

Influences on Design & Construction of Housing in Queensland

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Introduction

The design and subsequent construction of housing in any society is influenced by a wide range of factors. These include culture, climate, environment, politics and economics.

Housing solutions have evolved over the years to these ever-changing circumstances to respond to the needs of society. The process is iterative working towards a congruence between what is desirable and what is achievable.

The paper will case study a number of typical contemporary Queensland housing solutions and explain the broad rationale behind the design, construction and procurement methods employed to deliver the finished product, taking into account the wide range of factors previously mentioned.

Finally, the paper will briefly explain the Application of Strategic Asset Management in Government Property Portfolios and Information Technology Initiatives.

Influences

Listed below is a summary of the influences on Design in Queensland.

- **Culture**
 - Population has high expectations of Home Ownership.
Approximately 70% own or are buying their Dwelling.
Approximately 6% are in Public Housing.
Approximately 50,000 Units of Public Housing Accommodation in Queensland.

- **Politics**
 - Governments support notion of Home Ownership.
The Construction Industry overall represents 6.7% of GDP and represents 7% of the employment in all Industries.
Residential Housing accounts for 40% of this.

- **Climate**
 - Vast diversity from Tropics to Desert.
e.g. Western Areas 0 - 45°C - Low Humidity
Tropical Areas 20 - 35°C - High Humidity
South East Queensland 5 - 30°C.

- **Economics**
 - Mean value of Detached House and Land - AUS\$150,000
Average Gross Income - AUS\$32,500 p.a.
Interest Rates 6 - 7% p.a.
Detached House - floor area - 160 m², land 600 m².
Typically 3 - 4 bedrooms, lounge, dining room, family room, kitchen, 2 bathrooms and garage.
Land Value - AUS\$60,000
House Building Cost - AUS\$450/m²
Land Values around 40% of total property value.
Construction Costs about 50% labour 50% materials.
Labour Rates about \$25 - \$30/hour.
Strong emphasis on labour saving materials.
Repetitive tasks e.g. Tiling, Brick, Plasterboard by Specialist.
Subcontractors on unit rate contracts.

Design Solutions

Reference is made to the Slides presented at the Conference.

- **Culture**

- Minimum expectation for detached house - 3 bedrooms, separate lounge/dining room, kitchen and bathroom.
 - Emergence of medium density housing (decreasing family sizes).
Townhouses/Villas/Flats Inner City.
Purpose built housing for seniors and disabled.
 - *Climate*
 - Climate is addressed in a number of ways from the macro of urban planning, site orientation, landscaping to design features such as overhangs for shade, large window areas for natural light and ventilation.
Insulation, outdoor entertainment areas.
Environmental ratings are being applied to housing.
 - *Economics*
 - High use of standard materials selection with differing layouts and external design features.
- Standard Materials:
- Concrete floor slab and footings
 - Timber frame, brick cladding
 - Pre-fabricated timber roof trusses
 - Concrete roof tiles
 - Powder-coated aluminium windows
 - Plasterboard internal linings
 - Copper water system
 - PVC waste and stormwater drainage
 - Carpet and tile floor coverings.

Procurement Options

A wide range of procurement options are utilised for Housing including:-

- Traditional Lump Sum Tender on Clients Design and Specification. (Most popular with Public Housing and larger Residential). Construction risk rests with Builder.
- Lump Sum Tender on Builders Design (Design and Construct). (Most popular with private consumer market). Both D & C risk rests with Builder.
- House and Land Package - (Used for both Public and Private Housing).
- Joint Ventures are utilised in Public Housing Urban Renewal Projects.

In addition, for larger Government Buildings, alternative methods are sometimes employed:-

- Managing Contractor
- Construction Management
- Build Own Operate
- Build Own Operate Transfer
- Build Operate Transfer

The method is generally determined for each project with a risk management approach.

Information Technology Initiatives

One of the most significant opportunities to improve the efficiency and effectiveness of the building environment is through information technology.

The use of I.T. serves to assist to overcome perhaps the greatest source of loss of efficiency, namely communication.

Project Services has developed a paperless project (eProject) which delivers a project from the briefing to commissioning stage completely electronically.

eProject is, essentially a web-based interactive system that allows everyone involved in a construction project - ranging from clients to suppliers, architects and sub-contractors-quick access to up-to-date plans or documents by simply connecting to the Internet.

Each stage of development in a building project can be accessed through passwords from one central website.

The technology allows all plans and documents to be submitted, viewed or changed, without the need for specialised software for each end user. The only equipment required is a computer, modem and late-model web-browser.

eProject consists of six main areas, all electronically linked, which include client briefing, design and documentation, document viewing and publication, an electronic tender box, contract administration and plan room storage and management data.

Though some of these stages, individually, can already involve some form of electronic transmission, e-Project is the first system which brings the complete project together in one package. It allows a construction project to be designed, managed and completed without any documentation.

Strategic Asset Management

Government and Corporations are demanding better utilisation and management of their built assets. The Queensland Government Departments report on an accrual accounting basis, and as a consequence, there is an increasing focus on their assets and their return on investment.

Asset management covers the procurement, operational management, maintenance, rehabilitation and disposal of assets, such that their use is maximised in regard to their service delivery potential and that risks and costs are managed over their entire life.

The concept of a "life-cycle" of assets is a continuation from assessment of the need, planning, creation, operating and maintaining, refurbishing or enhancing to finally disposal.

Strategic Asset Management emphasises that assets exist to support the delivery of services. In the case of housing, the asset must meet the needs of society. In the case of a Hospital, it is to meet the needs of the Medical Services.

Three key tools are needed to match assets to service needs. These are the management of demand, value and risk.

- Demand management seeks to moderate the level of demand for assets in the delivery of a service. This is achieved by active intervention to influence service demand expectations and by the efficient utilisation of physical assets in support of the service delivery.
- Value management provides value-added, cost-effective asset solutions to service needs through a structured, systematic and analytical process. The solutions need to provide all the necessary functions, and the required levels of quality and performance at the lowest total cost.
- Risk management is a systematic way of identifying and analysing potential risks and developing economic solutions to manage the risks. The sooner risks can be identified and solutions sought, the easier is their management and the less detrimental their impact.

A suite of Strategic Asset Management - Best Practice Guidelines have been developed for application to all public infrastructure including Public Housing by the Department of Works.

The future means of meeting needs (society expectations) will not only be through smart design but a more rigorous approach to Asset Management.

Conclusion

The approaches to Design, Construction, Procurement, Asset Management and Information Technology in Housing are all influenced by a range of factors and driven by the needs of our society.

Governments are having to deliver more with less resources and the consumers are expecting more for their money.

The use of innovative design and construction techniques, together with the greater use of information technology, will provide better value for money Housing in both Private and Public ownership scenarios.

Strategic Asset Management provides a framework for both decision making and management of assets for the entire life cycle. It is already being applied to larger portfolios in Government and the Private Sector.

A combination of better design and management provides a more effective long term sustainable solution.

Reference

Total Asset Management, National Public Works Council Australia 1996
Strategic Asset Management - Best Practice Guidelines
Department of Public Works, Queensland.

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