE LOCH LOMOND AND TROSSACHS NATIONAL PARK?



Glasgow Caledonian University and Scottish Enterprise Dunbartonshire have developed a new exciting project set up to encourage the uptake of the latest technological developments by small and medium sized businesses.

The KIT-OUT project is funded by the Scottish Executive's Expertise, Knowledge and Innovation Transfer Fund (SEEKIT) and the European Regional Development Fund (ERDF) until 2010.

In year one, the project will focus on businesses located in the Loch Lomond and the Trossachs National Park area and the team are working closely with other partners such as Scottish Enterprise Forth Valley and the National Park Authority to have a holistic approach.

The aim is to make tourism businesses in particular more efficient by improving their business practices and environment, resulting ultimately in real business benefits. The project will not only focus on direct tourism operators, but also their suppliers, from food manufacturers to heating engineers.

Ultimately the project aims to help make small and medium businesses achieve competitive edge through increased awareness of the latest technological developments and their subsequent implementation, and make it easier to develop innovative products and processes.

In practice, businesses may benefit from the project in the following ways;

- Increased profit, increased sales
- New products and markets
- Free events and workshops with focused support
- Free support to access grants and other forms of investment

Two of the areas identified where the University has expertise are related to the built environment: sustainable construction and renewable energy. Another three areas of expertise will include food technology, IT/communications and business processes.

Tourism businesses and their suppliers in the Loch Lomond and Trossachs area will receive a survey questionnaire asking them to identify needs, interests and ideas in the five areas outlined previously. Once the survey is complete, the project team will develop a series of free activities, from workshops and seminars to one-to-one sessions with Glasgow Caledonian University staff or visits to University facilities.

If you are a business in the Park area and have ideas for your business or simply wish to discuss the project, please contact Claire Bereziat, on 0141 331 8407, Neil Morris on 0141 331 8498 or Claire McCann on 0141 331 8497.

IRVINE BAY, SCOTLAND: IRVINE BAY URBAN REGENERATION COMPANY





Irvine Bay is located on the North Ayrshire Coast some 40 minutes from Glasgow. It is an area of outstanding natural beauty spanning 14 miles of sandy coastline with the four seaside towns of Ardrossan, Saltcoats, Stevenston and Irvine. It also includes Kilwinning, an old abbey town, now a popular commuter town.

The Bay covers approximately 35 square miles with a total population of approximately 88,000. Situated only 33 miles from Glasgow and with excellent transport links, it offers an ideal coastal environment for the Glasgow City region.

Irvine Bay URC was established in 2006 as a company limited by guarantee. It has an eleven member board consisting of five public sector members, five private sector members and an independent Chair, Baroness Ford of Cunninghame. We are determined to work with those who share our vision and passion for sustainable urban regeneration of Irvine Bay.

Irvine Bay's greatest asset is the bay itself. Much of the coast is lined with attractive beaches and yet the towns turn their back on the sea. Irvine is cut off from the harbour and its beach by the railway and even Saltcoats, which grew up as a resort, seems to treat the coast as if it were the back of the town. There is therefore a need to turn the towns back towards the sea by using the coast as the thread that links them together through the creation of a coastal park.

Landmark Developments

The development of each of the headlands along the coast will include a series of high-quality landmark schemes. Currently some of these sites are occupied by sites that detract from the area, supermarkets that turn away from the sea, disused industrial units and poor quality housing. The aim of the landmark developments is to punctuate views along the coast to link the area together and create a very prominent symbol of regeneration.

They include:

- Ardrossan Marina: A residential tower to create a landmark on the marina
- Ardrossan Headland: A second residential tower overlooking south Bay.
- Saltcoats : A high quality hotel development (*in a later phase*).
- Saltcoats Pier: The development of the pier (*in the future to include the supermarkets*).
- Stevenston Jetty: An extreme sports centre with a tall mast structure.
- Irvine Harbourside: A taller residential scheme at the southern end of the harbourside scheme.
- Coastal Beacons: Despite having a fantastic sea front there is little to do on the beaches. It is proposed that ten 'Coastal Beacons' be commissioned by architectural competition to provide facilities for visitors
- The Coastal Beacons could be cafes, shelters, temporary galleries etc. The competitions should attract highest quality architectural practices and the Coastal Beacons will eventually combine to create a tourist route of their own as well as serving coastal visitors.
- Coast Walkway: A key issue is to resolve access difficulties that make some parts of the coast hard to access. This will include access improvements as part of the town masterplans. However the most important project is the Mudflats walk.
- Public Spaces: Developments, Coastal Beacons and walkways should be knitted through a series of public spaces that create attractive areas for walking and recreation.

These include:

- Ardrossan Esplanade: The creation of a waterfront landscape as part of the residential development.
- Ardrossan South Beach: Working with the flood defence proposals, environmental improvements to this area.
- Stevenston Dunes: The recreation of the dunes and the development of an extreme watersports centre.
- Irvine Beach Park: Improvements to the main part of the park and the creation of a Links golf course to the south.
- Waterfront Development: The coastal park will be punctuated by waterfront development. This will normally include housing on the upper floors with ground floor uses such as cafes, bars and restaurants.

