
[FLEXIBLE HOTEL DESIGN]
RETHINKING HOTEL DESIGN TO ADDRESS SHORT-TERM DEMAND FLUCTUATIONS

BY

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[ABSTRACT]

A hotel consists of two major components, the business operations and the physical property. These two components although distinctively different, are very much interdependent and affect the hotel's ability to succeed.

An understanding of this important duality is evident in the increasingly market driven nature of hotel design. More diverse and innovative new hotel concepts are constantly being developed based on the identification of gaps in hotel markets, or the creation of new market segments. However, the common perception of the hotel property as being a static and permanent entity remains the same. Despite the volatile and ever-changing nature of hotel markets, short-term demand fluctuations have always been one of the biggest concerns and topics of discussion for hotel management and marketing.

While there has been plenty of research into the problems and implications that short-term demand fluctuations have on hotel performance and profitability, common approaches to dealing with demand changes are very much restricted by the physical hotel design, and limited to strategic management and marketing tactics that are often inadequate to deal with the problem.

This thesis identifies a gap in the knowledge between hotel design and short-term demand fluctuations. Through research and design, it aims to bridge the gap by directing a design response targeted specifically at the nature of short-term demand fluctuations. The outcome of this thesis is the design of a new hotel proposed for Wellington, New Zealand. The design demonstrates how particular flexible design interventions can allow the hotel property to be more responsive to short-term demand fluctuations, and its potential to improve business performance and operating efficiency.

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Finally, I would like to thank my family, who are my greatest source of inspiration and encouragement.

[PREFACE]

The topic of this thesis closely relates to my interests and problem solving approach to architectural design.

From the very beginning of the research, I have been interested in researching how architectural design could improve hotel performance. This was triggered from both previous studies of hotels and by my personal experience of living in a hotel apartment for the last four years. Furthermore, the motives for this research traces back to my experiences of growing up and working in two different family-owned and operated motels, where I was exposed to the motel operations and consequently the operational problems. One of the most apparent issues was the fluctuating nature of demand, which not only occurred on a seasonal basis, but also weekly and even daily.

These personal experiences have not only influenced my motives and reasoning for the research, but have also been a valuable foundation for the direction and decisions made throughout the research.

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[1] INTRODUCTION

1.1. BACKGROUND

Due to the commercial nature of hotel developments, the success of the hotel and its design are both measured by and reliant on the business's ability to make a profit. In today's increasingly competitive hotel marketplace, designers and architects are not only required to design beautiful spaces, but also the right spaces for the right markets.

'During the last few decades the hotel industry has changed beyond all recognition. There are greater opportunities than ever to succeed and, of course, to fail. Market expansion has been associated with an ever more discerning consumer, who has come to expect that hotel facilities and services reach a minimum standard of comfort and convenience.'

(Ransley & Ingram, 2000: xxii)

Consequently, the processes of hotel development and hotel design have become increasingly market-driven. New hotel designs are increasingly affected by strategic design objectives that are derived from market analyses and feasibility studies, which study and compare the opportunities and weakness between different hotel market segments. Balin and Cole (1995) cautions designers who would often incorrectly do what they or their clients think is right, rather than what will attract the end-users, who are ultimately, the hotel guests.

However, even though hotel designs have become more market orientated, there is always a high level of risk due to the level of market instability, which characterises the hotel industry. Economic trends and cycles, and changes in political, technological, social-economic and other uncontrollable factors, all have a significant impact on the level and nature of hotel demand. These factors cause the demand to change extensively from year-to-year, month-to-month, and even day-to-day, making it very difficult to strike a balance between hotel supply and demand.

Changes in the level of demand can be beneficial when increased demand presents an increased source of revenue, but most are concerned with decreased demand levels that affect the economic sustainability of the hotel. The issue being partly inherent in the 'perishable' nature of hotel rooms as a commodity that cannot be stored, which is therefore represented as a lost and an unrecoverable opportunity for every night that is not sold.

Due to the complex nature of hotel developments, a long length of time is required for developments to occur. The conventional development process can therefore only respond to changes in demand patterns in the long-term, which is through the construction, alteration and destruction of hotel properties. However, hotel businesses are greatly affected by changes in short-term demand, which are well-covered issues in the field of hotel marketing and management, but not in hotel design. Problems with the static conventional hotel property have been acknowledged by others. Baum and Lundtorp (2001) suggested that letting the hotel operations adapt to seasonality is very much limited by the physical hotel design or 'product'. With a more flexible design, the hotel should be able to offer the facilities that different types of visitors require at different times.

1.2. RESEARCH OBJECTIVES

The main objective of this thesis is to explore how hotel design can improve hotel business efficiency and profitability. To achieve this, the thesis focuses on the knowledge gap between conventional hotel design and short-term demand fluctuations, and attempts to prove how bridging the gap through rethinking hotel design can lead to an improvement in the efficiency and profitability of hotel operations.

1.3. RESEARCH APPROACH

To investigate the aims of this research, Chapter 2 will firstly examine the typical hotel design methodologies and considerations. Emphasis will be given to the demand-driven nature of hotel development and the implications this has on hotel design. This chapter also mentions the limitations of conventional hotel design in regards to the changing nature of hotel demand.

Chapter 3 analyses performance data for the local New Zealand hotel markets. It discusses the implications of short-term demand changes on hotel performance, and the conventional methods of dealing with short-term demand changes. From this information, the chapter intends to identify and derive a series of opportunities and design implications to improve the hotel's ability to manage short-term demand changes.

Chapter 4 examines a broad range of flexible architectural design theories, methodologies, and significant building precedents. It outlines the main attributes of different flexible design approaches, as well as comparing and evaluating the advantages and disadvantages of each approach against the design parameters established in the previous chapter. This chapter forms the foundation for subsequent design explorations.

Chapter 5 documents a series of two design proposals for hotels in Wellington, New Zealand, which aim to show how different flexible design interventions can allow the hotel property to be more responsive to short-term demand changes. The design proposals add the dimensions of site and context, which present further opportunities and complications to the design.

Chapter 6 discusses the findings from this thesis, the limitations of the research and opportunities for further research.

[2] CONVENTIONAL HOTEL DESIGN METHODOLOGY AND CONSIDERATIONS

This chapter examines the conventional hotel design process and considerations. It establishes an understanding of the motives and methodologies of market orientated hotel design. Through a review of literature and examples, it outlines how different hotel market segments influence the design of hotel guestrooms and public spaces. This chapter also evaluates the limitations of market orientated hotel design with regards to changing nature of hotel demand.

2.1. INTRODUCTION TO HOTEL DESIGN

Consumer needs and desires drive contemporary hotel design and development more than ever. The traditional supply-led market is changing to a demand-led market, evident from the diversity of hotel types and the wide range of 'products' made available to the consumer to suit every type of taste, preference and price level.

'While the quality of hotels has advanced immeasurably over several centuries, the basic elements remained almost as simple and familiar as in ancient times. But with growing guest sophistication and imaginative design and development, the world's largest industry anticipates a vast demand for the increasingly diverse and popular customised types of hotels, resorts and leisure-time amenities now appearing worldwide'. (Rutes, Penner, & Lawrence, 2001, p. 5)

The designer or architect plays an important role in the development of new and redevelopment of existing hotels. The ultimate aim is to commonly maximise the developers return on financial investments. It requires the careful balancing of the needs of hotel owners and operators, and most importantly the hotel guests.

Additionally, Ransley and Ingram (2000, p. 3) stated that the final hotel product should be designed to meet the needs of the hotel developer/operator, as well as the customers. *'A balance must be struck between factors such as image, style, operating efficiency and customer comfort, and between aesthetics and practicalities. The external design of hospitality properties must be practical and appealing, while internal design aims to make best use of the space available. The designer is responsible for planning the space available and for filling it with suitable furnishings and fittings, so that the flow of people and materials is facilitated. Design is affected by factors such as company policy, location, budgets and logistics.'*

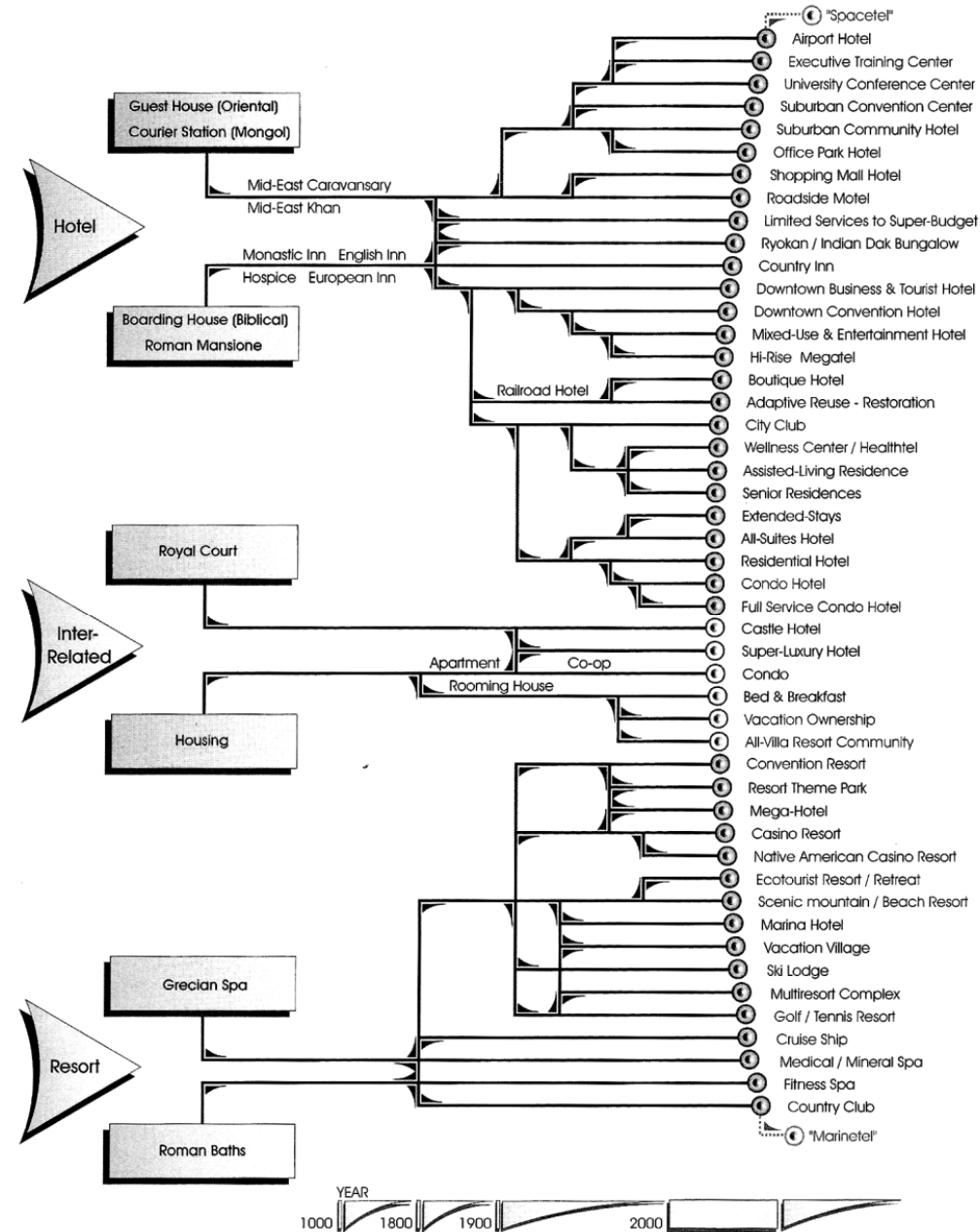


Figure. 1: Evolutionary Tree Diagram of Different Hotel Types

Source: Rutes et al, 2001, p. 4

2.2. THE TYPICAL HOTEL DESIGN PROCESS

Hotel projects follow the same general sequence as other development projects, but with some important nuances. For instance, The future operator, is usually involved from nearly the first step, influencing the site selection, programme, choice of consultants, and so forth. It is important to consider how the principal management companies, the organisations with the development and operating experience, think about a new project, and incorporate their methods and needs.

Ransley and Ingram (2004) explains that there are six main stages in design and development of a hotel property (Figure. 2).

One of the first steps is to confirm the location and particular site, and assess its suitability for a hotel. This is partly carried out in the feasibility study from a market standpoint but, equally important, the site needs to be evaluated from a design and construction perspective.

This is followed by feasibility studies, which assess present and future demand for lodging and such other hotel services as meeting areas, restaurants and bars, and recreation facilities. Feasibility studies also estimate operating income and expenses for the 10 years after the hotel opens.

From this initial research, a suitable building scope and programme can be produced. The findings of the prior research help to determine the best balance of guestroom and public facilities including restaurants and bars, meeting and banquet rooms, retail shops, recreation facilities, and parking.

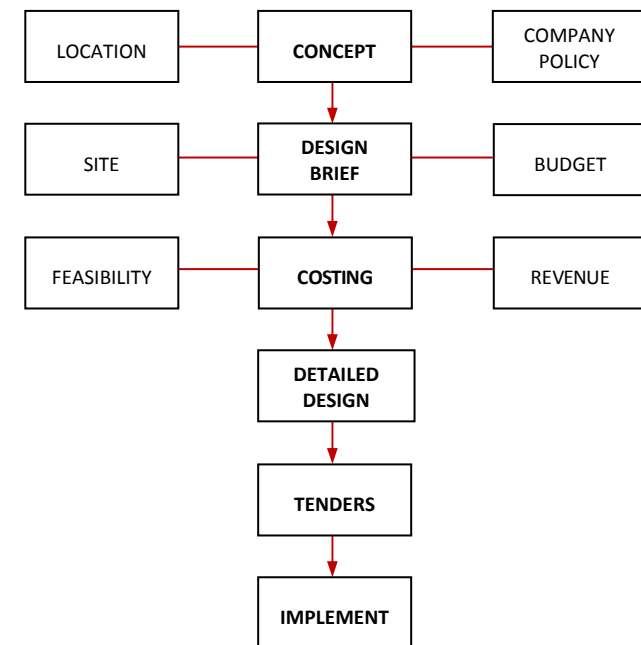


Figure. 2: Typical Hotel Development Process

Adapted From: Ransley & Ingram, 2004, p. 46

IDENTIFIED BY	EXAMPLES	CHARACTERISTICS
Location	City centre, provincial town, Resort, country house, Airport, motel	Business travel, urban visitors Vacation and conference users Transient and staging needs
Quality	Official or voluntary grading systems denoted by 1 to 5 stars	Standards of space, facilities and services appropriate for hotels of that grade
	Company tiering or sub-branding of products to serve differentiated markets.	Budget, mid-markets and luxury hotels distinguished by brand names, specific design features and range of services offered
Operation	Large hotel companies operating as a chain or group of company-owned, managed or franchised properties	Similar standards of quality, facilities and service Branding is usually adopted to provide a recognised and consistent product at a common national tariff
	Individual hotels which may be fully independent or associated with a marketing consortium	Emphasis is often placed on the distinctive character of the hotel and personal service
Specialisation	Hotels offering particular facilities and services, e.g.:	
	Resort hotels	Orientated around resort and leisure attractions
	Convention hotels	Including extensive facilities for meetings and conventions
	Spa hotels	Providing medical, paramedical, fitness and convalescence services
	Casino hotels	With gaming rooms, spectacular entertainment and public facilities

Figure. 3: Identification of Hotel Typologies by Four Main Factors

Adapted from: Lawson, 1995, p. 21

Furthermore, every project has various factors that not only affect hotel design, but can also guide or restrict the design response towards a specific outcome. Examples of these factors are listed below, and similarly in Figure. 3:

Company policy: Hotel product style, brand, and future development strategy

Concept: Objectives, and market orientation

Location: Type of premises, surroundings, and constraints

Function: Space usage, seating capacity, and operational needs

Aesthetics: Style, character, and design features

Budget: Investment criteria, payback, financing, and resources

Business: Planned life cycle, and future changes

Logistics: Critical dates, stages, and contractors.

The initial concept that evolves into a 'design brief' is very important and can be very valuable even at the earliest phase of a project. Even without a detailed program or spatial requirements, the design brief will indicate approximate amounts of space dedicated to the principal functions, such as the approximate balance between guestrooms and public/support areas. According to Venter (2006), this can vary from over 90% guestroom space in budget properties and many motels, where there is limited or no food and beverage, meeting, or back-of-house functions, to less than 65% guestroom space in large convention and resort properties, where the public and support functions are essential to enabling the property to gain market share.

Having introduced the myriad of factors and constraints that influence the design of a hotel at the conceptual level, it inevitably carries on into detailed design stages, which includes spatial planning, sizing and specification of different spaces, and certainly the building systems and construction methods.

According to Lawson (1995), the areas of built space required for hotel functions vary with:

- Hotel company standards
- Grade of hotel
- Specific facilities offered
- Location

Even though hotel groups such as 'Hilton' (Figure. 4) and 'Best Western' (Figure. 5) generally lay down space standards as part of their policy to ensure consistent quality and to characterise their products. Increasingly more hotels, both chains and independently owned are redefining spatial requirements according to the specific needs of targeted market audiences. The next section emphasises the significance of market studies, and how they influences hotel design.

