Minimising Life Cycle Costs: A simple checklist

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Background:

Design impacts not only the costs of construction but also the costs of maintenance, systems operations and disposal, user productivity, and, increasingly in today's world of social and environmental consciousness, the costs of dealing with official and community watchdogs and public opinion. Attention to the following in terms of both design and choice of materials will minimise the overall costs for owner and users.

It is important to determine how long is the building designed to last and whether it is likely that functional requirements will change in this time. Moreover, If it is likely that re-sale value will be enhanced by ability to adapt to new uses, then appropriate design can substantially reduce the costs of adapting to new uses.

Life cycle cost savings, once identified, need to be tracked.

How has your design achieved the following life cycle cost minimisation objectives?

Reducing construction cost, for example by

- Using locally sourced materials
- Minimising use of imported materials
- Choosing construction techniques that can be managed locally
- Designing so as to avoid conflict between different trades

Reducing maintenance cost, for example by

- Taking adequate measures within the design of key building elements
  - ✓ to make them readily accessible for regular cleaning, maintenance, and repair.
  - ✓ to provide dedicated and generous space for regular cleaning, maintenance, and repair to the central or major elements of the HVAC system.
  - ✓ To ensure that access points are readily identified and locatable
  - ✓ To ensure that the skills required are within the competency of available labour supply.
- Designing so as to minimise the extent of 'cut-in and detailing' in paintwork.
- Choosing minimum-maintenance materials

Reducing renewal costs, for example by

- Adopting an appropriate process during the design stage to characterise service life requirements and relating material and component choices to such requirements.
- Protecting materials from destructive elements such as sun, temperature variations, rain or wind, or migration of moisture-laden air through defects in the envelope. Best practice measures for envelope detailing may include:
  - ✓ Minimising premature deterioration of the walls and roof by specific measures appropriate to the region such as shading screens, eaves, overhangs, etc.
  - ✓ Use of surface materials appropriate to exterior conditions
  - ✓ Use of rain-screen design principles in joints of wall surfaces

Reducing energy use (and thus energy costs which are a large component of the life cycle costs of a building) for example by

- Using maximum possible low embodied energy insulation but with good ventilation.
- Using low energy lighting and electrical appliances.
- Using efficient low pollution heating.
- Making use of passive and active solar energy wherever feasible.
- Using passive and natural ventilation systems rather than mechanical.

Reducing user costs, for example by

- Providing high building mass to prolong ambient temperatures in the event of power outages, temporary disruption in fuel supplies, or abnormal exterior temperatures.
- Isolating critical sections of the building or systems from damage that may occur from flooding or storm damage.
- Providing redundancy in systems such as back-up power, lighting, or ventilation systems in excess of minimum regulatory requirements.
- While fully meeting the operational requirements of the building, provide easy-to-understand and easy-to-use building control systems for occupants and building operators to ensure effective operation of energy efficient technologies and components . If a simple system can achieve the objective, then a complicated one should be avoided.

Reducing costs of adaptation, for example by

- Designing building structure and enclosure, for ease of adaptation to suit new building functions. Specific design issues include attention given to the:
  - ✓ Absence of frequent changes of floor level.
  - ✓ Compatibility of the column spacing with standard dimensions of other interior finishes components
  - ✓ Ensuring that the column dimensions are not disproportionately large, and that column features such as drop panels do not limit potential interior layouts or services.
  - ✓ Complexity of the floor-plate shape and irregular column spacing does not limit the typical "useable" floor area.
  - ✓ Placement of shear walls, utility walls and fire separations acknowledges and provides for changing occupant uses.
  - ✓ **Provision for expandable reception areas for changing occupant services and traffic volumes**
- Designing building so that adapting to a new fuel source or renewable energy technology will require only minor adjustments to architectural, HVAC, or electrical systems
- Designing HVAC and communications systems for ease of removal, relocation, or addition for changes in operation. The design should ensure
  - ✓ It does not limit physical location or size of rooms;
  - ✓ It provides sufficient conditioning capacity for foreseeable occupancy needs
  - ✓ it is sufficiently diversified to accommodate operable windows;
  - ✓ flow of air is not affected by relocation of screens, walls or furniture;
  - ✓ adjustments and upgrades can be performed during fit-out or re-fit for a low cost;
  - ✓ it can respond and effectively condition local spaces with little

Reducing disposal cost, for example by

- Planning safe, efficient, disposal mechanisms, particularly for high rise buildings

Managing the life cycle cost process, by

- Implementing a life cycle cost checking process that can be maintained throughout the life of the building
- Building in new learning to the life cycle checklist

References:

Durham County Council Information Service. Asset Management. www.durham.gov.uk

The Environmental Performance Guide for Buildings http://asset.gov.com.au/environmentguide/

Life Cycle Assessment Design Aid, LCAid™, software designed by the NSW Department of Public Works aimed at the Building designer, LCA practitioner, LCA researcher or building rating practitioner as a tool for evaluating the environmental performance of buildings http://asset.gov.com.au/dataweb/lcaid/