LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS

Housing Authority's Initiatives on Management of Construction and Demolition Material

PURPOSE

The LegCo Panel on Environmental Affairs discussed the disposal and management of construction and demolition (C&D) material on 23 July 1999. The LegCo Panel on Housing discussed the waste generated from redecoration works in Home Ownership Scheme (HOS) flats at its meetings on 7 June 1999 and 3 January 2000. Members' views were noted. This paper updates Members on the progress and recent initiatives of the Housing Authority on reduction and management of C&D material.

BACKGROUND

2. The Housing Authority aims to reduce waste, conserve resources, re-use or recycle material in its development activities and properly dispose of any resulting C&D waste material. It participates actively in the Waste Reduction Task Force for Construction Industry set up under the Environment and Food Bureau.

PROGRESS ON REDUCTION OF C&D MATERIAL

(i) Existing Measures

3. The Housing Authority's current practice is to conserve resources and reduce waste by promoting wider standardization, by the use of modular flats in its residential building designs and by the use of prefabricated building components. The measures taken are set out below.

Planning/Design/Research

(a) **Modular Design and Prefabrication of Components**

- Use of dimensionally coordinated modular flats (since 1989).

- Use of precast concrete facades (since mid 1980's and phased in stages as a mandatory requirement on all standard domestic blocks since 1995).

- Use of precast staircases (since 1990).

- Use of semi-precast floor slabs (since 1996).

- Use of metal large panel formwork and steel table formwork (since mid 1980's).

- Installation of panel walls in lieu of blockwork (since 1993).

- Use of prefabricated door-sets (since 1990).

- Use of prefabricated metal security gates (since 1990).

- Use of prefabricated cooking benches (since 1990).

- Use of prefabricated kitchen and bathroom cabinets in HOS flats (since 1996).

- Use of precast and prefabricated external works items (such as planters, street furniture) (since early 1990's).

(b) **Reduced Use of Timber**

- Use of large panel metal formwork for all domestic blocks. Since 1985, estimated over 783,300 metric tonnes of timber saved.

- Using metal moulds for precast staircases. Since 1989, estimated over 4,900 metric tonnes of timber saved.

- Reduced timber formwork by the use of metal moulds for precast concrete facades. Since 1991, estimated over 50,000 metric tonnes of timber saved.

(c) **Review of Structural Efficiency**

A review of the structural efficiency of standard domestic blocks has been carried out to ensure that the blocks are both efficient and cost effective. If the findings are implemented, a further saving of 5,800 metric tonnes of concrete per Harmony Block will probably be achieved, equivalent to a 5.3% of the total concrete required. The saving of concrete will reduce C&D material.(Note 1)

(d) **Facilitating Residents' Self-Disposal**

The design of refuse room in domestic block has been reviewed. Sufficient space is now provided to facilitate disposal of domestic waste by residents themselves and for the provision of bins for the recycling of domestic waste.

Demolition and Civil Engineering Works

(a) **On-site Sorting of C&D Material**

A requirement has been included in demolition (since October 1993) and civil engineering (since July 1999) contracts to sort C&D material for proper disposal.

(b) **Use of Recyclable Material**

Rubble from demolition contracts may be processed for re-use as hardcore and back-filling material in situations where this is cost effective and practical to do so (since January 1997).

(c) **Use of Fill Material**

In site formation works, the objective is to balance cut and fill so as to reduce surplus excavated material. When there is a surplus, the inert C&D material will be considered for other available sites before the material is disposed of at public filling facilities.

(Note 1) A comparison with similar private housing blocks indicates that the Housing Authority's designs for Harmony blocks use 19.4% less concrete per m^2 construction floor area and 28.1% less reinforcement per m^3.

(d) **Orderly Disposal of C&D Material**

To avoid illegal dumping, the Housing Authority has followed the Works Bureau's practice under the "trip-ticket system"[(Note 2)] since July 1999 to ensure that truck drivers properly dispose of C&D material at the designated public filling facilities (for inert material) and landfills (for non-inert material).

Building and Piling Works

(a) **Reduced Use of Timber**

Metal hoardings have been specified in lieu of timber. Since July 1992, about 21,000 metric tonnes of timber has been saved.

(b) **Orderly Disposal of C&D Material**

The Housing Authority has followed the Works Bureau's practice to implement the "trip-ticket system" for piling and building contracts tendered out since July 1999.

(c) **Use of Recyclable Material**

- Pulverized Fuel Ash (PFA) generated from coal-fired power stations is being used in

  - sand/cement plaster finishes;
  - structural concrete for foundation works; and
  - roads to be handed over to Highways Department.

- Since 1990, all structural concrete for foundation works has incorporated PFA as a partial cement replacement. 25% of the cementitious content can be replaced by PFA.

(Note 2) The trip ticket system aims to effectively control the disposal of inert and non-inert C&D material arising from public works contracts. The trip ticket carries information on the contract and the disposal activity. The site supervisory staff checks the completed ticket before the driver presents it at the disposal facility and obtains a receipt for the contractor to submit to the contract manager to fulfil the contract requirement.