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A BREATH OF FRESH AIR FOR AYRSHIRE

ALLSEASONS AT THE MEADOWS, GALSTON, EAST AYRSHIRE



Much as been made recently in the news of ecologically sound building practices and environmental sustainability. These terms have almost become buzz words associated with what to look for in a forward thinking development. However these phrases and practices are nothing new to Andrew and Jennifer Malcolm, the owners of Allseasons at the Meadows, a 200 acre ecologically sound development in the west of Scotland.

Since purchasing the site in 1992, every consideration and decision they have made has been with the ecology of their own microenvironment and its greater impact in mind. With experience gleaned from their previous business, a successful landscaping firm, the Malcolms set about developing the site. Already an established wildlife habitat, they plan to develop the land to attract the UK and overseas tourism market and promote leisure activities such as walking, cycling, sailing and fishing.



To be built over two phases, the completed first phase included completing the road infrastructure around the site and a 25 acre loch with retained islets for roosting and nesting birdlife, such as oyster catchers, herons, ducks and geese. In the second phase building will commence on a luxury hotel, with electricity provided by solar panels and wind turbines, marina with Scottish retail outlets, restaurant and self catering New England style holiday homes.

The development will also provide a tourism Gateway for the Irvine Valley. This will take the form of four 'countdown' sculpture features along the A71 road, which passes the site. The design will create a symbolism of the past and the future, an historic textile centre and a green conservation theme.

The 200 acre site is situated in an area partly designated as flood plain, near Galston in East Ayrshire. East Ayrshire Council are implementing a multi million pound flood prevention scheme targeted to be completed in 2009 which will secure the area and protect it from flood risk.

Allseasons is a £100 million designated green development project and is also part of the rural stewardship scheme. The company's philosophy is the minimisation of the use of non renewable resources. Landscaped to a high specification the site is SEPA approved and works with them to monitor land reclamation materials.

These inert materials are received at the site and recycled. The hard inert materials are used around the site for the road infrastructures and the soft inert materials are used in landscaping and the planting of indigenous trees, shrubs and plants across the site.

The site operates a broad leaved planting management scheme. As well as being retained onsite some of these species have been transplanted on to community wide programmes supplying to local schools and local businesses.

The Malcolms take a keen interest in community initiatives and have regularly sponsored countryside awareness campaigns within local schools over the past couple of years as well as donating top soil for class gardening projects. Other onsite initiatives include provision of hatchery facilities for salmon and trout rearing, bee hives and bird nesting areas.

The site is home to over 40 species of bird, both endemic and migratory and has five RSPB red list (priority species of conservation concern) and 14 amber list (priority species of medium concern) on site. The site's biodiversity increases year on year and the company encourages visitors with a keen interest in nature and wildlife to visit the site. They have in fact been key in recording the annual activities and habits of the many species over the years. A wildlife diary will soon be available to web visitors at the company's website **www.allseasonsscotland.com**



Artist's impression of the luxury waterfront hotel, with health facilities and restaurant.



Artist's impression of the proposed harbour area.



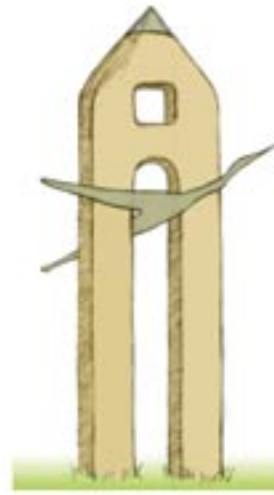
Planned for completion by Easter 2009, the leisure development aims to harmonise nature with tourism and showcase what this part of East Ayrshire has to offer. Andrew Malcolm is clear in his vision that as well as retaining the site's beauty it should also benefit the community in other ways. They encourage local school parties to visit and see the nature aspects of the site and each May the a popular Irvine Valley Walking Festival uses part of the site for one of its trails. On a larger scale this development can sustain and increase recruitment to the area. To accommodate this influx of employment, 50 acres of the site has been set aside to build affordable sustainable housing for local residents.

The homes will be built using eco-building practices in line with the rest of the development. A survey completed by Nationwide building society in April 2007, advises that 82% of respondents placed purchasing a home with environmental features over its proximity to the local school's catchment area. With house prices increasing against the rate of inflation, this type of opportunity will enable local residents to get onto the first rung of the property ladder with modestly priced homes which have all the mod con's and built with a green conscience.

The company is understandably proud of their achievements in sustainability, plant and wetlands management and have entered SEPA's VIBE awards in conjunction with European Business awards for the environment receiving recognition for their efforts in the form of a bronze award in 2005.