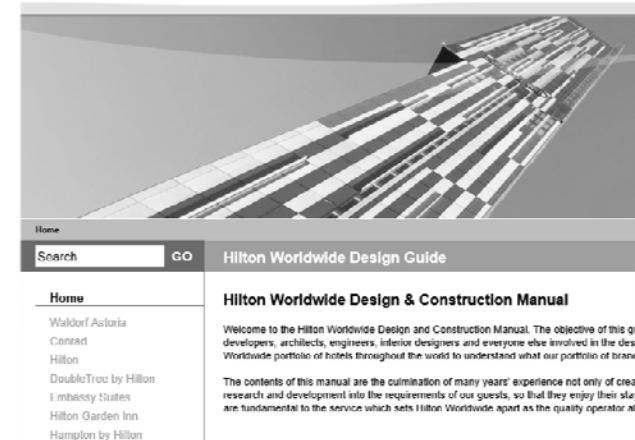


Figure. 4: Online Design Guide for Hilton Hotels

Source: Hilton Worldwide, 2010



Figure. 5: Design Guidelines for Best Western Hotels

Source: Best Western, 2009

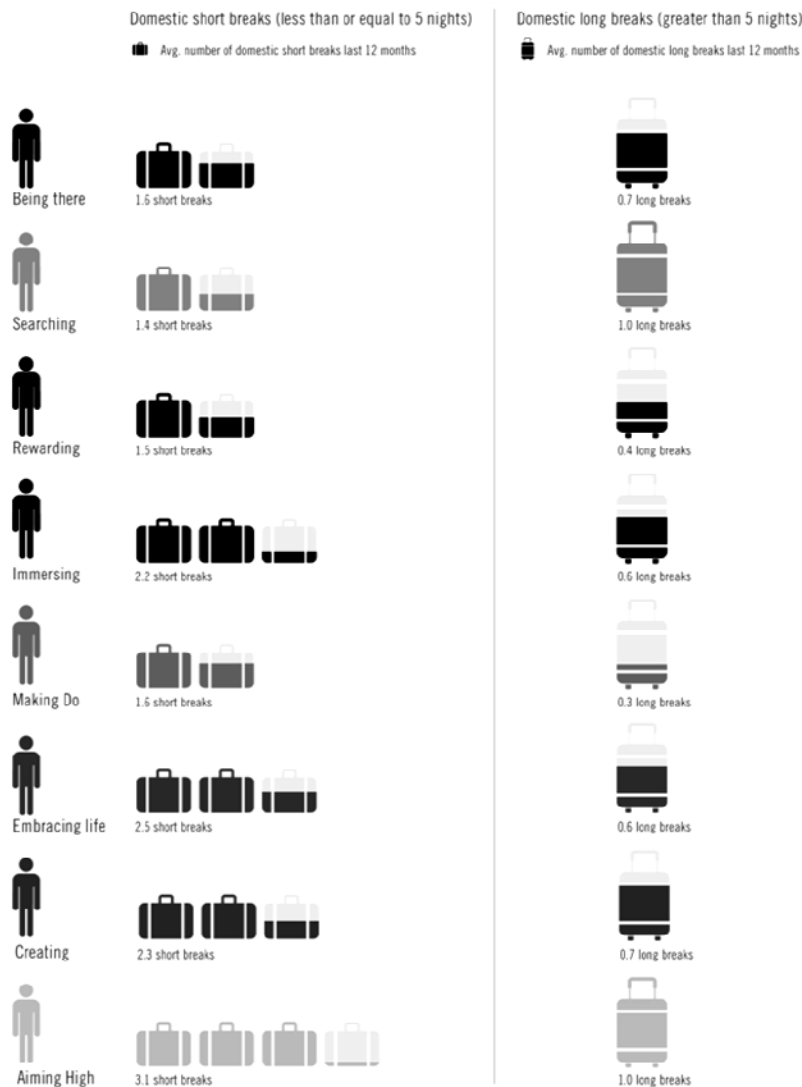


Figure 6: Categorisation of New Zealanders into 8 Market Segments

Source: Angus & Associates; The Knowledge Warehouse; Tourism Resource Consultants, 2010, p. 3

2.3. THE USE OF MARKET RESEARCH IN HOTEL DESIGN

Owing to the dynamic nature of the hotel industry and individual hotel markets, hotel market studies can be a useful analytical tool from the early stages of a hotel's development and throughout its economic life. As described earlier, establishing a targeted market is an important factor in hotel design. This section defines and explains the concepts of market segmentation, market targeting and market orientation.

Segmentation involves a three-step process. The first step in the process involves dividing a market into distinct groups of buyers who might require separate products and/or marketing mixes. The company identifies different ways to segment the market and develops profiles of the resulting market segments.

One of the most frequently used methods for segmenting a market has been demographic segmentation, which consists of dividing the market into groups based on demographic variables such as age, gender, family lifecycle, income, occupation, education, religion, race and nationality. One reason for the popularity of this method is that the consumer's needs, wants and usage rates range closely with demographic variables. Another is that demographic variables are easier to measure than other types of variables. Other variables, for example geographic, geodemographic, psychographic and behaviourist variables can also be used to segment markets (Figure. 6).

Venter (2006) argued that market segmentation is useful, because individual market segments exhibit unique characteristics relating to future growth potential, seasonal aspects of demand, average length of stay, rates of double occupancy, facility requirements, price sensitivity and other factors. Once the room night demand has been quantified by market segment and the individual characteristics of each segment have been defined, the future demand for transient accommodation can be more accurately forecast by making separate projections for each market segment.

The second step in the segmentation process is market targeting, which is the evaluation of each segment's attractiveness and selecting one or more of the market segments. Marketers identify the segments and then look for the segments that would be the most profitable in the long term for the organisation.

A third step is market positioning, comprising the development of a competitive position and an appropriate marketing mix for a product. Once a company has chosen its target market segments, it must decide what positions to occupy in those segments. The positioning task consists of three steps, i.e. identifying a set of possible competitive advantages on which to build a position, selecting the right competitive advantages and effective communication, and delivering the chosen position to a carefully selected target market.

The next sections consider the design implications of positioning hotels for particular market segments. It focuses on the tangible characteristics in the design of public spaces and guestrooms.

2.4. MARKET INFLUENCES ON THE DESIGN OF GUESTROOMS

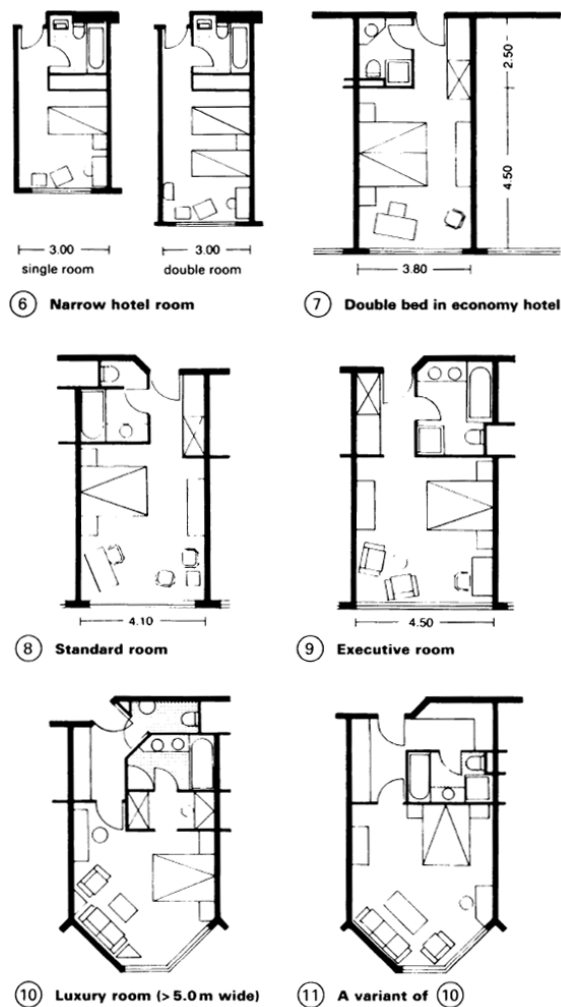


Figure 7: Examples of Different Guestroom Types

Source: Neufert, Neufert, & Baiche, 2000, p. 465

In the past few years, the dimensions of the guestrooms and bathrooms have become generally standardised for different quality levels of hotels (Figure. 7). Rutes et al (2001) suggested that designers should recognise the specific needs of the target markets and identify features and amenities that these groups most want and expect.

Figure. 8 illustrates how different market groups can be used to determine the appropriate bed combination and additional requirements. In general terms, the transient business person looks for single accommodation, the convention and group markets need double rooms, and the leisure market requires rooms to sleep two or more guests. Also, because each of these market groups uses the room differently, the designer must consider work and meeting functions in one case and family activities in another.

MARKET	GUEST CHARACTERISTICS	PURPOSE FOR TRAVEL	GUESTROOM DESIGN FACTORS
Business			
Group	Single or double occupancy; 2-4 night stay; 55% men, 45% women; somewhat price insensitive	Conventions, conferences, professional associations, sales and training meetings	King or double-double; bathroom with dressing area; lounge seating with good work area
Individual	Single occupancy; 1-2 night stay; 50% men, 50% women; price insensitive	Corporate business, sales, conventions, conferences	King; bathroom with separate stall shower; lounge seating with good work area
Leisure			
Family	Double-plus occupancy (includes children); 1-4 night stay, longer in resort areas; budget or mid price	Family vacations, sightseeing, sports, family activity	Double-double, queen-queen, or adjoining rooms; lounge seating and television; large compartmentalised bathroom; balcony, outside access
Couples	Double occupancy; 1-7 night stay; mid-price to upscale and luxury	Tours, clubs, associations, sightseeing, theatre, sports, weekend packages, shopping, vacation	King; dining area, writing surface; moderate storage; large compartmentalised bathroom
Singles	Single occupancy; young professionals to seniors; mid-price to upscale	Tours, clubs, associations; culture, arts, theatre, sports/recreation, shopping	King or queen; lounge/entertaining area; standard bathroom

Figure 8: Hotel Guest Characteristics

Adapted from: Rutes et al, 2001, p. 269

In order for the hotel developer to capitalise on profits, the design team must maximise the percentage of floor area devoted to guestrooms and keep to a minimum the amount of circulation and service space. Furthermore, the dimensions of the guestrooms also determine the structural module throughout the building, which carries through to the public and service areas on the lower floors.

However, the mix of guestroom types also has a significant impact on the hotel's ability to rent 100 percent of its rooms and to generate the maximum revenue. This is where the market data becomes crucial, and influences whether guestrooms should be standardised and of little variation to maximise efficiency, or be varied to target a wider potential market audience, like Lloyd Hotel for example, which offers guestrooms from 1 star to 5 stars (Figure. 9).

There are also examples of innovative new hotel concepts that aim to create new market segments, in which guestrooms are reinvented.

Capsule Hotels (Figure. 10) are an example of this, being first developed in Japan in the 1970s. They were designed to offer business people and other travellers extremely compact sleeping compartments (measuring 90 x 180 x 100 cm) at a very modest price.



Figure. 9: Lloyd Hotel, Amsterdam.
Contrasting architectural qualities of a 1 and 5 star room from the same hotel

Source: Lloyd Hotel, 2011



Figure. 10: Capsule Hotel, Tokyo, Japan

Source: Albrecht, 2002, p. 100

2.5. MARKET INFLUENCES ON THE DESIGN OF PUBLIC SPACES

While the hotel guestrooms make up the majority of the floor area in virtually all hotels, it is the public space that most distinctively separate different hotel types. Providing a mix of public spaces can potentially attract a greater market audience, but specialised facilities reduces investment costs and can lead to more competitive room rates.

The wide variations in programming of the lobby, restaurants and lounges, meeting and banquet space, and recreation facilities can vary from only 5 percent in a budget hotel to 20 percent at a conference centre (Figure. 11).

Similarly, Rutes et al (2001) emphasise the significance of understanding the distinctions between different hotel types in the planning of public spaces for hotel success (Figure. 12).

	PERCENTAGE OF TOTAL HOTEL AREA			
	NUMBER OF GUESTROOMS	GUESTROOMS	PUBLIC AREAS	SERVICE AREAS
Motel, economy hotel	<100	90	5	5
All-suite hotel	100-200	80	12	8
Urban business hotel	100-300+	75	14	11
Resort	100-500	70	16	14
Convention hotel	300-1000+	65	20	15

Note: The number of guestrooms/hotel depends on local market conditions and shows a large variation from country to country. The area percentages remain largely the same worldwide.

Figure. 11: Hotel space programme – percentage in guestrooms, public, and service areas

Adapted from: Ransley and Ingram, 2004, p. 198

HOTEL TYPE	LOBBY	FOOD & BAR AREAS	FUNCTION SPACES	RECREATION	RETAIL	PARKING
Business (downtown)	Moderate	Small	Varies	Moderate	Moderate	Small
Boutique hotel	Moderate	Small	Small	Small	Small	Small
Suburban hotel	Moderate	Moderate	Moderate	Moderate	Small	Large
Airport hotel	Moderate	Moderate	Large	Small	Small	Moderate
Roadside inn	Small	Moderate	Small	Small	Small	Moderate
Resort (golf/beach/tennis)	Moderate	Large	Moderate	Large	Large	Large
Resort (other)	Small	Moderate	Small	Large	Large	Moderate
Convention hotel	Large	Large	Large	Moderate	Large	Moderate
Conference Centre	Moderate	Moderate	Large	Large	Small	Large
Condominium hotel	Small	Small	Small	Moderate	Small	Moderate
All-suite hotel	Moderate	Moderate	Moderate	Moderate	Small	Moderate
Super-luxury hotel	Small	Moderate	Small	Small	Moderate	Moderate
Mega-hotel	Large	Large	Large	Large	Large	Moderate
Mixed-use hotel	Large	Large	Large	Moderate	Large	Moderate
Casino hotel	Moderate	Large	Large	Large (Casino)	Moderate	Moderate

Figure. 12: Public Space Matrix

Adapted from: Rutes et al, 2001, p. 282

Despite varying design requirements of different hotel types, Rutes et al (2001) suggests that there are two common design objectives that are common to all hotels and the design of public spaces.

Firstly, the planning and design of the public areas should be clustered around the lobby. This arrangement assures that the hotel guests can find the various facilities with ease, and provides the opportunity for functions to overlap.

The second major objective in high-rise projects is to organise the public areas with an understanding of their location in relation to the guestroom structure. This is very important, because the architect needs to plan the lobby floor so that the main guest circulation from the entrance to the front desk and elevators is convenient and logical. And because the structural requirements are different from the guestroom floors and public floors, in order simplify the structural design of the hotel and reduce construction costs, long-span spaces, such as the ballroom and larger meeting rooms must be positioned so that they are not directly under the guestroom tower (Figure. 13).



Figure. 13: Sheraton Palace Hotel, San Francisco, CA. The design utilises the u-shape arrangement of guestrooms to create large-span spaces in the middle.

Source: Knapp, 1995, pp. 222-223

2.6. THE LIMITATIONS OF CONVENTIONAL HOTEL DESIGN

While speculative hotel design focuses primarily on efficiency and maximum value for price, it almost inevitably leads to a static hotel product, that is single-use and of no use for other markets. To compensate for this, many argue that once a development is complete and functioning, the effectiveness of the operation needs to be reviewed periodically to establish whether the organisational objectives and customer requirements are met. This process gives rise to the property redevelopment/improvement cycle (Figure. 14).

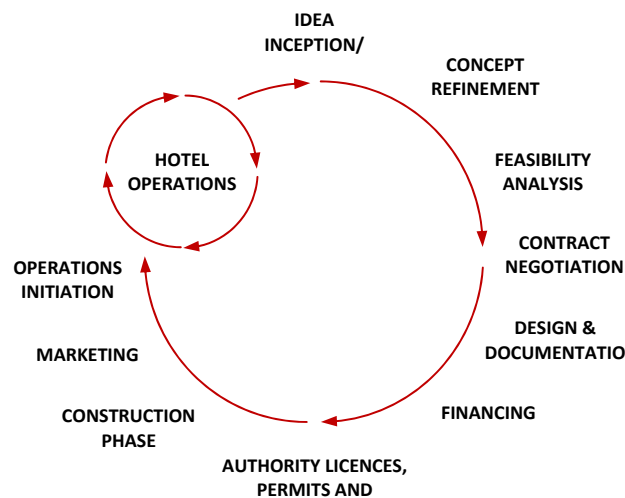


Figure. 14: Hotel Redevelopment Cycle

Adapted From: Venter, 2006, p. 85

Change constantly takes place as economic, social and cultural pressures impact on both building development and infrastructural needs. Society is never static; human civilisation has an integral tendency towards change.

Ransley and Ingram (2004, p. 17) use an interesting metaphor to describe the limitations of conventional hotel design that leads to a static outcome:

‘A good military commander, before embarking on a new campaign, will want to ensure that the strategy, based on the information available, is sound, the resources are in place and the troops are ready. After the most careful planning, all that can be expected is the unexpected! Development, whether that of a new concept or refurbishment of an existing property, presents the same dilemma to the manager. One can plan and assess risk in depth, only to find as the process evolves that the unexpected arises to present a challenge.’

They emphasise the increasing need for asset management in optimising hotel performance. Asset management involves unit operations, including the maintenance and repairs that are necessary to comply with the law and keep the property in good order. Asset Management is also concerned with regular reviewing of the unit's trading performance and any opportunities for maximising the asset value of the property. This can involve refurbishment or repositioning of the product to suit changing market conditions (Figure. 15).

A repositioning programme is usually triggered by a change in local market demand or an opportunity to leverage the property into a higher or, in some areas, low market segment. This provides the opportunity to enhance returns and increase capital values. Repositioning normally involves major remodelling of the property and normally incorporates opportunities to expand the property or increase the number of lettable units.

Due to the impact such construction work has on the image and operations of the hotel, these alterations usually occur over a long-term 10-20 year gaps. Alterations that occur within a shorter time period only occur out of absolute necessity, as second to last resort to shutting down completely. This illustrates how difficult it is for hotels to remain competitive in the changing market place, especially when market patterns are constantly changing.

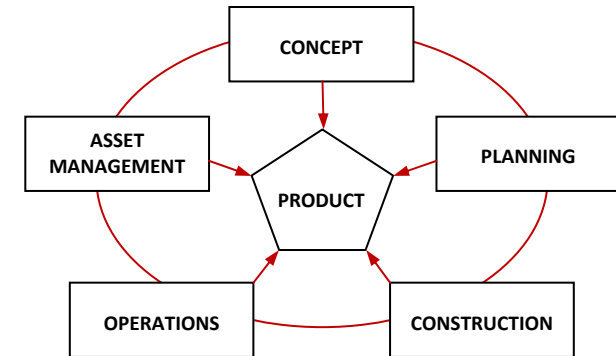


Figure. 15: Revised Model of the Hotel Development Process

Adapted From: Ransley and Ingram, 2004, p. xxiii

2.7. CHAPTER SUMMARY

This chapter has given an overview of the conventional hotel design process and considerations. It has illustrated how market conditions and particular market groups have a significant impact on the design of hotel components, such as the guestrooms and public spaces. This chapter has examined how market segmentation allows hotels to be designed with greater efficiency, to improve the value of hotel products and the competitiveness of the hotel for targeted markets.

It has also highlighted the disadvantages targeted design has for changing market conditions. While hotels undergo alterations or modifications in 10-20 year periods to maintain its competitiveness, the otherwise static hotel property is unable to respond to changes in demand patterns.

The next chapter will examine in detail the impact short-term demand changes have on hotels, and begin to identify what opportunities there are to address short-term demand changes through hotel design.