(ii) Future Measures

4. The Housing Authority will continue to explore other measures to reduce, re-use and recycle waste. The success of these initiatives will depend on their cost effectiveness and viability, in addition to support from respective Government departments to facilitate and promote such activities.

Planning/Design/Research

5. To reduce waste, the following research studies are being carried out :

(a) A study on the use of prefabricated bathroom and kitchen in domestic flat. A mock-up will be erected in the Fat Kwong Street Mock-up Centre which is due for completion in early 2000.

(b) A model waste management plan for building and piling contracts. The plan will set out arrangements for the on-site sorting, disposal, re-use and recycling of C&D material.

(c) The recovery of building services materials such as copper in electrical cables and mechanical equipment in demolition and new building services installations. A study to further explore the use of potentially recyclable building services materials and equipment is also proposed.

(d) The opportunities to further improve waste management practices of C&D material in design and construction.

(e) Surveys of purchasers' decoration works in the Concord Blocks. These HOS blocks were introduced into building contracts in 1996 and have a higher standard of fittings and finishes than the earlier designs. One project has been completed so far.

Construction

6. To reduce and more efficiently manage C&D material, the following proposals are under consideration -

(a) **Waste Management Plan**

The specification requirement stated in demolition and civil engineering contracts for contractors to submit waste management plans will be extended to building and piling contracts.

(b) **Wider Use of PFA**

The use of PFA will be considered as an option in concrete works to all estate roads rather than just public roads. This will align the Housing Authority's specifications with those of Highways Department. The Housing Authority already uses PFA in road works and public transport interchanges which are maintained by Highways Department.

(c) **Survey on Disposal of C&D Material**

The Housing Authority is participating in surveys of Government and private projects on the disposal of C&D material at landfills (such as the South Eastern New Territories Landfill) and public filling facilities.

HOS Finishes and Fittings

7. There are three types of HOS design, namely, Concord Blocks, New Cruciform Blocks and Harmony Blocks, offering different standards of finishes and fittings. Notwithstanding this, many purchasers carry out major decoration and refitting-out works before moving in. This generates C&D waste. To address the problem, the Housing Authority is considering three options of fitting out packages with purchase prices adjusted accordingly -

(a) "**Basic Shell" Option**

Where only the essential fittings are provided to comply with statutory requirements. This option should be welcomed by owners willing to spend money to carry out major decoration works to suit their own tastes. There are management concerns however that if a large number of purchasers opt for this then there will be large scale decoration activities during the intake period. Furthermore the proposal may not be favoured by a large proportion of HOS purchasers who may not have the financial means to carry out large scale fitting out work unless they receive a substantial discount on the purchase price.

(b) **Standard Option**

A single HOS standard based on the Concord Block will be offered for all HOS block types. To meet purchaser's demands, the current standard of finishes and fittings will be updated on a regular basis.

(c) **Upgraded Option**

To include proprietary kitchen fitments, electrical appliances and feature light fittings.

8. The proposals will be finalized after a public consultation exercise at the Wang Tau Hom Customer Service Centre is completed by February 2000. A pilot scheme will be initiated in mid 2000 based on the findings of the consultation.

Hong Kong Building Environmental Assessment Method (Hong Kong BEAM)

9. The Housing Authority has participated in the development of Hong Kong BEAM-(Residential)[Note 3] with a view to improving its environmental performance. Currently two Housing Authority's pilot projects are being assessed under this new system.

PROGRESS ON WASTE MANAGEMENT

10. A summary of the Housing Authority's initiatives and measures on waste management of C&D material is given in **Annex A**. Given that the estimated volume of C&D material to be generated from the Housing Authority's demolition projects will continue to be very large in the next five years as shown in **Annex B**, the Housing Authority will continue to improve on the disposal, sorting and re-use of C&D material generated from these demolition projects.

(Note 3) The Hong Kong BEAM is a voluntary environmental performance assessment scheme initiated by the Real Estate Developers Association. It sets good practice criteria for a range of environmental issues related to the design, construction and maintenance of buildings. The overall performance of the assessed buildings will be given a rating according to the percentage of applicable credits awarded.

CONCLUSION

11. In consultation with the Hong Kong Construction Association, Government departments and local and overseas academic institutions, the Housing Authority will continue to take a proactive approach to improving the efficiency of construction, the reduction of waste and the management C&D resources.

ANNEXES

Annex A - Housing Authority's initiatives and measures on waste management.

Annex B - Estimated volume of C&D material generated from the demolition of Housing Authority's estates.