The Centre for the Built Environment invited Andrew Malcolm to make a presentation on the development to its academic co-directors CBE to identify areas where academics with expertise in sustainable building design and environmental management could possibly assist in this prestigious development. Discussions are ongoing and we look forward to the prospect of collaboration with Allseasons in the future to our mutual advantage.

For those interested in visiting the site, or further information, check www.allseasonsscotland.com for further details.



left: Example of Gateway Sculpture Feature

Derived from a combination of a flying shuttle and a stylised heron to portray both a historical representation of Galston through its textile industries and a symbol of future wildlife and tourism development.

To be constructed from timber with bronze bird and cap.

below: One of the many heron nesting at the Meadows.

bottom: A rare Great Spotted Orchid

Photography: Mike Cruise



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SCHOOL OF THE BUILT & NATURAL ENVIRONMENT MSc CONSTRUCTION ECONOMICS



This innovative new programme is aimed at graduates from a wide range of backgrounds who aspire to a career as a Chartered Surveyor. It is open to those holding degrees in a variety of disciplines, including Quantity Surveying, Civil Engineering, Architecture, Finance, Law, and Humanities subjects.

Throughout the year students will develop a sound understanding of the financial and economic aspects of the construction and property industries, whilst focusing on those industries in the context of the global economy.

Key areas covered will include: Finance and Development Economics; Procurement of Buildings and Infrastructure; Project Management; Briefing and Value Management; Project Finance and Dispute Resolution.

On completion of this course graduates can expect to gain employment in the surveying professions at a strategic level, in areas such as contractual and procurement systems, private finance initiatives and PPP.

This course is available on the internet, allowing you the choice and flexibility to study at a pace that suits your lifestyle and work commitments. Other study options include:

- Full-time (*over one year*)
- Part-time (*one day per week, over two years*)
- By Distance Learning (*web-based delivery over a flexible period*)

If you would like further information on this programme, please call 0141 331 3271 or email schoolbne@gcal.ac.uk

ELIMINATING DEATH AND INJURY ON SCOTTISH BUILDING SITES



The biggest challenge facing the Scottish construction industry is how to make building sites incident and injury free, that's why 180 representatives from right across the industry gathered in Glasgow on 30th April to look at the latest safety techniques and to hear the latest thinking from industry experts.



The event was organised by Bovis Lend Lease, the UK's leading provider of construction and project management services and the contractor behind the award winning Pacific Quay development. Speaking at the event, Gordon Anderson, Head of Scotland for Bovis Lend Lease UK said:

"Ensuring construction workers are safe on site is not just a legal obligation, it's a moral one. Bovis Lend Lease is totally committed to achieving incident and injury free sites wherever we operate globally. The interest in today's event shows that we are not alone."

Other speakers at the seminar were:

- Murray Coleman, Chief Executive, Bovis Lend Lease UK
- Tom Haughey, Severfield Reeve Structures
- Kevin Mouatt – MD, SGB Contracts & President of the National Access and Scaffolding Federation
- Bernard Warden – Health and Safety Executive
- Dr Billy Hare – Glasgow Caledonian University
- Tom Stocker – Pinsent Mason

GLIMMERS IN LIMBO: SITE-SPECIFIC INTERVENTION AS A STRATEGY FOR SHAPING THE BUILT ENVIRONMENT



Spectator-participants are invited to navigate Tramway using the routes of Glasgow's former tram network marked on the floor - telescoping the city within the walls of the building.



Signage on the Britannia/Panopticon's facades - from the mid-nineteenth century to the 1970s - forms an interactive animated projection on the windows of the building.

Glimmers in Limbo is a three-year programme of practice-based research undertaken by artist Minty Donald. It is funded by the Arts and Humanities Research Council and hosted by the Mackintosh School of Architecture at the Glasgow School of Art.

The project starts from the premise that professional approaches towards, and popular perceptions of, the built environment are generally focused on the formal or functional aspects of architectural space. While this is perhaps to be expected, given the pragmatic imperatives of planners and architects, it promotes a perception of the built environment as static, circumscribed and rational. Our readings and uses of the spaces and places we build and inhabit become limited and fixed. This emphasis on the formal or functional is reinforced by the abstract and impersonal ways in which the built environment is commonly represented in architects' drawings and models, or planners' maps. These approaches exclude the individual, idiosyncratic, imaginative - living - relationships we have with our environments.

Glimmers in Limbo aims to consider alternative means of representing and engaging with the built environment - piloting an approach that puts personal experience at its centre. Through the creation of a series of site-specific interventions, the project's intention is to explore the potential - and limitations - of temporary site-specific artworks in shaping and critiquing perceptions and conceptions of the built environment.

A number of interventions - artworks which invite spectators to participate actively in their creation and reception - are currently being developed by Minty Donald in two contrasting, but complimentary, sites in Glasgow - the Britannia/Panopticon music hall building on Trongate and contemporary arts venue, Tramway. These are scheduled for final public 'showing' in October 2007 (***Glimmers in Limbo: Britannia/Panopticon***) and January 2008 (***Glimmers in Limbo: Tramway***)

Both sites have been chosen as examples of buildings in flux - whose changing functions, fortunes and appearances demonstrate notions of space and place as fluid and mutable.