[3] ANALYSING SHORT-TERM DEMAND PATTERNS AND THE IMPLICATIONS FOR HOTEL DESIGN

This chapter analyses qualitative and quantitative data that measures the performance of the New Zealand hotel industry. It examines how short-term demand changes affect hotels, and argues that hotel supply should be more flexible in the short-term to accommodate short-term demand fluctuations.

3.1. MEASURES OF HOTEL PERFORMANCE

Some financial performance measures used by the hotel industry are the same as those used by all businesses. These include gross revenue, net income, and gross operating income. The hotel industry also has a unique set of measures used to assess business performance at both company and individual property levels, which are identified and explained on the following page.

Guest Nights

This measures a hotel's capacity. The underlying measure is one room per night. The number of room nights varies per month, in respect to the number of days in that month. For example, a hotel with 100 rooms will have 3100 room nights in January and, typically, 2800 room nights in February.

Occupancy Rate

This indicates how full the hotel is. To calculate this, divide the total number of room nights sold by the total number of room nights available. For example if a hotel sells 2000 rooms in a month with 3000 room nights, the occupancy rate is 67%.

Revenue per Room Sold

This is calculated by dividing the revenue from room sales by the room nights sold. For example, if room sales were \$200,000 and there were 2000 room nights sold, the revenue per room is \$100. Alternatively, if room sales were \$150,000 and the room nights stay the same, the revenue per room is reduced to \$75.

RevPar (Revenue per Room Available)

This is calculated by dividing the revenue from room sales by the total room nights available. For example, if room sales were \$200,000 and there were 3000 room nights available, the RevPar will be \$67.

Top 15 RTOs (by guest nights)	Businesses ¹	Units per business	Average daily capacity ²	Guest nights (000)	Occupancy rate (%)	Average nights stayed
Total	3,312	42.5	140,600	32,014	36.3	1.9
Auckland	328	57.1	18,723	5,448	51.7	2.0
Canterbury ³	497	40.7	20,233	4,997	38.3	1.8
Queenstown	112	63.0	7,059	2,343	50.6	2.5
Wellington	120	61.9	7,426	2,313	57.7	1.9
Rotorua	123	49.2	6,053	1,716	41.4	1.7
Northland	252	39.6	9,970	1,634	24.2	2.2
West Coast	156	35.2	5,491	1,233	36.0	1.4
Nelson-Tasman	164	41.6	6,821	1,225	27.3	2.1
Hawke's Bay	131	36.9	4,831	1,038	32.8	2.1
Waikato	149	33.8	5,043	1,021	32.8	1.8
Bay of Plenty	105	47.5	4,983	988	29.5	2.5
Taupo	110	37.2	4,095	981	37.7	1.7
Dunedin	83	32.4	2,692	861	49.6	1.7
Marlborough	110	29.9	3,288	691	33.4	1.7
Coromandel	119	34.0	4,047	686	24.5	1.9

Figure. 17: Accommodation Statistics by RTO Area, 2009

Source: Statistics New Zealand, 2010

3.2. SHORT-TERM DEMAND FLUCTUATIONS

Two principle temporal patterns of demand are manifest in hotel occupancy data; the seasonal pattern over the course of the year, and within-week pattern over the course of the week. Together they constitute the two ‘fundamental frequencies’ of demand for hotel accommodation, and for tourism in general. (Jeffrey & Barden, 2000)

The New Zealand Accommodation Survey provides an authoritative set of information on the supply and demand for accommodation that is used in policy planning at both the national and regional level. However, the data is also important for hotel developers, operators, consultants, etc, because it is a useful indicator of the hotel market performance.

The survey data includes monthly statistics for capacity, occupancy rates, guest nights and origin of guests (domestic or international). Data are disaggregated (into component parts) by regional tourism organisation areas (Figure. 17) and by accommodation type (Figure. 18).

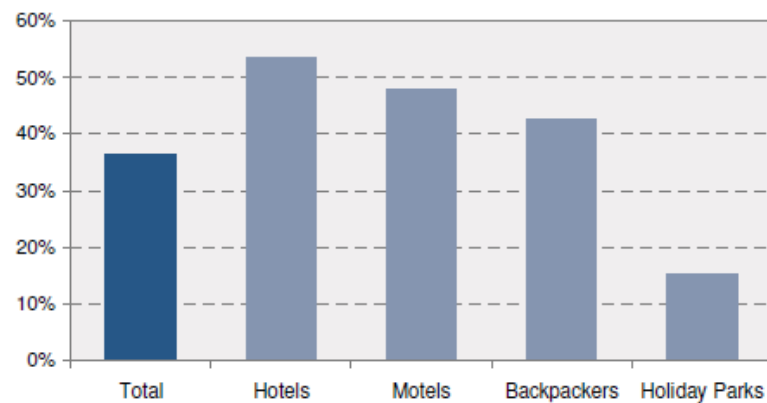


Figure. 18: Occupancy Rate by Accommodation Type, 2009

Source: Statistics New Zealand, 2010

3.3. SEASONAL DEMAND PATTERNS

We know that within most patterns of demand in tourism, there are regular fluctuations due solely to the time of year. This phenomenon is called seasonality. It is often the result of changes in climate over the calendar year.

Venter (2006) further explains, because tourism is a service industry, it is not possible to stockpile the product, i.e. a hotel room that is unsold on a particular night, an unsold seat on a flight or an unsold theatre ticket all have an economic value of zero. Seasonality of demand therefore causes major problems for the tourism industry. It can result in only seasonal employment of staff, the under-use or even closing down of facilities at certain times of the year. It can also result in an over-stretching by some destinations and businesses at times of peak activity, to compensate for low demand in the off-season. This leads to overcrowding, over bookings, high prices and ultimately to customer dissatisfaction and a deteriorating reputation.

The seasonal demand for hotel rooms is often characterised by crests and troughs, from Figure. 19 and Figure. 20, it is evident that the hotel industry experiences seasonality with a period of higher demand from October to April, and lower demand from May to September.

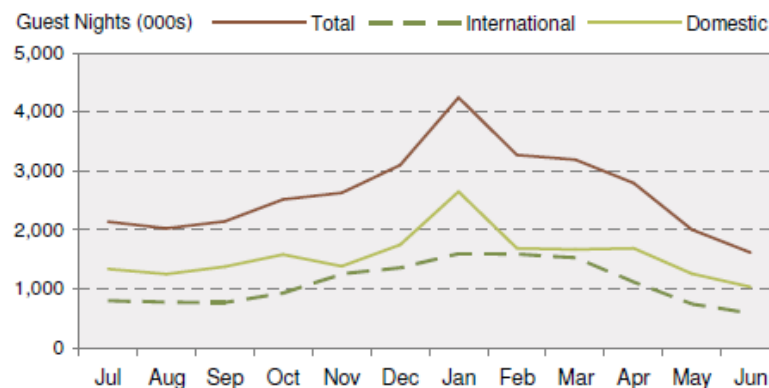


Figure. 19: Accommodation Guest Night by Month. 2008/2009

Source: Statistics New Zealand, 2010

			Series ref: ACSM	Month											
				2009			2010								
Region				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Occupancy rate (percent)															
Northland		S12RAB	37.0	43.2	46.4	56.2	58.5	49.1	44.9	32.5	25.0	26.1	23.2	27.7	37.5
Auckland		S12RBB	58.5	64.4	57.5	59.9	70.8	68.3	57.8	53.2	48.3	51.6	53.1	57.0	60.4
Waikato		S12RCB	42.1	45.0	44.7	53.5	55.1	53.5	46.5	34.8	35.6	36.3	31.8	36.6	42.8
Bay of Plenty ⁽²⁾		S12RDB	45.8	48.5	50.8	60.2	59.7	55.8	50.7	41.9	41.0	45.0	38.8	44.8	46.8
Haw ke's Bay/Gisborne		S12REB	45.0	48.8	48.4	57.5	62.3	57.7	50.5	35.0	35.2	34.7	32.5	37.8	43.8
Taranaki/Manaw atu-Wanganu		S12RFB	34.3	33.3	32.3	33.6	42.1	41.6	36.1	29.6	31.1	36.8	34.2	38.2	35.6
Wellington		S12RGB	57.5	60.2	49.7	56.1	72.3	67.9	56.8	49.4	48.7	48.8	45.9	54.9	55.9
Nelson/Marlborough/Tasman		S12RHB	36.2	46.4	48.9	63.0	67.6	58.0	44.7	29.4	26.5	29.2	29.4	30.4	34.4
Canterbury		S12RIB	47.2	54.7	49.8	58.5	65.3	60.4	49.4	36.6	34.9	40.2	39.6	44.0	48.9
West Coast		S12RJB	38.2	47.5	46.5	59.1	65.4	53.8	44.1	28.4	24.0	27.7	24.3	25.8	32.8
Otago ⁽³⁾		S12RKB	41.8	51.6	52.1	63.5	67.5	64.8	54.8	37.9	41.6	60.9	57.1	48.8	41.7
Southland		S12RLB	35.6	49.9	47.7	54.3	67.6	56.4	42.1	29.6	25.2	26.1	24.4	25.6	32.2
New Zealand		S12RZB	46.2	52.1	49.4	57.1	64.1	59.5	50.2	39.5	38.0	43.0	41.0	43.9	46.4

Figure. 20: Monthly Occupancy Rates by Region

Source: Statistics New Zealand, 2010

3.3.1. DEMAND VARIABILITY

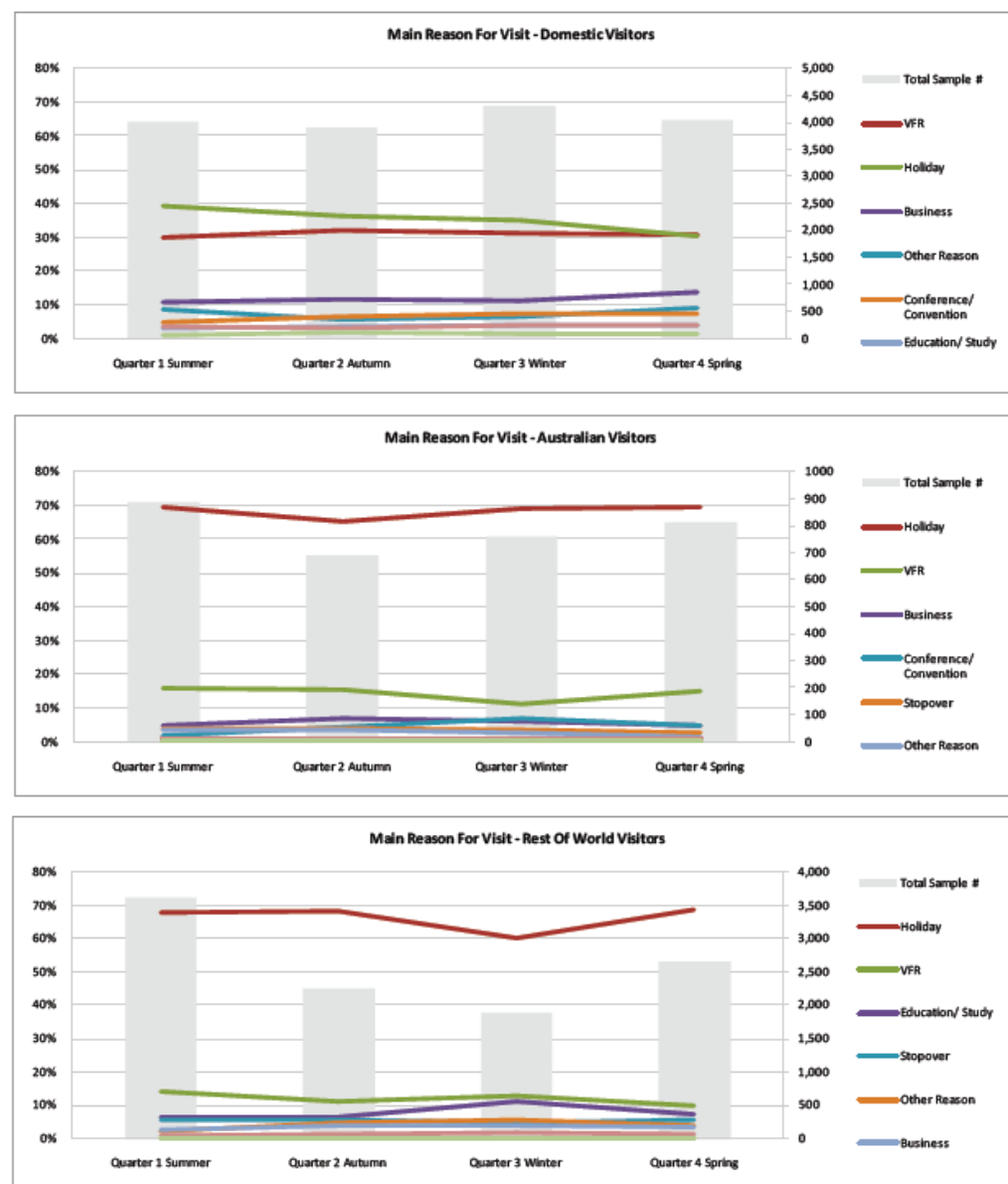
The Regional Visitor Monitor provides detailed information on travel motivations and visitor activities by season. (Figure. 21) RVM data points to distinctive patterns and differences between the domestic, Australian and ‘rest of the world’ markets when it comes to main reason for travel.

In the domestic market, holiday travel peaks in summer and declines through the balance of the year, while the reverse is true of business travel. In the Australian market, VFR-related travel troughs in winter, while convention related activity peaks at that time. The Australian holiday market remains strong through the year, although a dip in activity is evident through autumn months.

In other international (or ‘rest of world’) markets, the dip in holiday travel comes later in the year – during winter – while travel for the purposes of education or study is highest in the winter months.

Figure. 21: Main Reason for Visit by Major Market Grouping and Season

Source: Angus & Associates, 2010



3.4. WEEKLY DEMAND PATTERNS

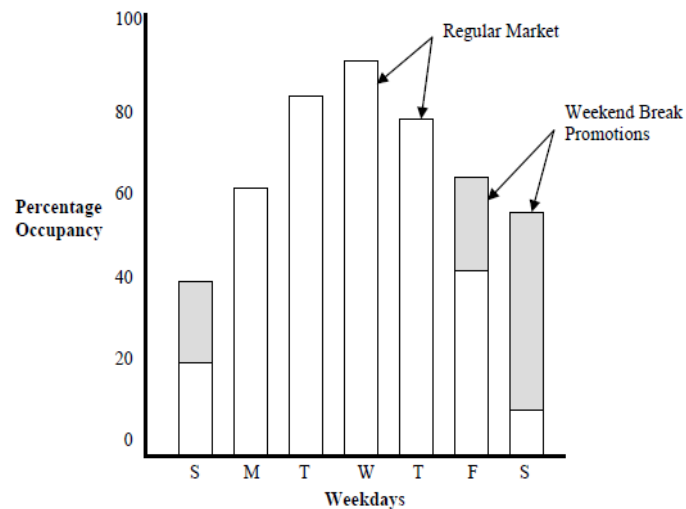


Figure. 22: Typical Weekdays/Weekend Hotel Demand Fluctuations

Source: Lawson, 1995, p. 104

Hotels often experience differences in room bookings at weekends compared to weekdays. This is particularly the case where a hotel is able to fill with business people during the week at high rates, and achieves at best only reasonable occupancy at weekends through special offers. In some parts of the world, Sundays are often 'dead' nights for large city-centre hotels. Attractions or recreation sites often attract more visitors during weekends than on weekdays.

The causes and characteristics of seasonality in tourism have been thoroughly explored, and broad strategies to reduce its impact have been proposed. In comparison, within-week fluctuations have received relatively little attention. Empirical studies of hotel occupancy have usually focused on the seasonal variation in hotel occupancy levels, with within-week variations being 'filtered' from the analysis by aggregating occupancy data into monthly rates.

However, it can be argued that it is the within-week fluctuations in daily occupancy rates, resulting from the periodicities in demand over the course of the week, that cause the greater problems for hotel management.

The study conducted by Jeffrey and Barden (2000) found: the variance in daily occupancy rates around the respective weekly means is greater than the variance in monthly occupancy rates around the respective annual means in an overwhelming proportion of the studied hotels.

Within-week variability presents problems for hoteliers, but it also presents opportunities, particularly in the light of recent developments in the nature of the working week and the recreational weekend.

3.5. THE IMPACT OF SHORT-TERM DEMAND CHANGES ON FIXED HOTEL SUPPLY

3.5.1. MANAGING INSUFFICIENT DEMAND

When demand is low, the level of competition heightens as hotels experience underutilisation and reduced levels of sales. Because the conventional hotel property is static, hotels can only partially manage hotel demand through the hotel operations. It was found, that cost-orientated pricing was the most popular approach used. According to Tung (1997) 'the fastest and most effective way for an organisation to achieve maximum profit is to get its price right. Given the importance of price in generating revenues and profits for a company, the pricing approach used by service firms in price setting has been relatively unsophisticated'. Although this method offers some advantages, the simplistic nature of cost-orientated pricing is not effective in a complex and competitive business world. As consumers have become more sophisticated and demanding, it is imperative that service firms adapt to this changing environment when setting prices.

A hotel can increase its competitiveness and increase the level of 'induced demand' through adding facilities or quality to the hotel property. This can be done through both the supporting facilities such as conference spaces, recreation, additional restaurants, etc. But it can also be achieved through the guestrooms, in which higher quality is usually reflected by larger guestroom, additional amenities and quality of finishes, etc. The problem with this approach is the additional costs of investment usually need to be recovered from increasing the room rates, which then negatively affects the hotel's competitiveness.

3.5.2. MANAGING EXCESS DEMAND

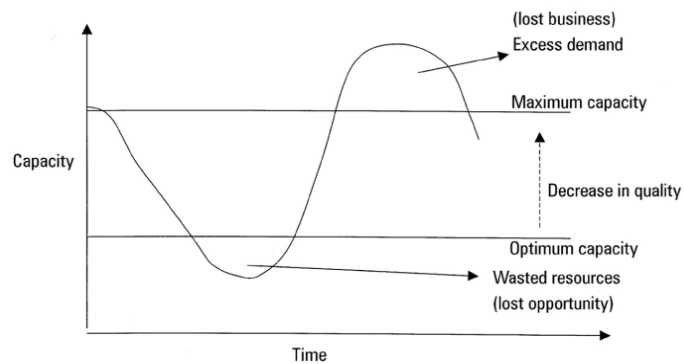


Figure. 23: The Impact of Demand Fluctuations With Fixed Hotel Capacity

Source: Kandampully, 2000, p. 12

When demand is high, it becomes easier to sell hotel rooms and the intensity of competition falls.