Housing Department
February 2000

File Ref. : HD(C)DS 723/5

WASTE MANAGEMENT -

HA INITIATIVES AND MEASURES THAT HAVE BEEN ACHIEVED

(With measurable achievement where applicable till 9/99)

A Planning / Design / Research

	Objectives	Key Measures (solutions)	To overcome the problem of (cause)	Effects
1	Reduce construction waste	Prefabricated components factory produced off-site, e.g. drywall, doorsets, metal gates, cooking benches and windows	Reduce waste associated with repetitive elements	Doorset since 10/90, Metal gates since 10/90, Cooking benches since 10/90, Panel walls since 93, Aluminium window since 4/93, Kitchen/bathroom cabinets since 12/96, Stainless Steel gates since 12/96 Precast facades since 1990, starting at 25% of building contracts and then made mandatory on Harmony Blocks in 1995 and Concord Blocks in 1996
2	Reduce timber waste	Precast facade, for Harmony and Concord Blocks, using metal moulds which can be used repetitively	Tree felling and soil erosion	Since 8/91, a saving of about 50,000 metric tonnes of timber
		Precast staircase, for Harmony and Concord Blocks using metal moulds which can be used repetitively		Since 8/89, a saving of about 4,900 metric tonnes of timber

Annex A

A Planning / Design / Research (Cont'd)

	Objectives	Key Measures (solutions)	To overcome the problem of (cause)	Effects
3	Reduce resources	Research on structural efficiency of standard domestic blocks, hence conservation of material.	Excessive use of resources.	Implementation being considered with a saving of 5,820 metric tonnes of concrete (5.3%) for one Harmony 1 block, 5,780 metric tonnes (9.7%) for Concord 1, and 3,000 metric tonnes (5.3%) for NCB.
4	Facilitate residents' self-disposal in design	Storage space for recycling to be provided in standard blocks to facilitate residents' self-disposal.	Possible inconvenience for residents / estate management.	Sufficient space allowed for bins in refuse rooms to facilitate recycling of domestic waste since 4/99.

B Demolition and Civil Engineering Works

	Objectives	Key Measures (solutions)	To overcome the problem of (cause)	Effects
1	On-site sorting	Requirement for on-site sorting of C&D materials into inert and non-inert material for disposal at landfills, public filling areas	Rapid filling up of the landfills	Contractor to carry out on-site sorting in demolition contracts since 10/93, in civil contracts since 7/99
2	Use of Recyclable	Brick rubble or other hard materials arising from demolition may be re-used as hardcore	Large quantity of construction waste	Since 1/97 contractors can use suitable demolition materials as hardcore & backfilling
3	Use of fill material	Project officer to first consider the use of public fill (inert C&D material) in reclamation and earth filling projects	Unco-ordinated use of public fill.	Project officer to agree with CED Public Filling Sub Committee about using public fill for the works.
4	Reduce timber waste	Metal hoarding in lieu of hardwood for all contracts, including maintenance works	Tree felling and soil erosion	Metal hoarding has been specified in lieu of hardwood. Since 7/92, a saving of about 21,000 metric tonnes of timber
5	Orderly disposal of construction and demolition (C&D) material	Implementation of a trip-ticket system for the proper disposal of C&D material at public filling facilities of landfills	Illegal dumping or flytipping	Demolition and civil contracts to comply with the system since 7/1999

C Building and Piling

	Objectives	Key Measures (solutions)	To overcome the problem of (cause)	Effects
1	Reduce timber waste	Metal hoarding in lieu of hardwood for all contracts, including maintenance works	Tree felling and soil erosion	Metal hoarding has been specified in lieu of hardwood. Since 7/92, a saving of about 21,000 metric tonnes of timber
2	Orderly disposal of construction and demolition (C&D) material	Implementation of a trip-ticket system for the proper disposal of C&D material at public filling facilities of landfills	Illegal dumping or flytipping	Building and piling contracts to comply with the system since 7/1999
3	Use of recylable	Use of Pulverized Fuel Ash (PFA) in structure concrete to partially replace the cement in concrete mix, plaster and concrete roads to be handed over to HyD. (Note : PFA is a 'waste' material in the coal fired power station)	Excess use of building materials	Since 1990, all structural concrete for foundation works has incorporated PFA as a partial cement replacement. PFA content is 25% of the cementitious content of the concrete.

Annex B

WASTE MANAGEMENT -

ESTIMATED AMOUNT OF C&D MATERIAL

FROM DEMOLITION OF HA ESTATES

	Redevelopment Date					
	1999/2000	**2000/2001**	**2001/2002**	**2002/2003**	**2003/2004**	**2004/2005**
Estimated Amount of inert C&D material for use at public fill *	66,500 Tonnes	382,300 Tonnes	123,600 Tonnes	146,900 Tonnes	92,400 Tonnes	89,000 Tonnes
Estimated Amount of Non-inert C&D material for disposal at land fill	6,000 Tonnes	34,400 Tonnes	11,100 Tonnes	13,200 Tonnes	8,300 Tonnes	8,000 Tonnes

Notes :

1. Figures are derived from quantities estimated from programmed HA demolition contracts.
2. * Assuming that public filling sites are available.