Tramway, built in the 1890s in Glasgow's Southside, has been an industrial site (as the city's tram manufacturing works) popular family destination (as Glasgow's museum of transport) and home for 'high' culture, in its current guise as a contemporary arts venue.

The semi-derelict Britannia Music Hall, until recently buried in a city-centre warehouse, was once at the heart of Glasgow's working class entertainment district.

They wear the evidence of their histories in their fabric - the layers of the Britannia's flaking paintwork, the steel tramlines in Tramway's floor. Both are sites of multiple, competing narratives bound up in the social and cultural fabric of Glasgow. They are sites in which the varied interests and investments of those who use and remember them are interwoven, whose histories and potential futures are unresolved.

Throughout the development of the project, work in progress 'showings' of the interventions have been taking place on both sites. Observation and documentation of these 'showings', together with audience feedback, continues to inform and shape the interventions as they evolve - reflecting ongoing changes at both sites and in their wider social, cultural and geographical contexts. At the final public 'showings' in October 2007 and January 2008, a wide range of spectator-participants will be encouraged to experience the interventions. These will include Tramway employees and casual visitors to the café, Britannia/Panopticon volunteers and user-groups (such as the local branch of the Laurel and Hardy Appreciation Society), as well as invited 'specialists': architects, planners, curators and conservationists. Their responses will be collected through workshops and discussions. The hope is that new, unpredictable reactions to the interventions, and to the sites themselves, will emerge, offering fresh insight into our relationships with the places and spaces that hold our cultural memories - the sites that allow us to juxtapose alternative interpretations and images of our pasts and presents, and to imagine our futures.

Minty Donald

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KEITH MCCARTER, SCULPTOR, PARTICIPATES IN CBE SEMINAR SERIES

CBE are delighted to announce that Keith McCarter has accepted an invitation from them to hold a seminar on his work and his views on the role of art in the built environment on 21st June 2007, in Glasgow. Keith is a sculptor based in the Scottish border town of Galashiels who has undertaken numerous commissions both in the United Kingdom and abroad. His work is in collections world-wide and ranges in scale from small, domestic sized pieces, to monumental work related to architecture or landscape situations.

Primarily concerned in creating work within the built or landscaped environment, Keith has carried out numerous commissions in a diverse range of media and has worked with many eminent architects on a wide variety of projects world-wide.

The majority of his work has been realised in bronze or stainless steel, often incorporating the use of water, but he has also designed work in concrete, granite, grp. and a host of other materials which has ranged from individual murals and reliefs, to retaining walls and complete cladding of buildings.

He has also worked as a member of several design teams responsible for urban design strategies and is currently retained as consultant to the ForthQuarter waterfront development in Edinburgh.

Keith's sculpture, *Continuum*, (above) was commissioned by John Menzies.



DESIGN FOR LEARNING: SCHOOLS FOR THE 21ST CENTURY

THE LIGHTHOUSE, SCOTLAND'S CENTRE FOR ARCHITECTURE, DESIGN AND THE CITY

The Design for Learning Programme (2004-2006) was initiated to involve pupils in generating ideas for buildings that inspire and motivate teachers and pupils to maximise their individual and collective educational potential. The project has generated new ideas about the way in which pupils can impact on the quality of a school's design in order to raise educational achievement, promote sustainable development and support a culture of lifelong learning within local communities.

The Lighthouse worked in partnership with nine local authorities, during the course of the project. The expertise developed has also led us to act as a consultant to seven local authorities: designing and delivering consultation workshops and strategies that integrate pupils into the school design process and supporting professionals in learning from pupils' experiential expertise.

A series of project types were identified as valuable precedents but with the potential for further development. Firstly, it was important to avoid projects that centred on professionals gathering information from young people and children. Where professionals had been left to prioritise the information gathered they did so according to their own agendas, values and preconceptions. They often gave the information a low priority in relationship to adult concerns especially when some time had passed. In cognisance of these projects DfL aimed to develop projects that deepened the democracy and increased the participation of young people and children.

Secondly, it was important to avoid projects where young people and children's involvement was restricted to creating decorative interventions, often working on discreet design projects isolated from other users and stakeholders. However the success of these past projects in creating temporary ownership had provided important learning. DfL aimed to maintain this ownership as an outcome. However we also aimed to increase our ambition by focusing on processes to involve and reflect on pupils' experiential expertise as users of a school. DfL found that high levels of participation successfully maintained a sense of ownership from both the adults and the pupils involved.

There were a number of additional research themes that emerged from discussions with architects and designers. Many of these creative professionals were unsure of how to develop the connections, reflections and aspirations of young people in relationship to their environment without their own values having a leading and formative impact on the priorities that the young people used to brief and evaluate design. They were also concerned about the impact of the commercial procurement process that is being used for some schools. They were aware of the impact of financial concerns on the design process and questioned whether the private sector would see an advantage in involving young people and children.