During the peak season or during certain events, hotels may be completely booked out. During this time, not only is accommodation difficult to find, but the room rates also tend to be excessively high, making travels at these times less accessible for certain markets.

When all accommodation providers in an area are full, there can also be a level of unable to be accommodated demand, which is represented as potential lost business to hotels. (Figure. 23)

Unable to be accommodated demand develops as a result of the hotel business's cyclical nature. Because hotels cannot expand or contract in response to cyclical lodging demand, unable to be accommodated transient visitation is normal in many market areas.

With a fixed hotel supply, it is difficult for conventional hotels to adjust their capacity to take advantage of the excess demand. Hotels can only plan to increase hotel capacity through extensions and alterations in the longer term.

3.6. CHAPTER SUMMARY

This chapter has illustrated the significance of designing a more responsive hotel property to better manage short-term demand changes. It has shown how short-term demand changes not only significantly affect business efficiency and profitability, but it also affects consumers with regards to the availability and affordability of accommodation when demand is high.

Analysing the quantitative and qualitative data has shown that short-term demand changes not only fluctuates between peaks and troughs, but also has a component of variability that is reflected in the type of hotel guests. The findings in this chapter have helped to determine the opportunities for rethinking hotel design, and the need to address both insufficient levels of demand and excess levels of demand through a more flexible hotel property.

[4] RETHINKING FLEXIBLE HOTEL DESIGN

This chapter examines the topic of flexible architecture and how buildings respond to change. The chapter will give a brief overview of different categories or approaches to designing flexible buildings, present relevant examples of particular flexible hotels and other flexible building precedents that help build a body of knowledge in flexible design strategies to address the issue of short-term demand fluctuations.

4.1. (RE)DEFINING FLEXIBLE HOTEL

Flexible buildings can vary significantly in nature, as the most appropriate solution depends on the parameters of what the building is being flexible or responsive to. Flexibility that is discussed in reference to hotels often refers to the suitability of hotel facilities for different guest types, and one of the most common solutions to this is providing a variety of facilities and providing flexibility through choice.

The variety of guestroom types and public spaces widens the potential market audience, but it does not make the hotel more responsive to short-term demand fluctuations. Despite the variety, guestrooms will still be fixed in its capacity, and offering a variety of supporting public spaces only adds to investment costs and room rates, which makes the hotel property less competitive against competing hotels.

4.2. DIFFERENT APPROACHES TO DESIGNING FLEXIBLE ARCHITECTURE

'Architecture has traditionally been perceived as enduring, permanent structures. For centuries the architect has aspired to permanence...It is apparent that the monument syndrome of static, permanent architecture has persisted throughout history into these dynamic times.' (Drum, 2007)

Society is changing at such speed that buildings are faced with new demands which they should be in a position to meet. There are times when buildings change function during construction or even during the design process. Therefore, a new approach is to design buildings that are able to cope with such changes, and be responsive to the time factor.

As architects are increasingly recognising the dynamism and fast-pace of change in of our modern society, flexible architecture is receiving more attention and innovation than ever before. Kronenburg (2003) writes 'increasingly clients working in the commercial, industrial, education and healthcare sectors are demanding flexibility'.

Flexible architecture is not a new phenomenon. It is a form of building that has evolved over time according to changing needs. Where functional problems have necessitated a responsive, and built environment, flexible architecture has formed at least a part of the solution as a response to contemporary problems associated with technological, social and economic change.

Throughout history, there have been countless attempts at a 'time-based' response in architecture, either in theoretical context or in practice. From which, many different architects, styles of architecture, have explored and formulated different opinions and theory about this dynamic form of architecture.

Leupen, Heijne and Zwol (2005, p. 9) write: 'during the 20th century it became increasingly clear that architecture is by no means a timeless medium. To begin with, artists and architects like Constant, Friedman, Archigram (Figure. 24) and the Metabolists merely toyed with the notion of time. In the late 1960s, however, serious research was done into techniques that would allow buildings to adapt to meet the demands made by time.'

According to Leupen et al (2005), there are principally three possible ways to deal with time and uncertainty:

- Making buildings polyvalent
- Make buildings that are part permanent and part changeable
- Make semi-permanent buildings

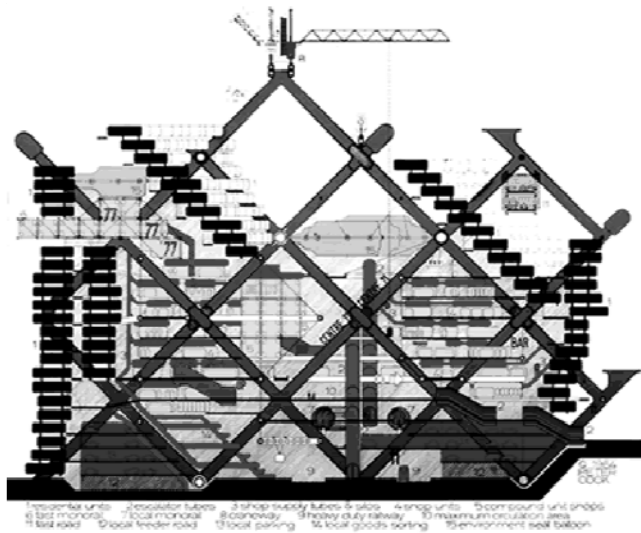


Figure. 24: Plug-In City, Archigram

Source: Archigram, 2011

The following sections categorise different flexible design approaches into three main categories. Each of these sections describes the characteristics of the approach and presents relevant building precedents. The critical evaluation of each of these approaches is made in reference to addressing the issue of short-term demand fluctuations, and the opportunities identified in the previous chapter.








4.3. FLEXIBILITY THROUGH POLYVALENCE

Polyvalence refers to buildings that can provide for a variety of different uses without the need to make major changes to the building itself. It is interior focused, and is most commonly associated to large open spaces such as halls and museums, which out of necessity are required to be adaptable to a wide variety of uses.

In the context of a hotel, the multi-functional public space can often be seen as polyvalent. The restaurant can often double as function areas, and even the guestrooms can provide for a variety of functions beyond that of sleeping and conventional activities.

The Novotel in London designed for the business and conference markets, provides a huge variety of different function spaces to cater for events of all types and scales (Figure. 25). The Champagne Suite in particular, is the largest and most flexible space in the hotel, which is custom-built for large-scale and international events. While the Champagne Suite offers a total of 1,726 sq m of space, the use of special acoustic screens can divide the large space into 8 smaller areas (Figure. 26). This allows the space to be used as meeting rooms, a conservatory style terrace, large and small function areas or as a spacious foyer.

Floor sq m
(L x W in meters)



Ground Floor								
CHABLIS SUITE	1,360 (53.64 x 35.05)	300	100	N/A	600	N/A	24	900
Mezzanine								
POUILLY	33.5 (6.7 x 5.0)	30	14	10	10	12	8	25
MUSCADET	78.3 (11.6 x 6.75)	80	40	24	40	20	24	100
ALSACE	89.6 (12.8 x 7.0)	90	56	28	50	28	40	100
BEAUJOLAIS	47.7 (7.2 x 6.6)	40	32	16	20	16	16	40
SANCERRE	31.2 (6.5 x 4.55)	26	12	10	10	10	8	40
BOURG	192.5 (18.87 x 10.2)	150	100	36	100	32	80	80
First Floor								
CHAMPAGNE	1,726 (47 x 42)	1000	540	400	1,200	N/A	500	2,000
CREMANT	966 (23 x 42)	1000	540	N/A	620	N/A	460	900
MANCY	322 (23 x 14)	250	180	90	200	75	160	300

Figure. 25: Variety of Meeting Facilities at Novotel London West

Source: Novotel, 2011

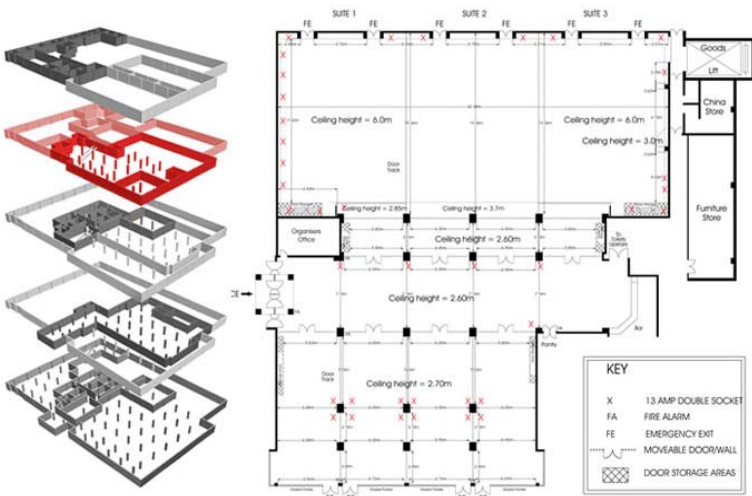


Figure. 26: The Highly Flexible 'Champagne' Suite at Novotel

Source: Novotel, 2011



Figure. 27: Aerial Photo of Yokohama International Port Terminal

Source: e-architect, 2004



Figure. 28: Interior Photo of Yokohama International Port Terminal

Source: FOA, 2003

However, the design of multi-functional space has a common downfall. Out of the necessity to accommodate a wide range of functions, the space inherently becomes generic and compromises on the architectural quality or efficiency that a fit-for-purpose space would have.

This is also a common criticism for the Yokohama International Port Terminal (Figure. 27) designed by Foreign Office Architects (FOA). The Ferry Terminal not only has the primary function as a pier, it acts as an extension of the surround context, and provides a place for relaxation and civic facilities for local residents.

The architects envisioned the structure of the pier as a fluid, uninterrupted and multi-directional space, rather than a gateway to flows of fixed orientation. This is also evident in the very limited palette of materials and details that further enhance the continuity of the typography like forms (Figure. 28). However, dedicated/functional spaces are strategically located adjacent to ambiguous spaces, to address specific functions that need to be carried out, while also creating a 'buffer zone' in which cross-over use and less-defined activities can occur. This allows the dedicated spaces be appropriately serviced, decorated and finished, while also allowing unplanned activities to expand out from it as required. (Kronenburg, 2007)

4.4. FLEXIBILITY THROUGH MOVABLE BUILDING COMPONENTS

This section also focuses on interior-based building flexibility, but unlike the previous category, it covers more 'determinate' strategies that restrict the level of flexibility but is able to accommodate these pre-established programmes more effectively and efficiently.

Schumacher, Schaeffer, & Vogt (2009) categorise variable building elements into three distinctive groups:

1. Space-containing walls
2. Moving platforms (floors, ceilings, stairs)
3. Mobile cells

Movable building components have the potential to optimise the use of space and allow room sizes to be variable. They also enable spaces to grow or shrink. The ability to switch between different spatial configurations can create the illusion of more space or rooms than is actually the case. Carefully conceived and painstakingly executed detailed solutions make it possible to create complex living and working scenarios in very small spaces.

The ways in which a room can be used allow us to develop a functional relationship to it and this can be extended through the introduction of additional fixtures. Depending on needs and function, elements of differing degrees of flexibility can be used. These can be realised traditionally as static elements, fixed units around which we move, or as variable spatial elements which, through their flexibility or mobility, can liberate a space from fixed or constrained patterns of use.



Figure. 29: 24 Different Rooms in One

Source: ArchDaily, 2010

Gary Chang's Apartment in Hong Kong is one of the most exciting examples of this type of flexibility. After years of studying his apartment, Chang has transformed his miniature 32 sq m apartment into a complex residence that allows 24 different spatial configurations (Figure. 29).

Through a combination of different systems such as sliding walls, foldout furniture and surfaces, the apartment can transform from large open space to a sequence of smaller spaces with layers and walls (Figure. 30). This not only allows the apartment to change in its functions but also adjusts the atmosphere of spaces depending on the inhabitant's mood or needs.



Figure. 30: Movable Walls Reveal and Hide Different Functions Within the Apartment

Source: ArchDaily, 2010

While Chang combines a large variety of different dynamic building components to achieve a high level of flexibility. There is also potential value in more distinctive and simplified solutions to changing needs through dynamic building components.

The Boxetti Collection by designer Rolands Landsbergs, is a collection of five dynamic modules, which includes the bedroom, sofa, office, television, and the kitchen (Figure. 31) The design of Boxetti Collection is driven by three basic design principles of functionality, advanced technologies and the contemporary aesthetics of minimalism. Each of the Boxetti modules is designed to achieve maximum efficiency. The modules can be transformed from compact solid blocks into fully-functional furniture units, which can be operated either by hand or through remote control. Unlike the last example, these modules like conventional furniture, has the potential to be mass-produced and be deployed into different environments such as homes or offices much more easily.

These examples have shown how dynamic building components can make a space multi-functional, but are able to do so with more efficiency and great fit-for-purpose than the previously discussed polyvalent approach. However, these comparatively more complex building/furniture systems not only require higher construction and investment costs, they can also require more effort and time to carry out these changes.



Figure 31: Boxetti Collection

Source: Boxetti, 2010

4.5. FLEXIBILITY THROUGH PORTABLE BUILDINGS

Portable buildings are highly mobile and are able to be transported or relocated from one site to another. The focus on external or locational flexibility contains a very broad spectrum of architectural possibilities. Kronenburg (2003, 1) suggests there are three different types of portable buildings.

One type of portable building is composed of a system of modular parts that are easily transportable and usually dry assembled on site. This method can allow for variations in the configuration of building layouts to suit different contexts and needs, but consequently requires a more complex assembly procedures and longer construction time.

Another type consists of buildings that are partially complete building parts that can be more easily and quickly assembled on site.

The third consists of buildings that are transported in whole, which may have their mode of transportation integrated within the building itself. Whist this type of building allows for instant use once on site, it is generally restricted in size due to the limitations of transportation.

This type of architecture has the ability to accommodate changing hotel demand by allowing the hotel property to be more easily altered according to demand conditions. The 'Podules' designed and supplied by All About Space in the UK is all about meeting temporary accommodation needs for all. It utilises modular prefabricated components that can be delivered and assembled quickly into self-contained accommodation units.



Figure. 32: Construction Sequence and Completed Podules

Source: TreeHugger, 2008



Figure. 33: Marketing Image of the Podule

Source: All About Space, 2011



Figure. 34: MDU Prototype

Source: LO-TEK, 2002

The Podule is a more affordable and sustainable solution to situations that create temporal demand hikes, such as large international events that may not be feasible for the construction of permanent buildings. Instead, it allows businesses to hire these temporary accommodation pods to take advantage of excess demand, and be returned or relocated after the demand is gone.

While the Podule is marketed for its versatility and speed of deployment, the end result is a loose-fit product that offers little customisability for different activity and user needs. As a commercialised product, the costs of its implementation versus the profit gains ultimately determine the success of the flexible building system.

Another example of a portable building system is MDU (mobile dwelling unit) by LO-TEK. The MDU is constructed from transformed shipping containers, which can be moved and shipped to follow its owner from place to place, carrying all their possessions.

Cuts in the metal walls of the container create extruded sub-volumes that also contain different functions and services (Figure. 34). When travelling, the sub-volumes of the container push inwards to allow easy transportation according to worldwide shipping standards. On arrival, the sub volumes are pushed out, leaving the interior of the container unobstructed with access to all the functions along the sides.

Unlike the Podule concept, which follows conventional development paradigms, MDUs are conceived as an alternative to hotels that are suitable for modern nomads that are always travelling around the globe. Once the MDU reaches its destination, it is slotted into a transitory community that is made up of a vertical harbour constructed as a steel rack that houses MDUs along the length of the site (Figure. 35). The vertical harbour is in constant transformation as MDUs are loaded and unloaded from the

permanent rack. 'Like pixels in a digital image, temporary patterns are generated by the presence or absence of MDUs in different locations along the rack, reflecting the ever-changing composition of these colonies scattered around the globe.' (LO-TEK, 2002)

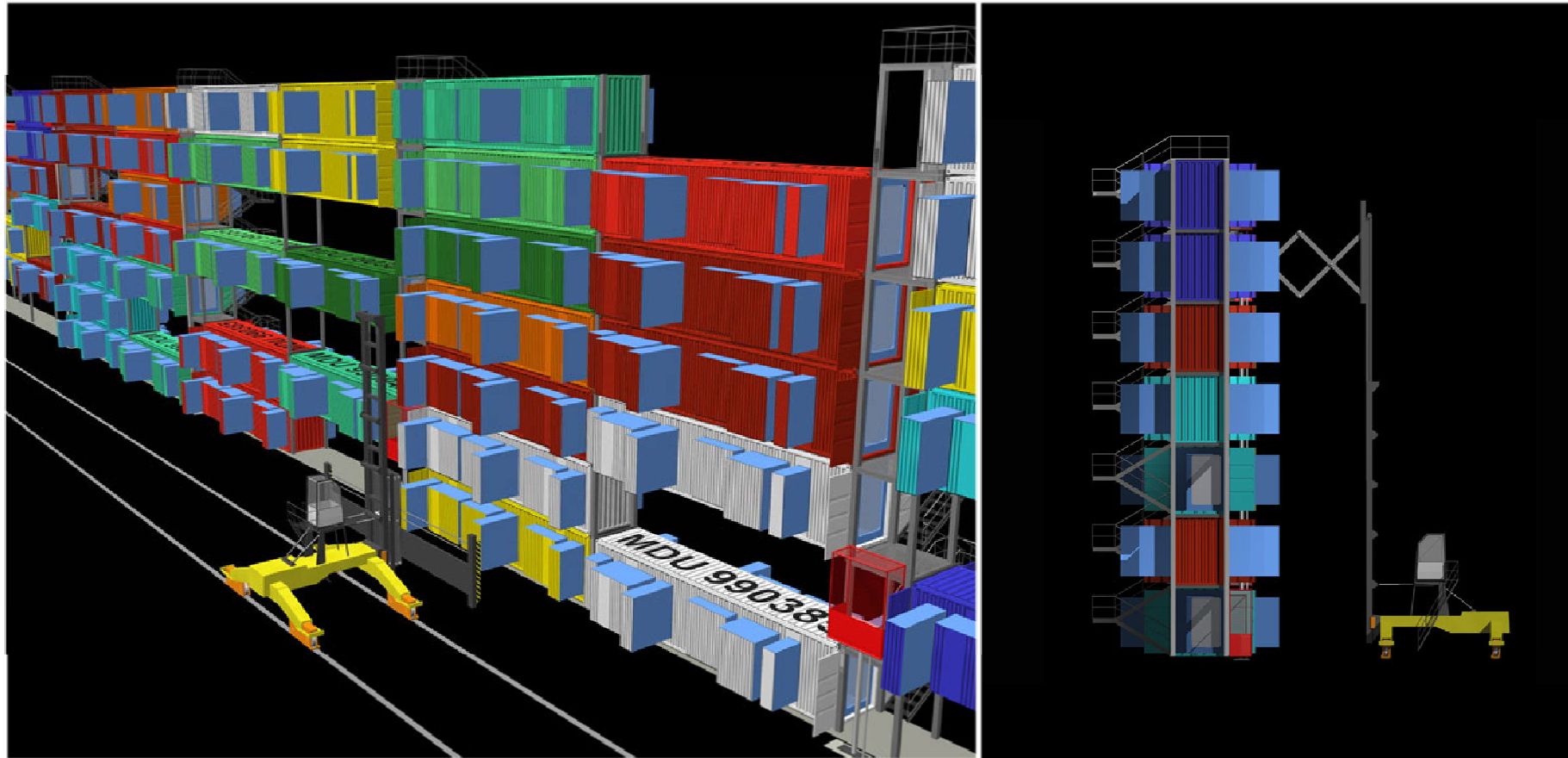


Figure. 35: A Crane Slides Along the Track to Load and Unload MDUs From the Permanent Structure

Source: LO-TEK, 2002

4.6. CHAPTER SUMMARY

This chapter has shown that there are a wide range of different approaches and design strategies towards flexible architecture. The chapter has identified and discussed three main approaches to the design of dynamic flexible buildings, namely polyvalence, movable building components, and portable buildings.

