

# GreenSpec

## A BRIEF INTRODUCTION TO RECYCLED MATERIALS AND PRODUCTS

by Brian Murphy

Recycled materials come in two forms. The basic form is that of raw materials such as aggregate, concrete and masonry. The more advanced form is the inclusion of raw materials in building components themselves.

### RAW MATERIALS

It's a nice idea to build with recycled materials, but at the moment it means hard work for the design team and usually requires the input of an enlightened client.

### WHO SOURCES THE MATERIAL?

#### **The contractor?**

Writing the requirement to use recycled materials as a performance specification clause means the Tenderer/Constructor has to find materials in sufficient quantity and select appropriate solutions to meet the requirements. If normal tender periods are used then this cannot happen in the time available. This approach to clause writing will probably cost the client a lot of money.

#### **The specifier?**

Specifying directly means the design team needs to find, identify and stake a claim on sources of such materials and document all of it (advanced reservations which involve the client committing to expenditure) to be as helpful to the Tenderer as possible. Typical sources might include:

- potential deconstruction or demolition waste on the site to be developed, if there is any.
- unused building due for demolition,
- stocks of reclaimed materials in yards in sufficient quantities.

Bill Dunster of BedZED Sutton and Earth Centre Doncaster fame is an exponent of this approach to construction. Bio Regional are good guides to procurement methods for finding materials as are the Yellow pages.

### PROBLEMS

#### **'Fit for Purpose'**

Adding 'Fit for Purpose' ensures the material used are suitable, but in whose opinion and on what terms? Who is evaluating tenders, assessing and checking proposals?

Strength and Toughness are familiar issues which may be addressed but what about human and environmentally friendly? Probably not, don't forget tendering is mostly about doing it cheaply and rarely about doing the environment any favours.

The criteria for success need to be specified but there are a number of publications from CIRIA and the BRE that can help.

## **'Of Merchantable Quality'**

Of 'merchantable quality' will very likely be an issue, second hand materials can do the job but selection will take time. Commercial developers usually want 25 year guarantees from manufacturers there are none in the case of second hand materials. Again, refer to information from CIRIA and the BRE.

## **Building Regs**

Building Inspectors require 'Proper Materials' i.e. BBA certificate or BSI Kitemark or 20 years track record, not so easy with new components made from second hand materials. There are exceptions: recycled newspaper as thermal and acoustic insulation and recycled plastic as new pipes.

## **Aggregate and Concrete**

There are British Standards now for many cement with reduced cement content using aggregates as substitutes, These are often used as a cement substitute to reduce cement content in concrete, this helps to reduce CO2 emissions in cement production.

PFA (Pulverised Fuel Ash (crushed coal)) has been in use for decades and might be okay.

Blast furnace aggregate is too broad:

Bottom ash is highly toxic;

Fly ash is possibly OK;

Mixed is better but still toxic. It has been used in concrete blockwork, loose gravel and road construction lately. Government figures for acceptable levels of exposure should always be critically appraised for instance drilling holes into such concrete, and blowing the dust out of holes into your face and nose could be lethal in the long term.

## **Limecrete**

Limecrete instead of concrete could be recycleable because of the special nature of lime and its ability to recycle, but it's limited in its use due to its lower strength than concrete.

## **Plastic**

Recycled plastic as large and small aggregate and sand substitutes in concrete originating from New Zealand is about to be manufactured and launched in the UK. It has the advantage of working to stop crack propagation giving concrete the added strength in bending tension.

## **Masonry**

- Getting large quantities of one type of brick will be difficult,
- Commercial developers usually want New materials, another hurdle to overcome.
- Recycled bricks as facing bricks are only practical and cost effective if the original building was made with lime mortar which is easily removed.
- Recycled blocks are unlikely since as far as we know they've always used cement mortar,
- A recent AJ had a Brick Bulletin style article about second hand materials in buried walls of common quality.
- Brick can be crushed and used as an earth substitute or a mulch or paving in landscape. There are many other uses!

Recycled stone is only practical if the original building was made with lime mortar or stones are of sufficient size to allow recutting.

Recycled concrete, stone and brick can be used as gabion infill, reduced further and used as hardcore, further still as aggregate in concrete, or as paving gravel and landscape mulch and soil substitute.

## COMPONENTS USING RECYCLED MATERIALS

Walls floors and masonry are not the only areas where recycling can be exploited. There are many other opportunities to use components including recycled materials throughout the building:

- Recycled Glass as aggregate in a terrazzo like paving, and in roofing paviers
- Recycled Glass as glass tiles, paviers and bricks is common,
- Recycled Glass as loose aggregate and mulch in landscape.
- Recycled Glass car windscreens as thermal insulation (Foamglas)
  
- Recycled plastics as boards in wall linings and toilet cubicles
- Recycled plastics in street furniture, signage, and landscape fencing.
- Recycled plastic as large and small aggregate and sand substitutes in concrete originating from New Zealand is about to be manufactured and launched in the UK. It has the advantage of working to stop crack propagation giving concrete the added strength in bending tension.
- Recycled plastic as aggregate in concrete street furniture
- Recycled plastics as timber substitutes and board are available for use in internal furniture.

## CONSTRUCTION AND DEMOLITION WASTE

Waste management on site during construction will also reduce waste generated by this project.

Current BRE figures show up to 40% of materials delivered to site leave in mixed skips to go to landfill, recent projects with waste separation, multiple skips and waste monitoring and management has reduced this to 20%. BRE have achieved even better figures on demonstration projects like Environment Building at BRE campus which recycled all but a few skips of an existing building on the site.

## BUILDING-IN OPERATIONAL WASTE MANAGEMENT

All waste generated by the building in use can also be systematically separated and recycled off site.

Suitable provision for multiple waste receptacles can separate out:

Paper and cardboard

Polyethylene sheet, bags and wrap

Plastic bottles

Aluminium and steel drinks and food cans

Compostable Kitchen waste

Expanded Polystyrene protection packaging

Yoghurt pots and other food containers

Glass bottles, Green white and brown

Etc. all of which have commercial value in today's recycling industries.

© Brian Murphy 2003