Consultation workshop

From this The Lighthouse has expertise in developing consultation strategies and participatory workshops that explore the following:

- Developing and communicating a brief for consultation. This ensures that you consult on only what can be affected.
- Investigating your relationship to learning and your environment: This ensures that users do not overemphasise what they currently lack but also reflect on social, cultural and environmental aspects of their current built environment.
- Advocating for aspirations: This phase allows users to explore the relationship between use and design and decide on their own aspirations.
- Building Consensus: This ensures all users have an opportunity to explore a range of aspirations, critique them and set joint priorities for the future.
- Design reviews: These allow users to explore design ideas. We support professionals in communicating designs using displays that users can fully understand and critique by relating them to their own aspirations and experience.
- Think and Do Tanks: These forums ensure that stakeholder and users understand each other's priorities and can negotiate consensus and set joint priorities.



Model of design ideas

The Lighthouse continues its work in developing good user client-ship in a number of different ways:

Senses of Place: This project is an integral part of the Scottish Executive's School Estates programme. During 2007 we will work with five local authorities. Workshops will be held to explore the aspirations of their education professionals, communities and users for spaces that support 'Curriculum for Excellence'. These aspirations will inform a design challenge that will bring together some of Scotland's leading architects and designers to create exemplar designs for schools. This work will be disseminated via a publication, a conference in December and an exhibition at The Lighthouse in 2008.

Consultancy for Local Authorities and Architects: The Lighthouse continues to offer consultancy on school design to enable clients to introduce or further develop their consultation of users for school design.

Designs on My Learning, a guide to involving young people in school design. This publication, available free from The Lighthouse, acts as a resource and manual for those involved in developing school consultation strategies.

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THE NEW CONSTRUCTION INDUSTRY SCHEME CBE ROADSHOW IN PARTNERSHIP WITH HM REVENUE & CUSTOMS



The snow covered landscape made the journey to the Aviemore event a treat for CBE staff

The Centre for the Built Environment organised a series of seminars throughout Scotland in partnership with HM Revenue and Customs who provided speakers to raise awareness of the new Construction Industry Scheme (CIS). The seminars took place in Inverness, Aberdeen, Fort William, Glasgow, Edinburgh, Irvine, Dumfries and Stranraer.

CBE would like to thank the following organisations who assisted greatly in the organisation of the events in their areas and to all staff involved in HMRC for their time and sponsorship to allow all seminars to be free to delegates:

- The School of the Built and Natural Environment, Heriot Watt University
- North Ayrshire Council
- Dumfries & Galloway Construction Industry Forum
- Scottish Enterprise Inverness
- Scottish Enterprise Fort William
- Lochaber College
- The Scott Sutherland School of Architecture, The Robert Gordon University

CBE would also like to extend their thanks to all delegates who attended and to their local hosts at all venues for their warm welcome.

Here is a very brief summary of the changes. For information on the new scheme please refer to www.hmrc.gov.uk/newcis or call the new CIS helpline open 8am – 8pm seven days a week on 0845 366 7899



Carol Halliday of HMRC with delegates at the Dumfries event

Whether someone is employed or self-employed depends upon the terms and conditions of the relevant engagement and not whether the subcontractor has a CIS4 card. If you are a contractor, it has always been your responsibility to correctly determine the employment status of your workers and from April 2007 you will also need to sign a declaration that you have done this.

New Scheme

There will no longer be any cards, certificates or vouchers.

Verification Process

On engaging a subcontractor who has not worked for them for a set period of time, the contractor must contact HMRC to ascertain whether the subcontractor should be paid net or gross.

Payment

The contractor will make payment to the subcontractor - in accordance with the net or gross instructions given by HMRC.

Monthly Returns

Contractors will submit a monthly return to HMRC which will include a declaration that the subcontractors listed are not employed.

No Need to Re-register

Contractors and subcontractors who are already registered under the current CIS scheme will not have to re-register for the new scheme.



Anyone who had emigrated from Scotland in the past two decades on returning to these shores would notice a dramatic change in our built environment. The scale of the ongoing regeneration within Scotland is staggering and unprecedented in our recent history. The cumulative effect of this myriad of build programmes is that we are changing the face of Scotland for a new generation.

These new environments are places where future generations of Scots will work, live and play. In addition we compete in a global market place and our built environment will leave a lasting impression on visitors, tourists and investors.

All those involved in this regeneration process would say that they had the same goal- to create inspiring, safe, secure and sustainable environments, but our thoughts and actions often occur in isolation. However, the resultant environments we create affect everyone.

So if we are to create a successful legacy for future generations how do we make sure we get the physical environment right?