In evaluating the advantages and disadvantages of the three different design approaches, the first two, of which are interior based strategies (as opposed to exterior based strategies) are observed to be significantly more appropriate for addressing the nature of short-term demand fluctuations.

To further test the applicability and validity of the flexible design strategies discussed in this chapter, a series of design proposals were carried out, which are documented and evaluated in the following chapter.

[5] DESIGN EXPLORATIONS

This chapter documents the design-based research in the form of two separate design proposals. These design proposals provide the opportunity to further test the effectiveness of different flexible design interventions within the context of a hotel programme, and specific site conditions.

5.1. INTRODUCTION/DESIGN BRIEF

The two design explorations were carried out in different phases of the research and for two different sites (Figure. 36) The first proposal on 'Site A' is the design-based research result at the mid-point, and the latter proposal on 'Site B' is the final outcome towards the end of the research.

The design explorations play a very important role in testing, developing and proving the main objectives of the research. Where previous chapters have examined research that conceptualise how the knowledge gap between conventional hotel design and short-term demand fluctuation may be bridged, the design proposals applies and combines the different ideas and findings to further test the objectives of the research.

The main objective of the design proposals is directly related to the research objectives, which is to show how hotel design can improve hotel efficiency and profitability through a strategic design response that improves the hotel properties ability to respond to short-term demand fluctuations.



Figure. 36: Aerial View of Wellington, New Zealand

Source: Google Earth, 2011

5.2. PRELIMINARY DESIGN PROPOSAL

The preliminary design proposal extends the exploration of flexible design concepts by applying and testing them with a chosen site and hotel programme.

The project site is 'Site 9' at north Kumutoto, Wellington, New Zealand. Although the site's potential is currently underutilised as paid car parking, it is a prominent waterfront site that receives a high level of exposure from pedestrian traffic.



Figure. 37: Location Map of Site A

Source: Google Earth, 2011



Figure. 38: Exterior Perspective

Source: Author, 2011

5.2.1. THE DESIGN PROCESS

The beginning of the design process followed closely to conventional design processes. This included conceptual plans and diagrams that worked with the conditions of the site (Figure. 39), from which a building programme was established.

Working with the spatial requirements of the building programme and the site parameters, a conceptual model for a seven storey hotel (Figure. 40) was generated to maximise utilisation of the site. The public and administration spaces were positioned on the ground floor to take advantage of the street edge, and the guestrooms take up five levels above. Due to the lack of space, an underground level became necessary for the building services.

Because the public spaces and guestroom floors have very different architectural and structural requirements, this preliminary design proposal split the exploration of flexible design interventions into two separate components. One explores the flexibility of public spaces, while the other focuses on the flexibility of guestrooms.

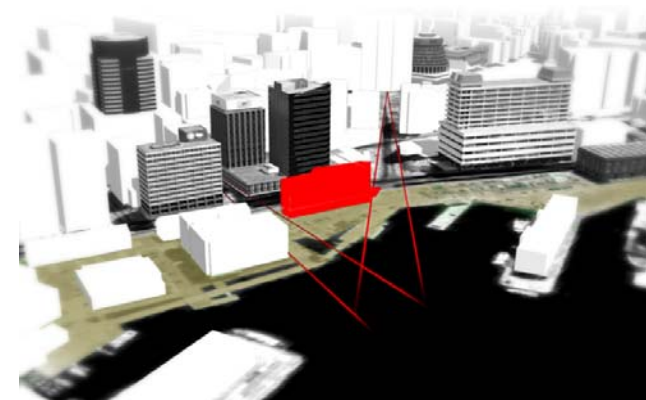


Figure. 39: 3D Context Diagram - View Shafts

Source: Author, 2011

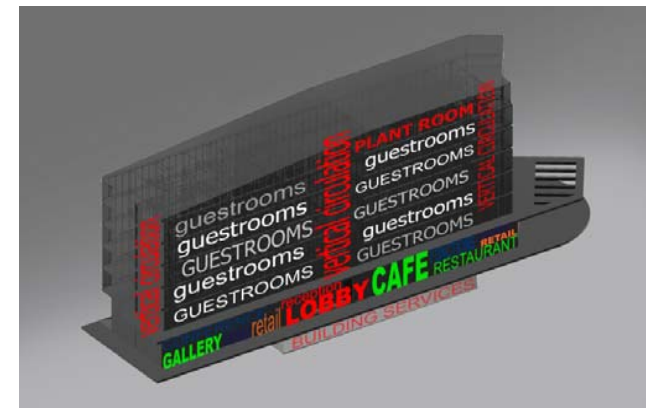


Figure. 40: Diagram of Building Programme

Source: Author, 2011

5.2.2. FLEXIBLE DESIGN OF PUBLIC SPACES

Variety

Due to the relatively restrictive dimensions of the site, the number and size of public spaces is very confined. With the lobby centred in the middle, the conventional ground floor plan allows for public facilities to be filled in on either side of the lobby space. (Figure. 41)

Polyvalence

The strategic placement of services such as toilets and kitchen create 'service cores', which allow the adjacent 'raw' spaces to be used for a number of different functions while maintaining the full functionality and serviceability.

Movable Building Components

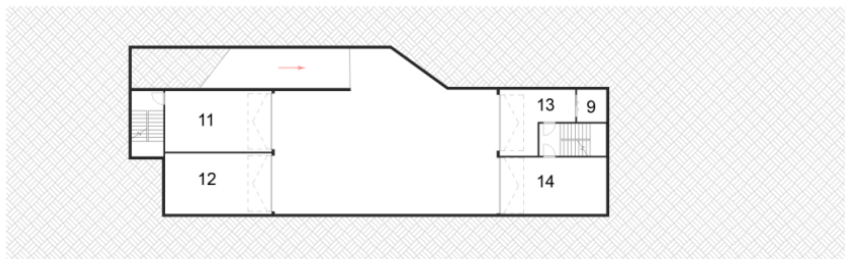
Additional flexibility is added when movable wall partitions are used. The opening and closing of wall partitions is able to change the number, size and quality of spaces, as well as affecting the spatial organisation to create more complex levels of privacy and intimacy. (Figure. 44)



GROUND FLOOR PLAN

SCALE 1:200

- | | |
|-----------------------------|--------------------------|
| 1 lobby (core) | — fixed/structural walls |
| 2 kitchen (core) | — active/temporary walls |
| 3 toilet (core) | |
| 4 "raw" space | |
| 5 administration office | |
| 6 reception | |
| 7 multi-use service hallway | |
| 8 hotel lifts | 11 transformer |
| 9 service lift | 12 generator |
| 10 storage | 13 general storage |
| | 14 trash handling |



UNDERGROUND FLOOR PLAN

SCALE 1:200

Figure. 41: Floor Plans

Source: Author, 2011

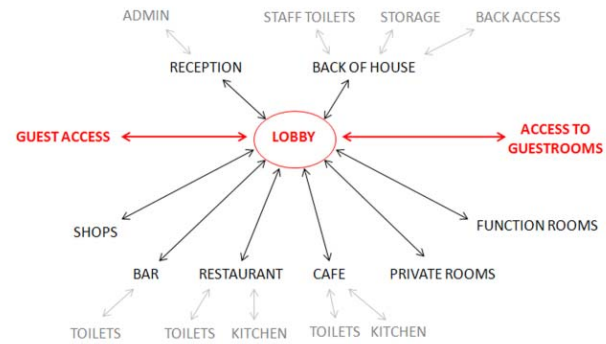


Figure. 42: Typical Spatial Planning centred around Lobby
Source: Author, 2011

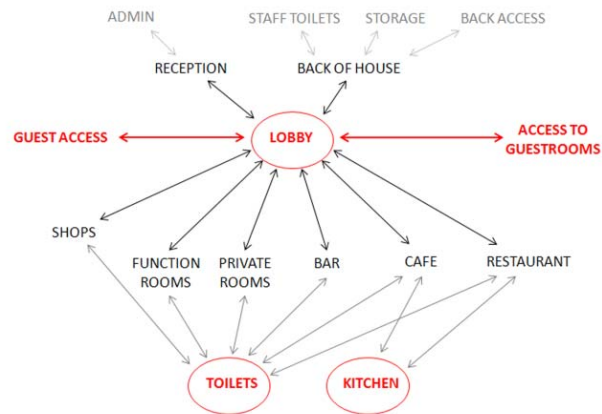


Figure. 43: Strategic Spatial Planning centred around Lobby and Service Cores.
Source: Author, 2011

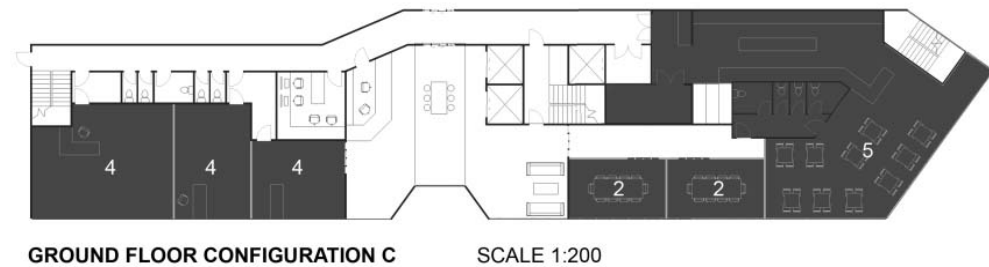
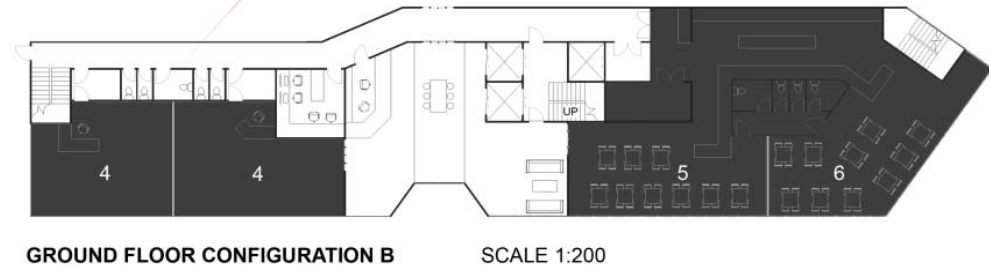
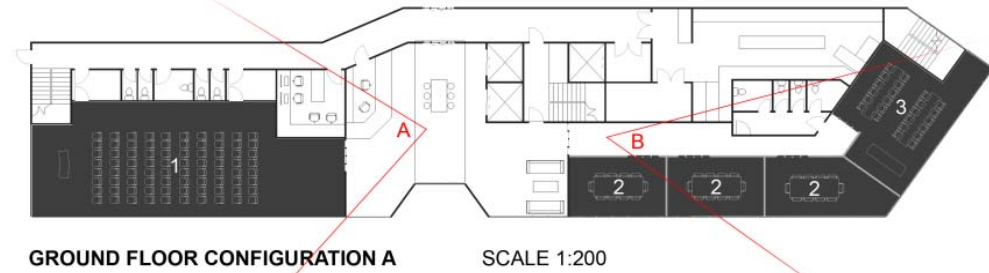
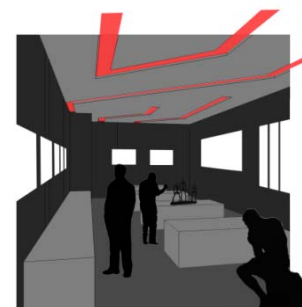
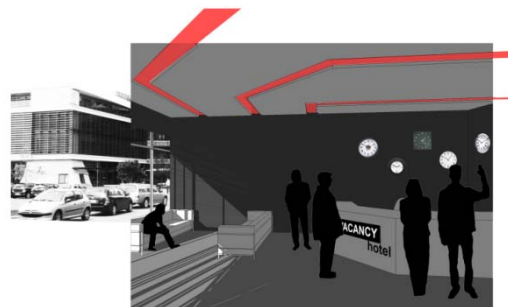
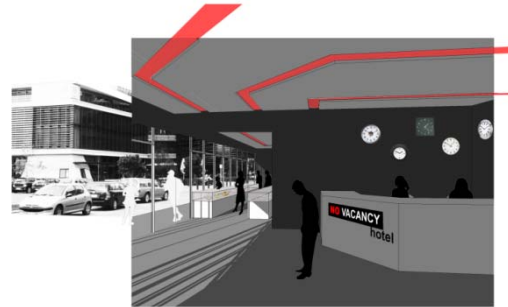
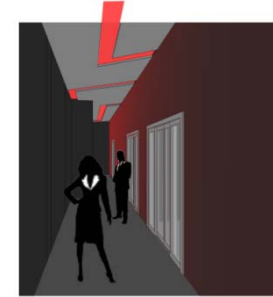


Figure. 44: Alternative Building Programmes for the Ground Floor
Source: Author, 2011

**POTENTIAL FACILITIES/
PROGRAMMES**

- 1 large function
- 2 private/meeting
- 3 small function
- 4 retail
- 5 cafe/bar
- 6 restaurant
- gallery
- offices
- gym
- parking
- performances
- market
- play area...



A

B

Figure. 45: Contrasting Spatial Qualities From Changes in Programme and Use on the Ground Floor

Source: Author, 2011

5.2.3. FLEXIBLE DESIGN OF GUESTROOMS AND GUESTROOM FLOORS

Guestroom Mix

While maintaining structural regularity in the stacking of guestroom floors is very important for the costs of construction, a large number of varieties can still be achieved through the implementation of double bay structure and variations in the length of rooms. Figure. 47 shows three possible floor configurations and Figure. 46 shows the three main room types.

Polyvalence

The level of polyvalence in guestrooms is really dependent and limited to the size and amenities in the guestroom. Even though the smallest room type can facilitate different room layouts, and therefore differences in room capacity and quality, the logistics of moving, and questions of utilisation and storage are major drawbacks.

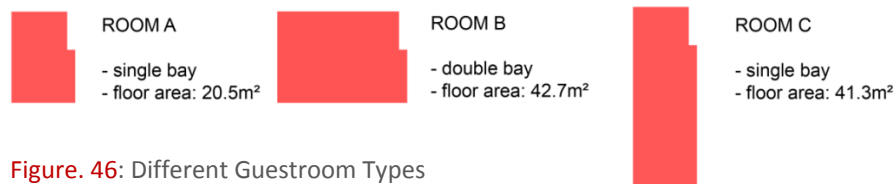
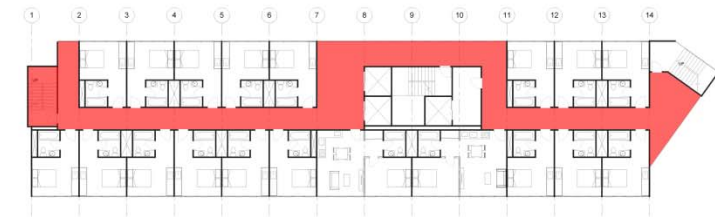


Figure. 46: Different Guestroom Types

Source: Author, 2011



FLOOR CONFIGURATION A

- FEATURES:
- double loaded bay
 - 17 small units, 2 wide units
 - total of 19 units
 - maximises the number guestroom units



FLOOR CONFIGURATION B

- FEATURES:
- double loaded bay
 - 3 small units, 9 wide units
 - total of 12 units
 - allows for more variety and quality in room plans



FLOOR CONFIGURATION C

- FEATURES:
- single loaded bay
 - 1 small units, 2 wide units, 8 long units
 - total of 11 units
 - allows more variety and quality, increases the number of rooms with ocean view from plan B

Figure. 47: Different Guestroom Configurations

Source: Author, 2011

Movable Building Components

There are a large number of different interventions under this category of flexibility, which can provide very different benefits and costs.

The use of flexible furniture that fold or slide allow even the smallest room to increase its usability. This also prevents the need to move and provide additional storage for unused furniture, which makes changes to the guestroom easier and faster to carry out. (Figure.48)

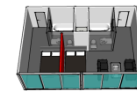
The increased flexibility through a relatively simple implementation of sliding walls can allow new room configurations to be possible. For the larger units, sliding or folding dividing units becomes useful for achieving different room configurations to increase versatility. They act as an easy and effective way of increasing privacy and separation where required. However, simply using sliding walls and or/even moving furniture modules does not allow the creation of full additional units (assuming they require bathroom/toilet). (Figure.49)

The last step in the design exploration was to free up the service intensive areas of the guestrooms. By making the bathrooms and kitchens movable, the entire guestroom floor becomes flexible for a completely new range of floor configurations such as a youth hostel configuration that adds considerable accommodation capacity. However, to achieve this would require an extensive amount of building infrastructure that would have significant implications on the design of the building structure and services. (Figure.50)

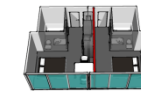


Figure. 48: Explorations in the Flexibility within Rooms

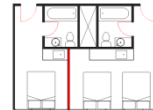
Source: Author 2011



intended market: short stays
maximum capacity: 1-2 people
facilities: extremely limited

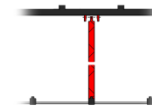


intended market: long stayers
maximum capacity: 1-2 people
facilities: good



intended market: low budget, couple
maximum capacity: 1-2 people
facilities: limited

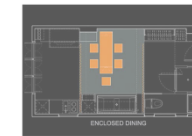
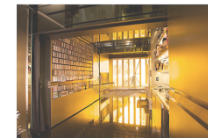
intended market: low budget
maximum capacity: 2-4 people
facilities: limited



the movement of walls need to be done with careful consideration of privacy and safety. Vertical mullions in the glazing can double as fixed points for movable walls.



moving walls along the width of the building can allow the transformation of the single loaded corridor to double loaded. But the practicality of this becomes limited by the placement of services, ie. bathroom. As well as changing the circulation path.