For a number of years Police Architectural Liaison Officers have worked with architects, planners and developers to collectively design out crime. Today this partnership is more important than ever. These specially trained police officers do not possess specific expertise in design, architecture or planning legislation. They are experts in crime and criminality, and are amongst the best placed individuals to understand the complex relationships that occur within our social and physical environments.

Ideally the police, architects, planners and developers should meet prior to planning submission whereby there is greater scope to consider challenges and identify appropriate solutions. In addition, retrospective solutions will always be less effective and may compromise the original design and functionality of the development, as well as adding considerably to costs.

Using a set of minimum standards that have been developed from research, evaluation and good practice, Police Architectural Liaison Officers can provide a detailed risk assessment for the development and surrounding environment. Any required enhancement to these minimum standards will be evidenced against the known crime risk.

Security should be integrated with normal operational procedures and Police Architectural Liaison Officers, whilst considering the physical environment, will also bring attention to the management processes required to ensure improved levels of sustainability.

Where planning restrictions, fire regulations or building controls restrict the range of safety and security measures that can be applied, a suitable compromise can very often be found. Build programmes by their nature are full of challenges and conflicts however they also present great opportunities to create quality, well-used and sustainable places.



DESIGNING OUT CRIME DESIGNING IN SUCCESS

An excellent example of such an opportunity exists on the Clyde Waterfront. This long-term, multi billion pound project will see the transformation of approximately 300 hectares of prime derelict and vacant land and hopefully return the River Clyde to its rightful status as 'the heart of the city'. However, if you were to walk along its banks today you would be met with inconsistency in the quality of environments it provides. Poor natural surveillance, undefined space and use, conflicting ownership and lack of investment and management have led to a number of potentially dangerous areas that generate high levels of crime.

Many of the existing developments have been created in isolation and the resultant collage of environments is visually confusing and does not present an image of safety and security. Nonetheless a golden opportunity remains.

Strathclyde Police has dedicated resources to this iconic project and through a partnership comprising local authorities, architects and private developers hope to establish a template for success. Using the principles of Crime Prevention through Environmental Design, Secured By Design and the Scottish Executive's Planning Advice Note 77 -Designing Safer Places, good practice can be identified and a set of agreed minimum standards for this unique physical environment established. An opportunity now exists to learn from past mistakes and embed what we have learned in our planning legislation and local plans whereby we can be guaranteed that any new development will bring harmony and additionality to the wider waterfront environment.

If we work in partnership and respect and understand each other's contribution we can create safe, secure and sustainable environments. Security needn't compromise design and vice versa. So let's think and work collectively. This is simply too good an opportunity to miss!

For further information on the ARCHITECTURAL LIAISON SERVICE or to arrange an appointment to discuss a project please contact:

Insp. Billy Graham
tel: 0141 532 2695
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NEW WAYS OF FORMING CONCRETE

Introduction



Wall panel using fabric

Concrete is often perceived as a plastic, sculptural material, able to take any shape. In reality the geometry of cast concrete is often constrained by the limits of the formwork. Different ways of producing formwork can lead to new geometries whilst maintaining the technical rigour of efficient construction. An example is the use of fabric as formwork. Being flexible fabrics can only carry the weight of the wet concrete by tension and hence the finished shape of the cast depends on the initial shape of the fabric, its initial pre-tension and the tensile properties of the fabric itself.

By careful shaping of the fabric it is possible to produce complex shapes that would otherwise be difficult to manufacture using conventional formwork systems. The controlled permeability of fabric can also improve the durability and finish of concrete. Fabric cast concrete has the potential to produce concrete elements that are structurally efficient, responsive to construction process and develop a heightened sensitivity and awareness to the architectural expression of the surface.

The potential for fabric cast concrete has been explored via a series of full-scale constructions undertaken in the Architectural Workshop at the University of Edinburgh. The results have shown that there are considerable benefits with these techniques in comparison with conventional formwork using planar material.

Low cost – inexpensive formwork: The most efficient way of carrying any force is by axial tension. Casting in fabric will cause the fabric to adopt the most efficient geometry to carry the weight of the wet concrete. The formwork needs little or no additional bracing other than direct support of the fabric itself. The key is in controlling the geometry and deformation of the fabric to achieve the required shape. The fabric itself is relatively inexpensive and many different types are suitable for use.

Structurally efficient forms: The fabric can be shaped to produce form-active structural components such as beams and columns, elements with variable cross-sections that change in both depth and breadth to follow the principle structural actions. The quantity of concrete used and hence the self-weight of the structure can therefore be considerably reduced compared with conventional rectangular cross-sections.

Improved quality of concrete The porous nature of the fabric aids compaction, curing and the surface finish of the concrete. The benefits of permeable formwork liners in conventional concrete formwork are now becoming established. During casting excess water and air is allowed to bleed through the fabric. Blemishes and air holes are reduced with improvements in surface texture and appearance. The density, strength and durability of the surface concrete are also improved. It is also possible to determine if the formwork is filled completely during casting.

Prototype constructions

A large number of prototype constructions have been completed.

Initial studies involved casting simple rectangular panels. Fabric was stretched across a rectangular steel frame. The steel frame was raised off the ground and various forms were placed under the fabric. When the concrete was cast the fabric deformed over the forms underneath to produce contoured surfaces. The fabrics used were simple textile fabrics, cotton and polyester woven and non-woven fabrics.

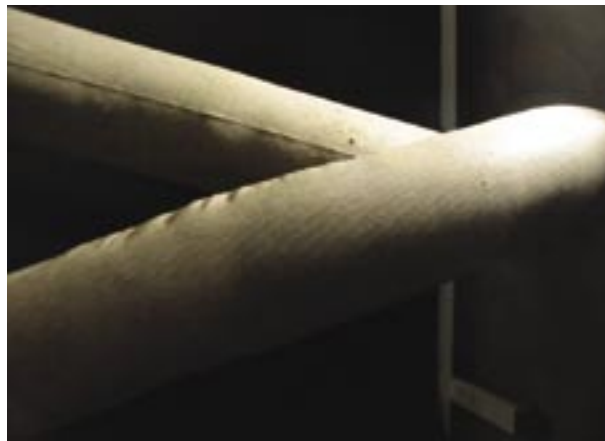
The research has developed through a series of more complex projects to produce columns, beams, panels and walls. For columns a purpose designed, adaptable casting rig was manufactured that can pre-tension the fabric prior to casting. Pre-tensioning is essential to counter the hydrostatic pressure of the wet concrete. A tube of fabric is passed a hole in the lower frame and fixed to the underside of the plywood and fixed to underside a second sheet of plywood is attached to the underside of the first sheet sealing the base of the column. The fabric tube is then stretched similar hole in the upper frame and fixed to the top side of the plywood. Tension is induced in the fabric by jacking the top frame upwards. Concrete is then poured into the form through the top hole. A series of columns with differing geometries and surfaces were constructed this way.

A highly efficient structural beam has also been developed. The beam has a T shaped cross-section in which the web tapers from a maximum depth and breadth the mid-span to zero at the supports. The form was produced from a single rectangular piece of fabric. The beam uses less concrete and less steel than a corresponding rectangular beam. To date a total of nine beams have been constructed and tested confirming the dimensional accuracy consistency and structural behaviour of the technique.

Possibly the first project to use the technique in the UK has recently been completed. In collaboration with the architectural practice E and F McLachlan bespoke external concrete panels were designed, prototyped and manufactured in the Architectural Workshop. The panels have recently been installed in a social housing project in West Lothian.



Wall panel using fabric



Fabric formed beam



Fabric formed column

For further information please contact:

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FREE ASSISTANCE FOR CONSTRUCTION SMES

The Sustainability Centre in Glasgow received funding from the Scottish Executive (SEEKIT) and European Regional Development Fund (ERDF) to provide free help and assistance to construction SMEs based in the West of Scotland to become more sustainable and competitive. Project assistance allows companies to make their bids more competitive, improves awareness of environmental issues, and in general, makes companies think more about how they can improve their business practices. To date, twenty-five companies have been assisted through the following project deliverables:

- Construction of an Environmental Policy Statement
- Development of a Site Waste Management Plan
- Carbon Footprinting
- Web Site Design

The benefits of SMEs (an SME is defined as company with less than 250 employees and with less than £26 Million turnover) participating in the project include 100% free professional help towards meeting corporate environmental objectives; compliance with environmental legislation; operational cost reduction; business improvements and subject to company approval, inclusion in case studies and publicity.

REDUCE YOUR COMPANIES CARBON FOOTPRINT WITH PROJECT ASSISTANCE @ THE SUSTAINABILITY CENTRE IN GLASGOW

A Background to Carbon Management

As the start of the first commitment period of the Kyoto Protocol in January 2008 rapidly approaches, more governments around the world are taxing and regulating greenhouse gas (GHG) emissions. Such emissions, now commonly referred to as carbon emissions due to the predominance of carbon dioxide in most countries' emissions profiles, carry potentially serious financial implications for businesses. With emissions at the sharp end of the UK Government's recent "war on carbon," there is the potential for a real financial impact on the business community as a whole, and SMEs in particular. However the regulation of carbon emissions being implemented across Europe and elsewhere, presents both opportunities and challenges.

For businesses to understand how their financial performance may be affected in the future, it is essential that those accountable understand the impact of the emissions that their business produces. Economic activity and carbon emissions can be closely correlated such that as a company grows economically, an associated increase in carbon emissions results in a greater environmental impact on climate change.

Promoting Sustainable Business
Competitiveness in Construction SMEs



www.sustainabilityinconstruction.org

However, increasing process efficiency can mean reducing this growth in carbon emissions whilst increasing economic activity. Thus, the carbon footprint can be used as a business performance indicator; with footprint monitoring providing an ongoing understanding of a business' sustainability and competitiveness.