32m² flexible apartment, Hong Kong

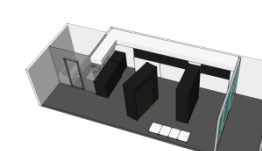
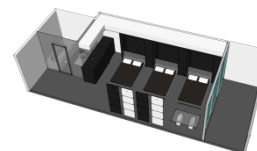
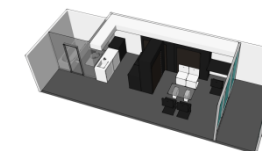
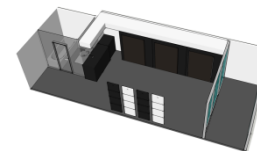
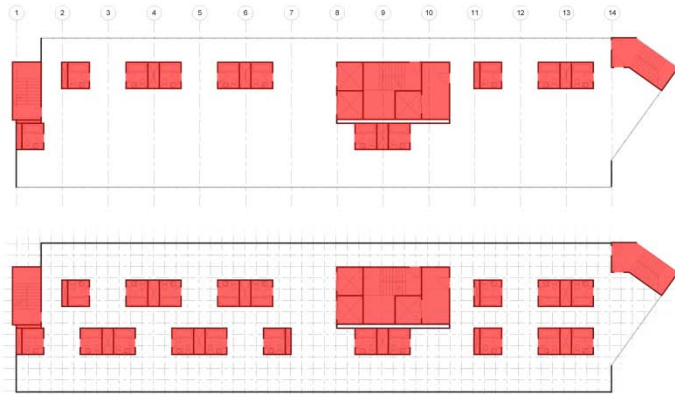


Figure. 49: Explorations in the Flexibility between Guestrooms

Source: Author, 2011



With movable furniture and dividing units, the floor effectively becomes a multi-functional space, only being confined by vertical circulation and service nodes.

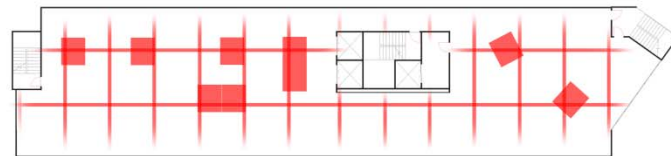
To make configurational changes more efficient, modularisation of the movable walls and furniture through the implementation of a secondary grid system can allow standardisation in parts that will not only enhance changability but also costs of production.



space saving bathroom unit



portable bathroom module



OVER DESIGN OF BUILDING SERVICES



YOUTH HOSTEL CONFIGURATION

Figure. 50: Explorations in the Flexibility of the Guestroom Floor

Source: Author, 2011

5.2.4. PRELIMINARY DISCUSSION AND EVALUATION OF DESIGN

This preliminary design proposal has been valuable in exploring the potential of a number of different flexible design interventions and their compatibility with the hotel context through a systematic investigation. While this design proposal can be seen as more of a design process rather than a completed building proposal, it was a useful step because the research evaluated the opportunities and limitations of different flexible design interventions in the hotel context.

While this initial design proposal was intended to be relatively conceptual, the lack of design details and refinement of ideas makes it more difficult to evaluate and appreciate the benefits of the design interventions. There were missed opportunities in the design that resulted from the conceptual nature of design experiments. The success of the flexible design interventions rely on the level of integration and consideration of all aspects of the hotel building and design, for example the structure and services.

The design being predominantly interior focused had also ignored the expressive potential of the flexible ideas. This resulted in an understated exterior that did not take advantage of the full marketing potential of hotel flexibility, which could be articulated more clearly through the building exterior.

Having established a foundation of knowledge in flexible hotel design through this project, the opportunities and limitations in different flexible design interventions will be further tested and developed in the final design proposal.

5.3. FINAL DESIGN PROPOSAL



This final design proposal builds on the foundations set in the preliminary design proposal. While the size of ‘Site A’ in the last project was found to be too restrictive, a decision was made to find a new site for the final design proposal. Eventually ‘Site B’ was selected. The new site is not only larger in size; it is also a site that could attract a wide variety of potential market groups, making it not only ideal for the development of a hotel in general, but even more so for objectives of this thesis.

The next section documents a thorough analysis of the project site, followed by the design process and final outcome.

Figure. 51: Location Map of Site B

Source: Google Earth, 2011

5.3.1. SITE ANALYSIS



Figure. 52: Site Study - Background analysis

Source: Author, 2011

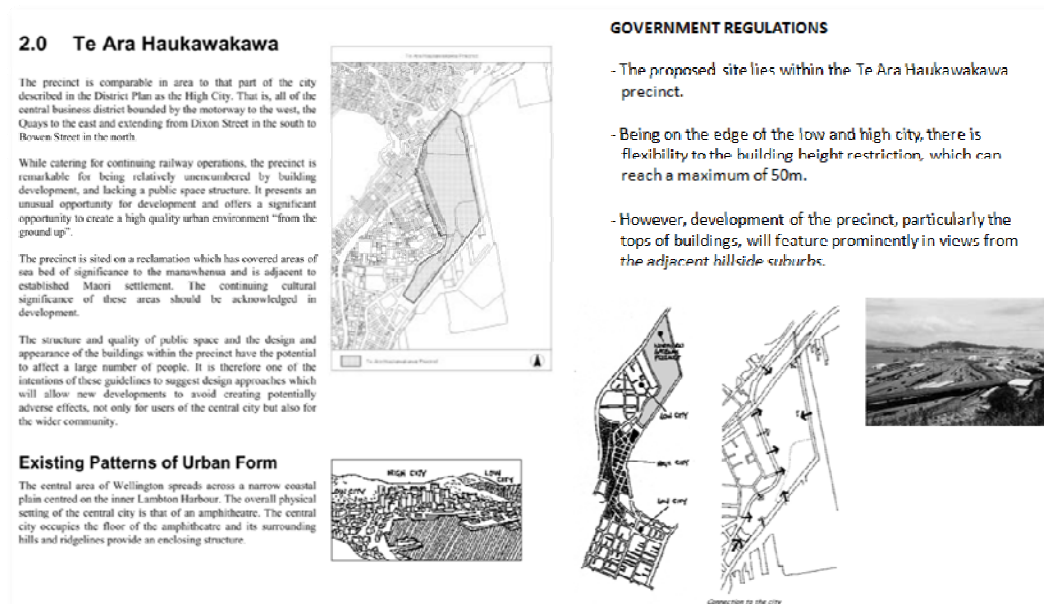


Figure. 53: Site Study - Government regulations

Source: Adapted From Wellington City Council,

Figure. 54: Site Study - Vehicular access

Source: Author, 2011

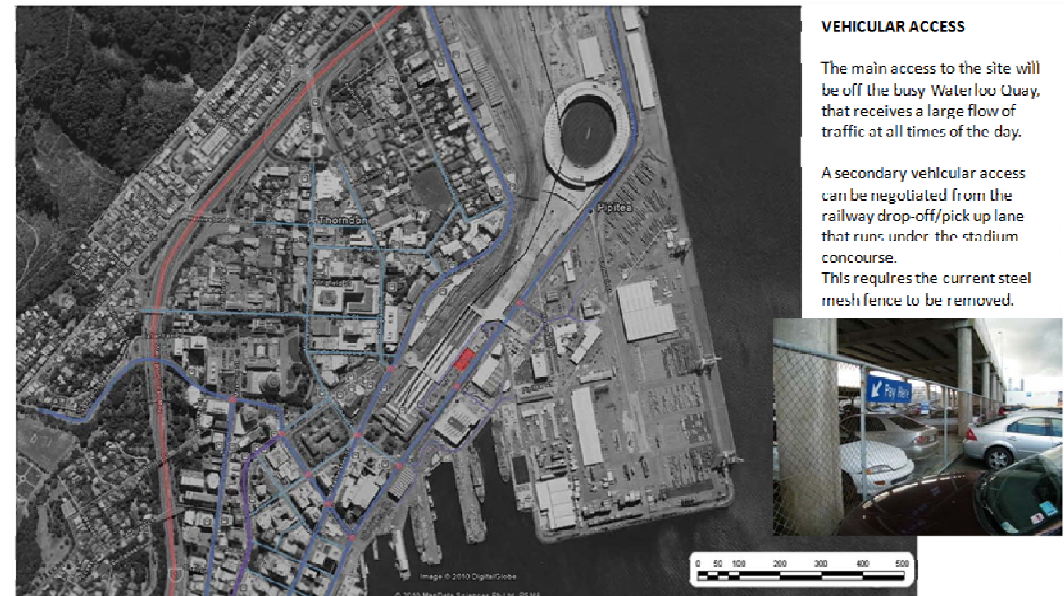
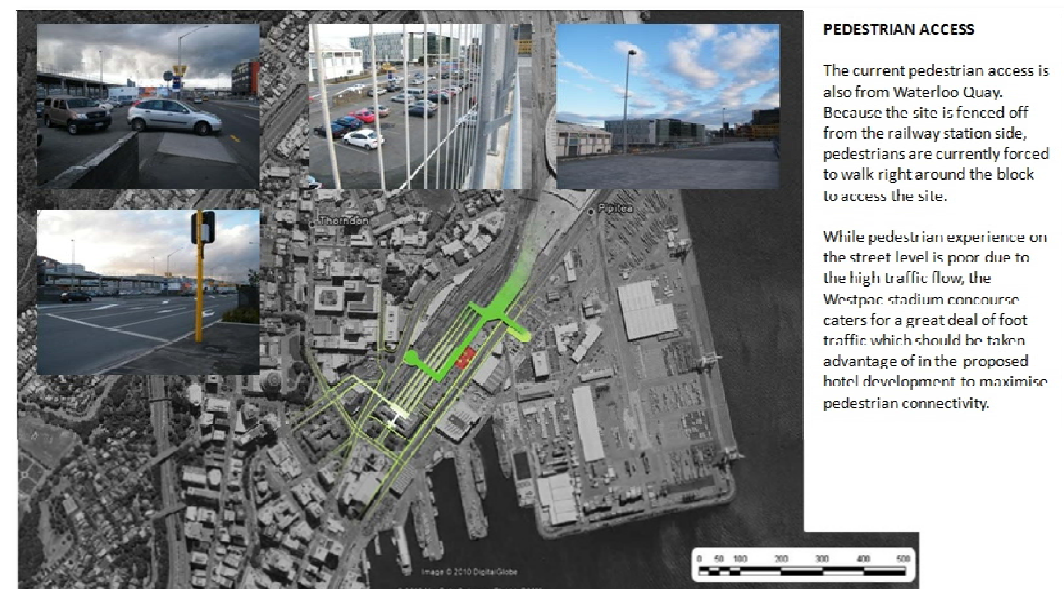


Figure. 55: Site Study - Pedestrian access

Source: Author, 2011



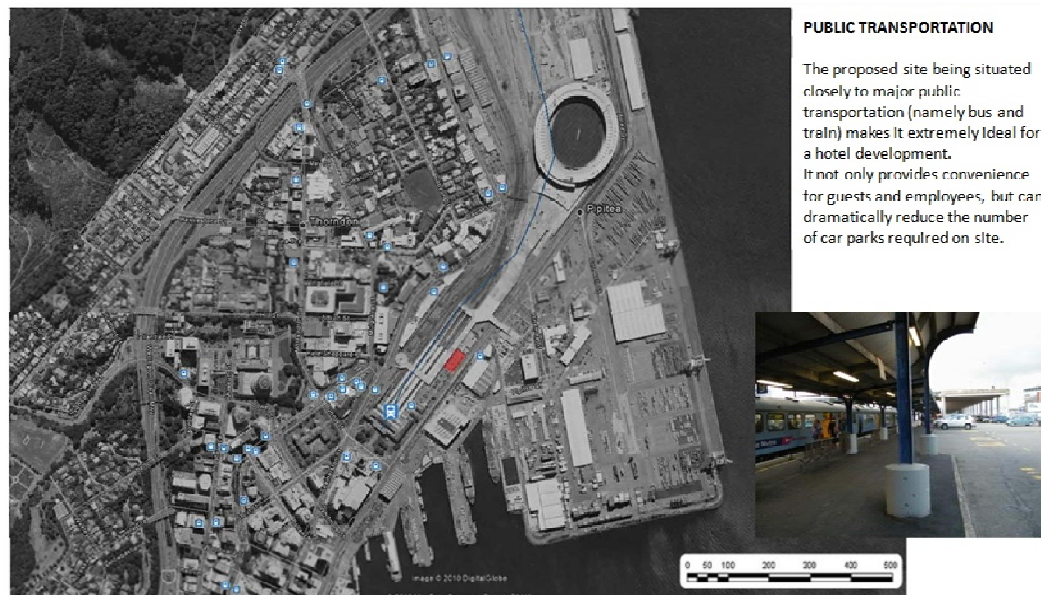


Figure. 56: Site Study - Public transportation

Source: Author, 2011

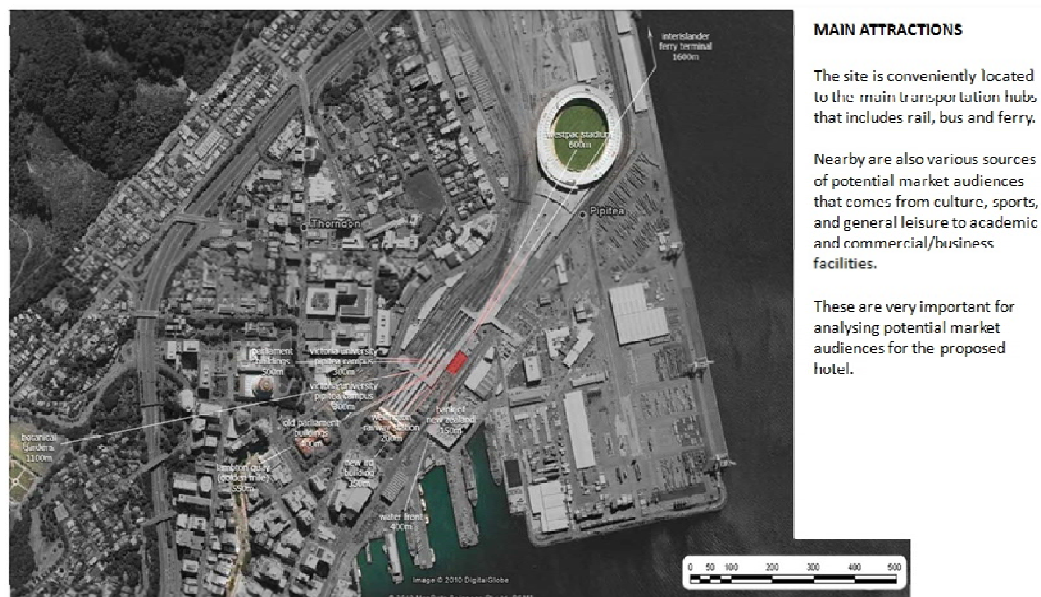


Figure. 57: Site Study - Main attractions

Source: Author, 2011

5.3.2. DESIGN PROCESS

The design process for this hotel proposal begins by working with the conditions of the site and establishing a building programme from the architectural requirements of targeted market groups. The targeted market groups are very broad and consist of 4 main categories that have distinctive implications on the hotel planning and design.

MARKET GROUPS	ARCHITECTURAL REQUIREMENTS
Business	Meeting rooms, function spaces
Leisure	Entertainment and restaurant spaces
High Price Sensitivity	Low budget rooms, double-double bed configurations
Low Price Sensitivity	High quality rooms, suite rooms, additional amenities