To date, four companies have been supported via carbon footprinting. Factors contributing to their company's carbon footprint and the quick win and longer term recommendations to improve their company's footprint have been identified and presented in a bespoke company report.

Recommendations for a Reduced Carbon Footprint

Recommendations cover energy, waste and transport use and have involved:

- Nominating a member of staff to be accountable for monitoring and reporting the carbon footprint to the company.
- Conducting a full energy audit and creating an inventory of the energy profile of usage in the company, including setting a reduction target mandated by the Chief Executive of the company.
- Undertaking a waste audit to produce a waste management action plan, including implementing separate waste streams for recyclable wood waste, paper and organic waste.
- Installing an indoor composting system for organic food waste.
- Developing a company transport policy to reduce transport emissions.
- Switching to a renewable energy sourced electricity supplier.
- Undertaking a materials inventory to balance resource input with waste output.

If you are interested in becoming involved in the project, please contact project manager, Dr Kirsty Hunter, on 0141 331 8256 or, for an informal chat about carbon management, please contact Dr Charlie Russell on 0141 331 8427.

AGE POSITIVE

ENCOURAGING AGE DIVERSITY IN THE WORKPLACE



A diversely aged team working together advantages the company

The Construction sector currently employs 2.2 million people (8% of the national workforce) in about 206,000 organisations. These are mainly small firms (92% employ fewer than 11 people). The sector covers all types of construction - commercial and domestic, civil engineering, roads, railways, finishing trades, installation (electrical and plumbing) etc. 50% of the workforce is in skilled trades, and a high proportion of the workforce is aged 50 or over.

There are some common practices within the sector which employers should review in order to avoid breaking the Age regulations introduced last October:

- Firms shouldn't use length of experience as a substitute for assessing competence - they should base their decisions about recruitment on the skills required to do the job.
- Using physical strength as a recruitment criterion is lawful only where the requirement is genuine. It is deemed unlawful if used randomly when not necessary - physically capable to do the job is different from being physically strong - there are differences related to gender as well as age.
- Using length of service, or the familiar "last in, first out" scenario as the basis for redundancy decisions is indirectly discriminatory.

There are some practices used in the construction industry that, although less common, are nevertheless unlawful, and should be avoided if firms who still use them wish to stay within the law. It has been identified that:

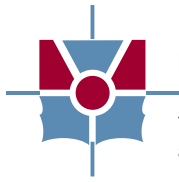
- 10% of firms still use age as one of their recruitment criterion
- 27% of firms specify a maximum recruitment age that can be more than 6 months before the firm's standard retirement age
- 12% of firms use age as a basis for a starting salary.

It is worth noting that construction firms appear to be more willing than other sector employers to allow employees to stay longer in employment than for other industries. However, they appear less likely to recruit people over 50 years of age, despite the acknowledged labour and skills shortages faced by the industry and the valuable skills many of these workers bring with them.

In summary, employing a diversely aged workforce, based on ability, skills and experience not only keeps firms within the law, but is actually good for business.

If you want to know more about Age Legislation, how it affects you, and to see some examples of good practice, please visit the Age Positive (part of the Department for Work and Pensions) website at;

www.agepositive.gov.uk



BESPOKE CONSULTANCY AND RESEARCH SERVICES

There are many areas where specialist advice or research from our academic staff can be offered, and CBE acts as a channel to allow businesses to access this, for example:

- **for specific projects** - are you working on a project which requires you to outsource advice from a specialist?
- are you **bidding for a project** and need specialist advice for input to the bid or **prequalification questionnaire**?
- would you like to discuss having **specific research** carried out which would give you a **competitive advantage** or **increase your reputation** as a specialist in a particular market?

We would be delighted to discuss your company's requirements and can also assist by:

- Developing bespoke consultancy sessions on the topics you require and delivering them to your staff in-house.
- Delivering seminars from the CBE series to your staff in-house.
- We welcome your suggestions for topics for our regular weekly seminar series.

If you are interested in finding out more about any of the above, please contact Anne Blacklock, Business Development Manager, on 0141 273 1411 or email: anne.blacklock@gcal.ac.uk

For a complete listing of all the expertise available and recent research at each of the institutions please refer to the CBE website www.cbe.org.uk

KNOWLEDGE AND TECHNOLOGY TRANSFER IN THE BUILT ENVIRONMENT (KTTBE)

Award Winners

- ScotMark and gm+ad architects to undertake a feasibility study focused on how architecture practices can capture experiential knowledge and practice-based research and transfer this more widely.
- The Mackintosh School of Architecture and DRC Environment Trust Ltd to prepare a feasibility study focusing on integration of wind turbines into high-rise housing.

If you would like to find out about the KTTBE award scheme please refer to CBE's website:

www.cbe.org.uk/awards



SCOTTISH EXECUTIVE

CBE has launched a new website which is updated daily.

It has our complete list of forthcoming events and expertise available through CBE and lots more valuable information.

Have a look... www.cbe.org.uk