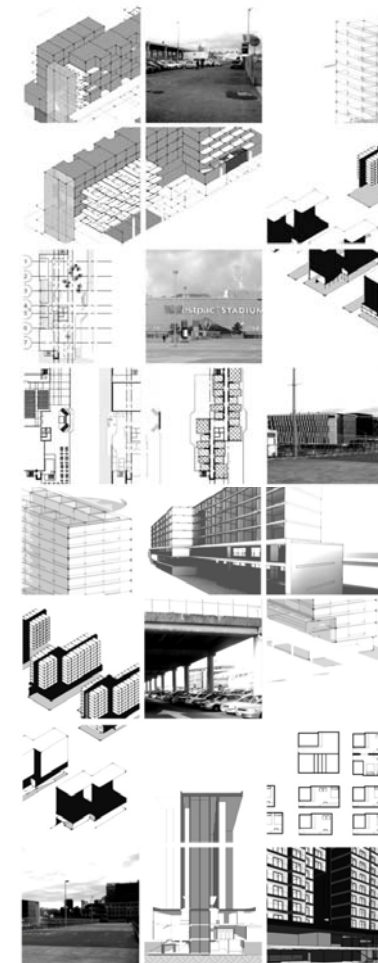


Figure. 60: Collage of Conceptual Design Images

Source: Author, 2011

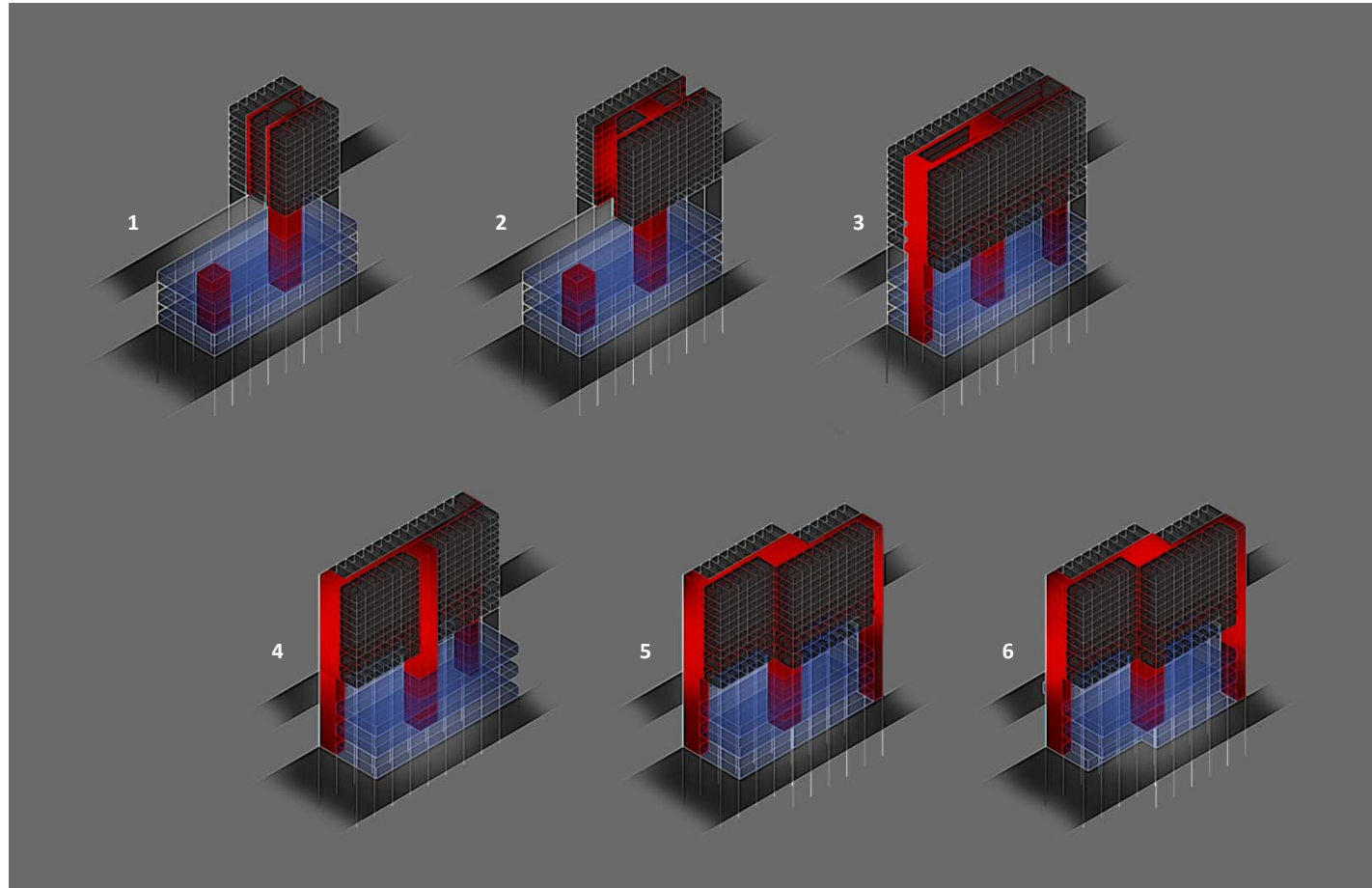


Figure. 61: Conceptual Mass Models - The final mass model optimises the utilisation of the site parameters, and indicates the distribution of floor areas to guestrooms, public and supporting areas, including the placement of vertical circulation.

Source: Author, 2011

5.3.3. SPATIAL PLANNING

From the site context, the ground floor and second floor (Stadium Concourse) levels are planned to allow easy access to the hotel for both vehicles and pedestrians via creating links with existing circulation paths and points of activity (Figure. 62).

Figure. 63 indicates the hotel building programme.

On the interior, separating the main circulation paths between the public and staff is crucial as one of the fundamental hotel design objectives (Figure. 64). Spaces were arranged to allow easy flow between different spaces for guests and visitors, while making sure the spaces are also easily serviceable by staff.



Figure. 62: Site Plan - Pedestrian and Vehicular Circulation

Source: Author, 2011

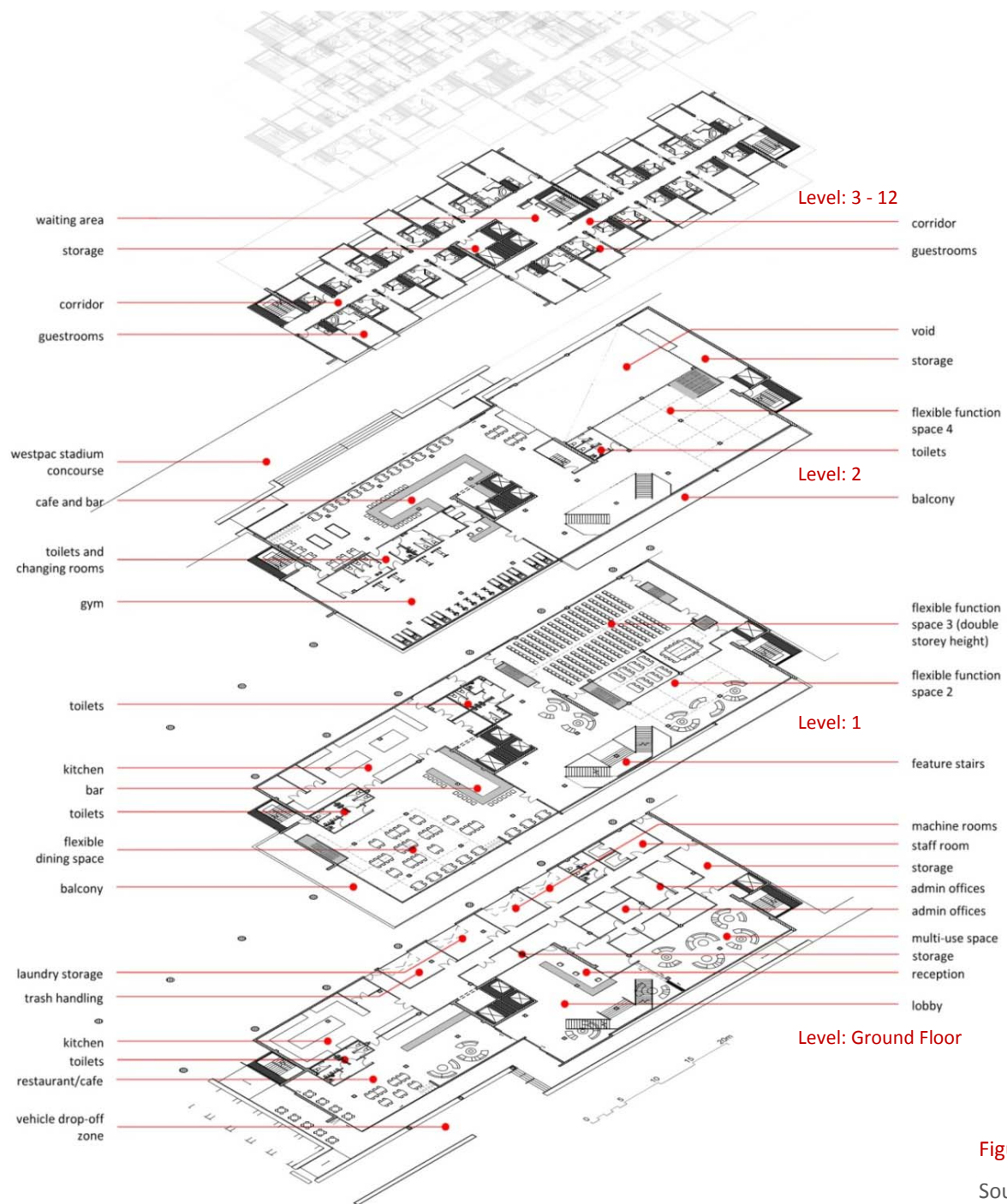


Figure. 63: Building Programme

Source: Author, 2011

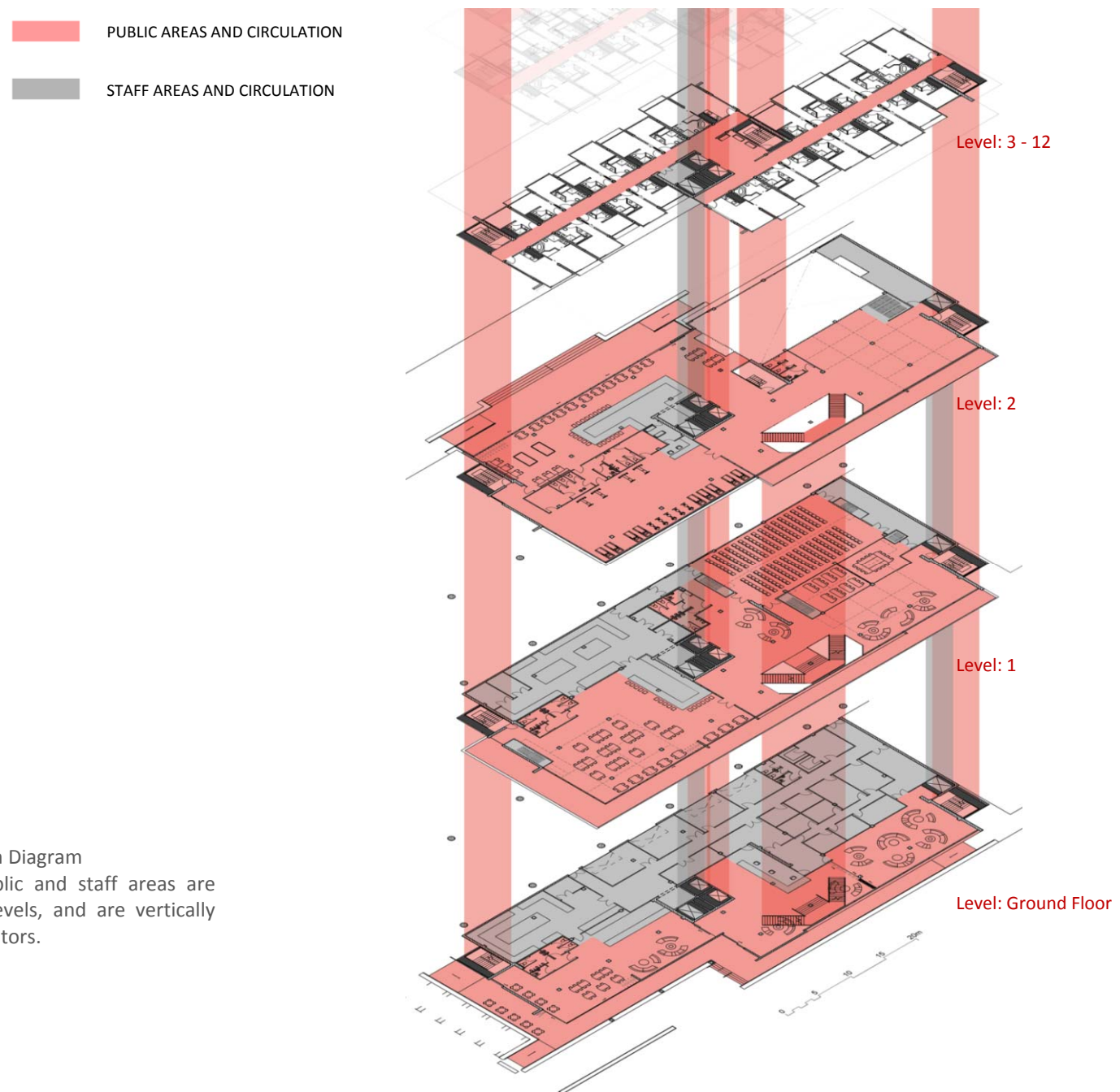


Figure. 64: Building Circulation Diagram

The circulation between public and staff areas are completely separate at all levels, and are vertically connected via dedicated elevators.

Source: Author, 2011



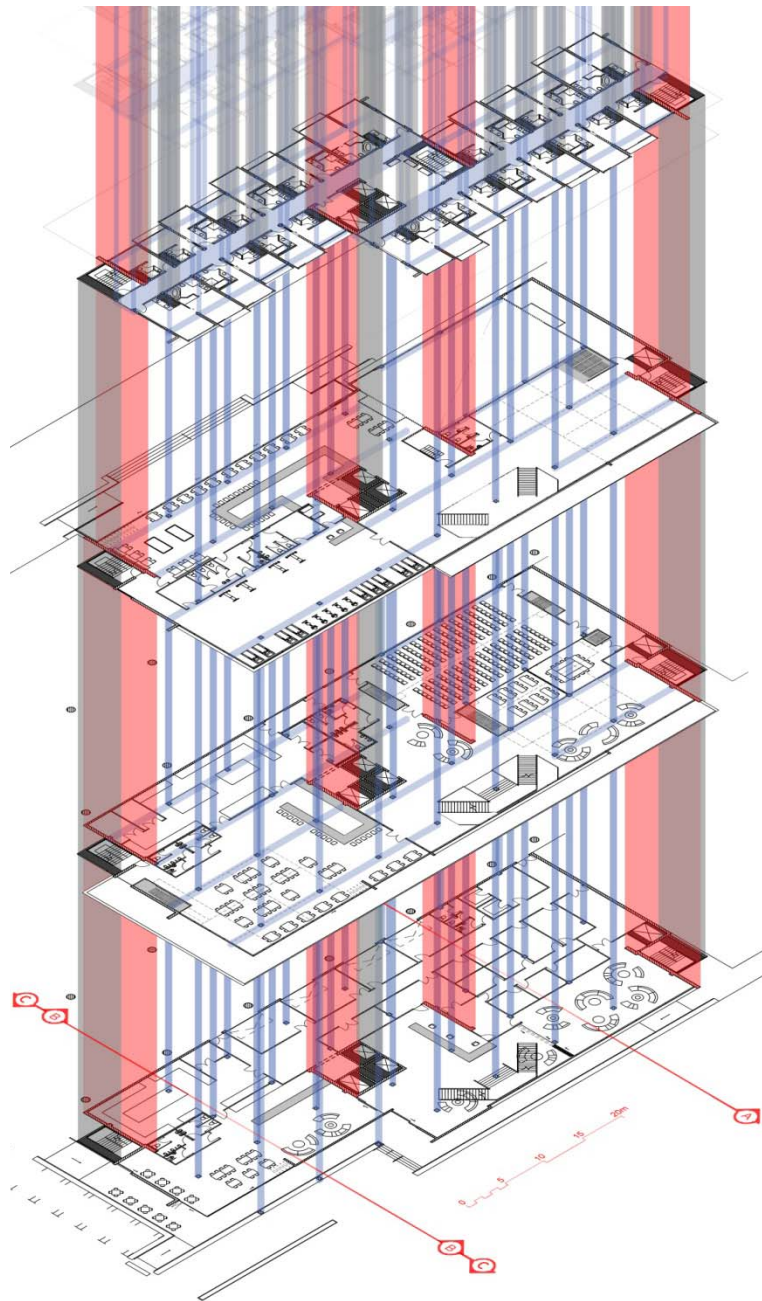
Figure. 65: Exterior Perspective – The ground floor creates pedestrian and vehicle connections to provide easy access into the hotel

Source: Author, 2011



Figure. 66: Interior Perspective – The hotel lobby acts as a central point of navigation upon entry on the ground floor

Source: Author, 2011



5.3.4. BUILDING STRUCTURES AND SERVICES

The selection of structural systems have significant impacts on the flexibility of spaces. Because the structure and services of the guestroom floors would greatly affect the lower floors, a great deal of effort was spent on coordinating the structures and services to allow for maximum versatility for both the design of guestrooms and public spaces. Moment resisting frames became the most suitable structural solution, because not only does it allow for inter-room flexibility between guestroom bays, it also reduces the disruptions the structure has on the lower floor levels. While the moment resisting frames resist both vertical gravity loads and longitudinal lateral loads, stronger shear walls were required to provide the additional strength to resist lateral loads in the transverse direction (Figure. 67).

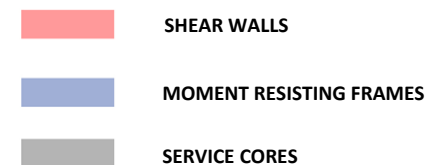


Figure. 67: Structural and Services Diagram

Source: Author, 2011

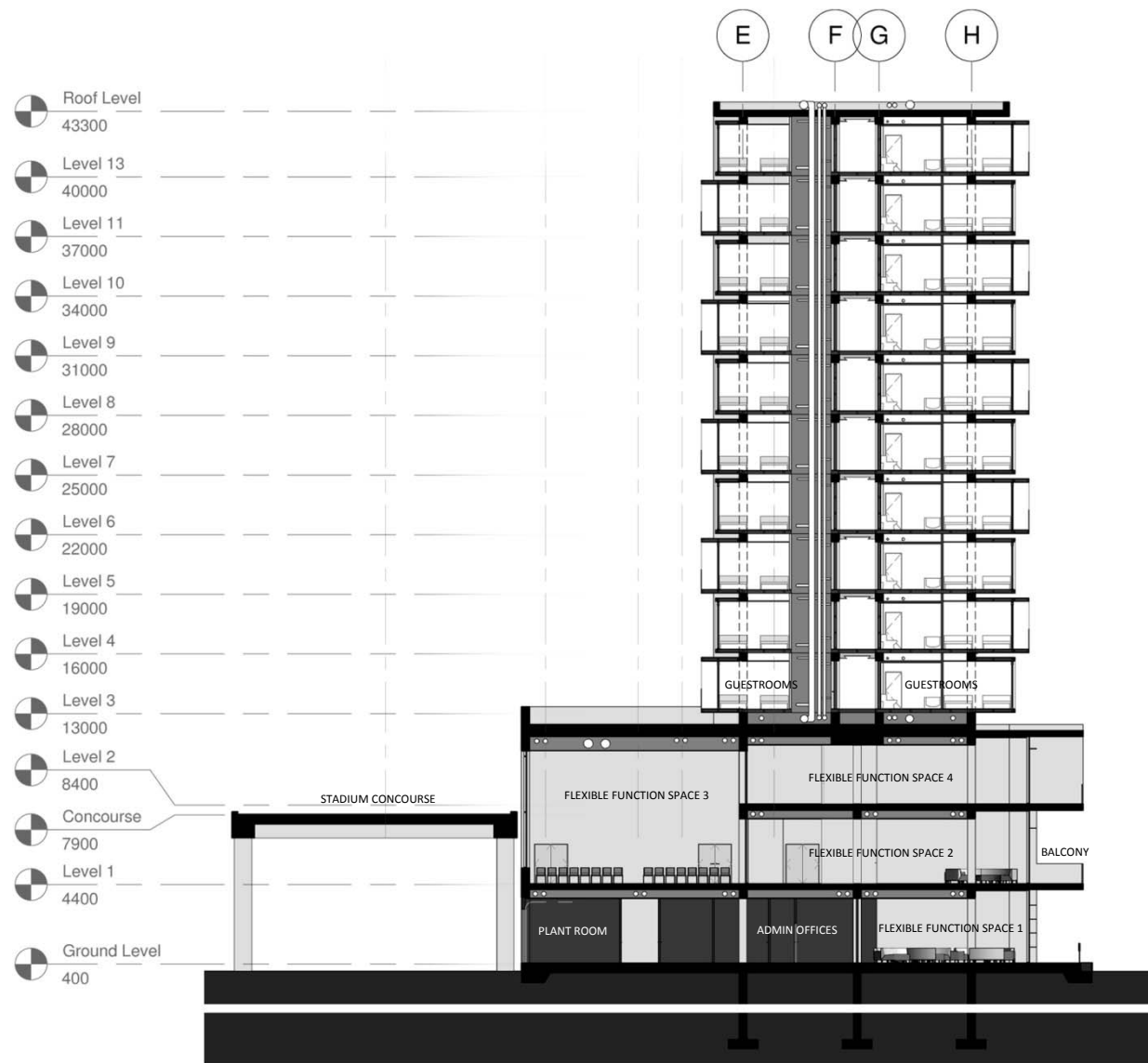


Figure. 68: Section AA

Source: Author, 2011

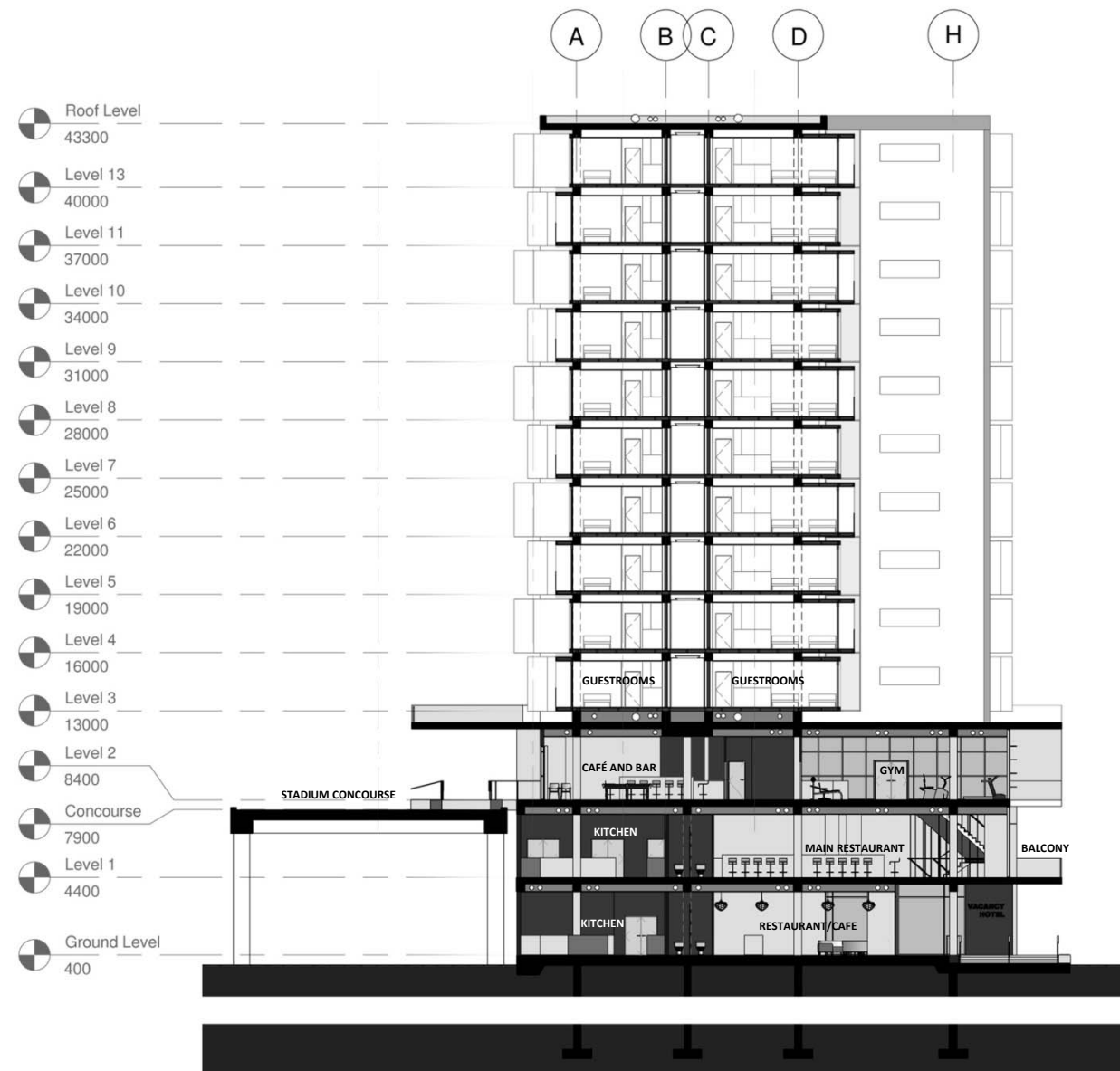


Figure. 69: Section BB

Source: Author, 2011

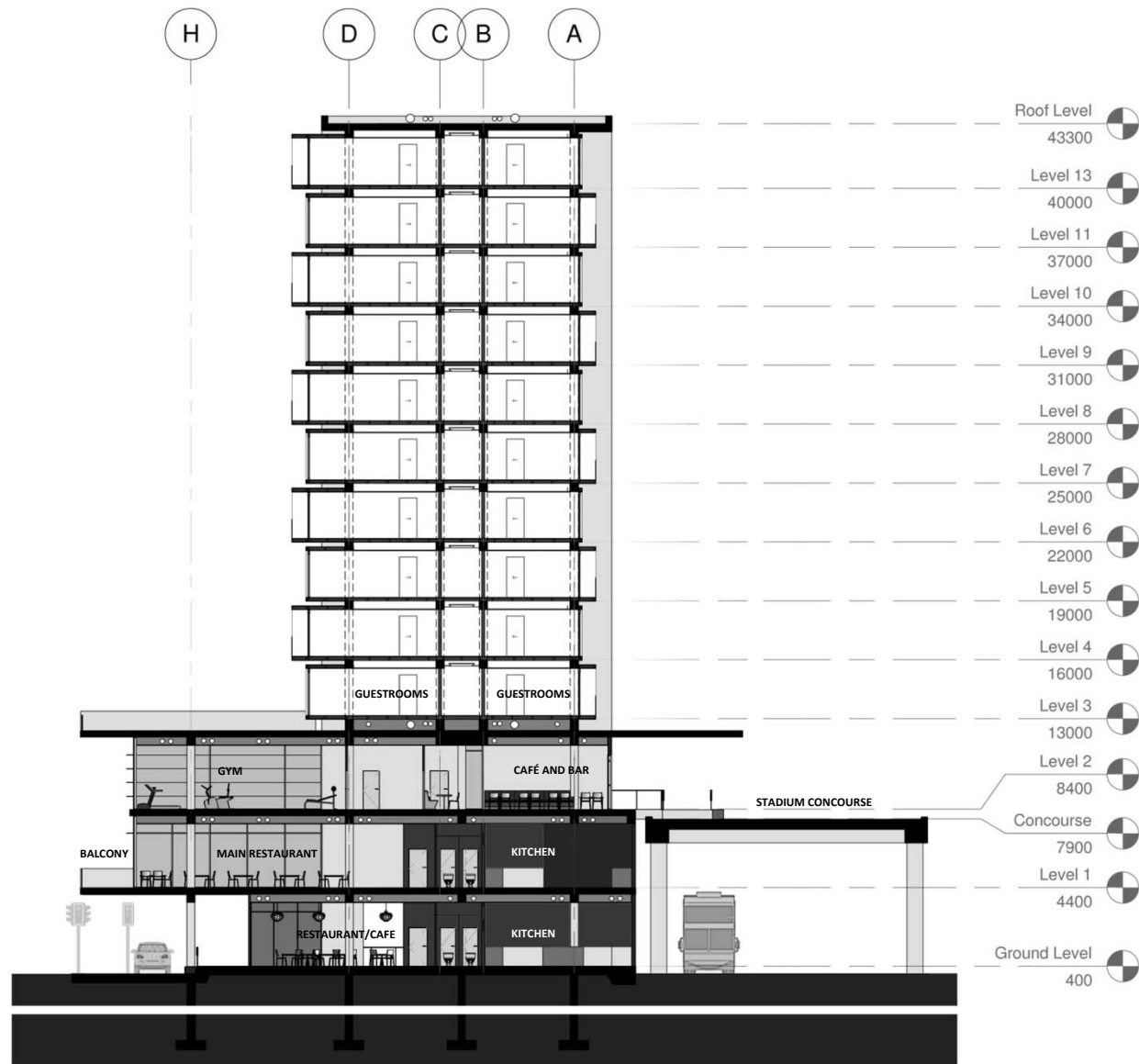


Figure. 70: Section CC

Source: Author, 2011

5.3.5. FLEXIBLE DESIGN OF PUBLIC FACILITIES

Having established that short-term demand fluctuations cause changes in the type of demand, which occur on a seasonal and weekly basis. The mix of public spaces are not only required to attract different market groups, but also fluctuate between uses that match the demand conditions to reduce waste and maximise utilisation of the built space.

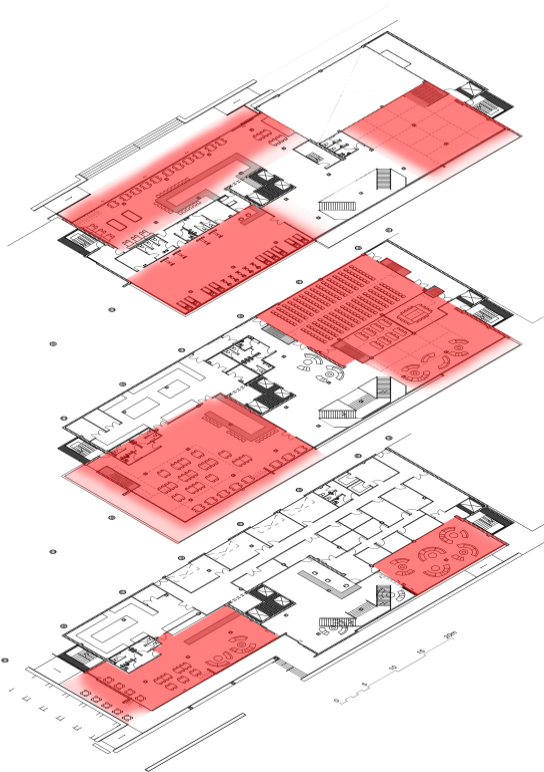


Figure. 72: Flexible Polyvalent Zones

Source: Author, 2011

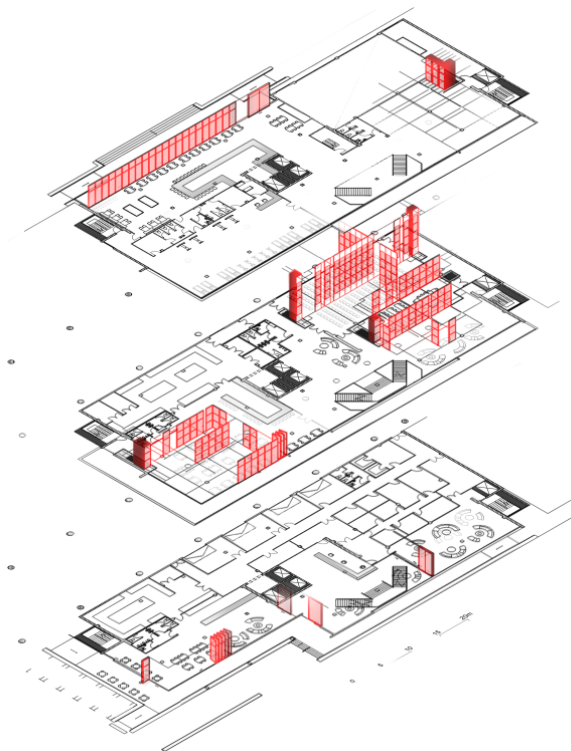


Figure. 71: Flexible Movable Building Components

Source: Author, 2011

The public spaces are firstly designed to be polyvalent to allow for different activities to occur on a short-term basis, without the need to make drastic changes to the building itself. This is achieved by creating large-open spaces that maximises freedom for varied furniture configurations (Figure. 71).

Additional flexibility is provided by movable building components that allow the large-open spaces to be divided or changed to suit different market needs (Figure. 72).

Integrating the two different flexible design approaches allows different public spaces to change in use, capacity and architectural quality to accommodate varying needs of different market segments. These are illustrated in Figures. 73 - 78.

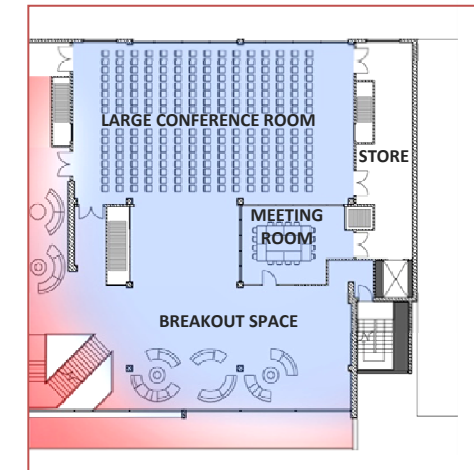
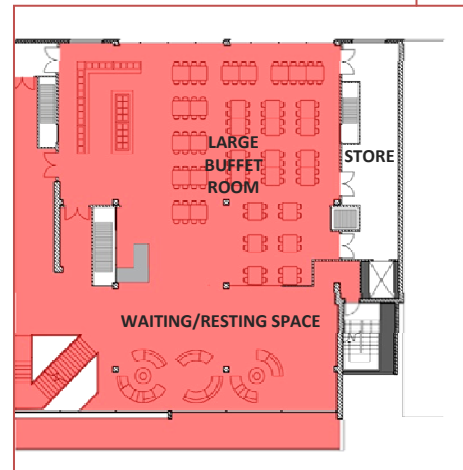
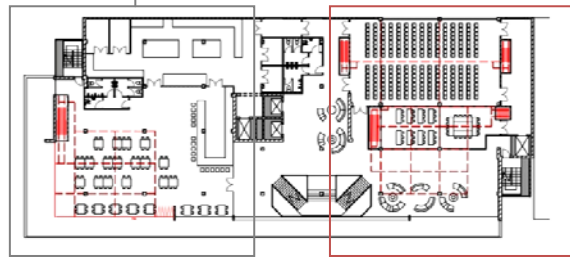
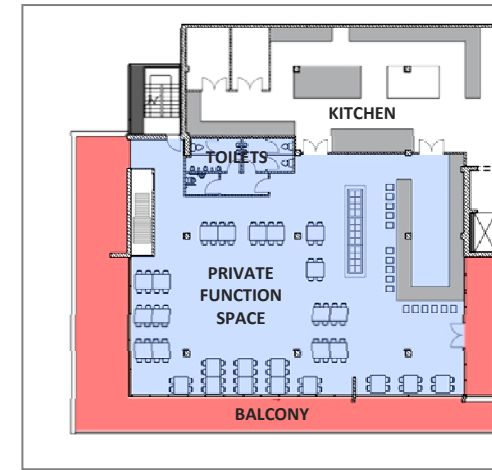
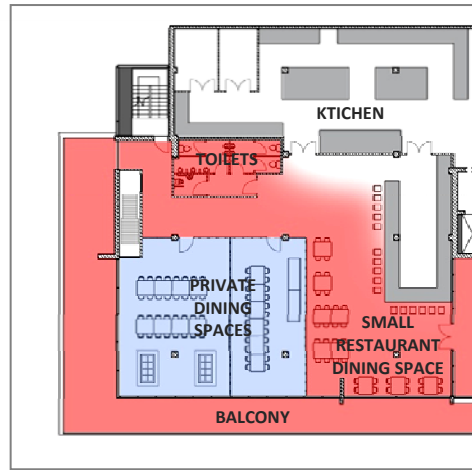
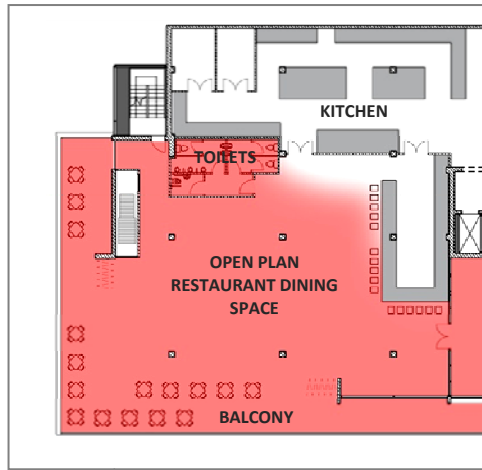


Figure. 73: Potential Configurations of Flexible Spaces on Level 1

Source: Author, 2011

- PUBLIC SPACES ACCESSIBLE TO ALL VISITORS AND GUESTS
- ENCLOSED PUBLIC SPACES FOR EXCLUSIVE/PRIVATE FUNCTIONS

Figure. 74: Interior Perspective - Flexible function area being used for business meetings.

Source: Author, 2011



Figure. 75: Interior Perspective - Flexible function area opened up for a large function.

Source: Author, 2011



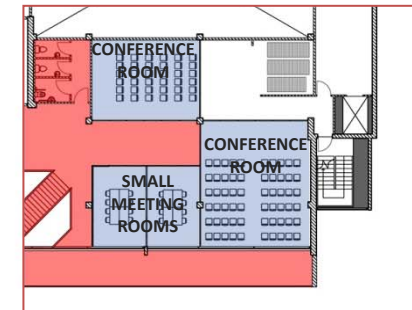
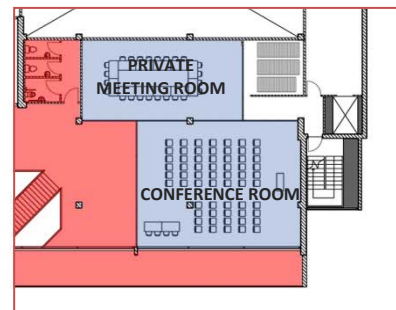
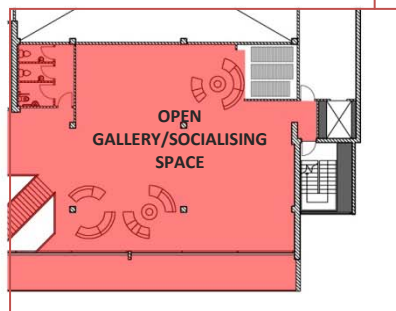
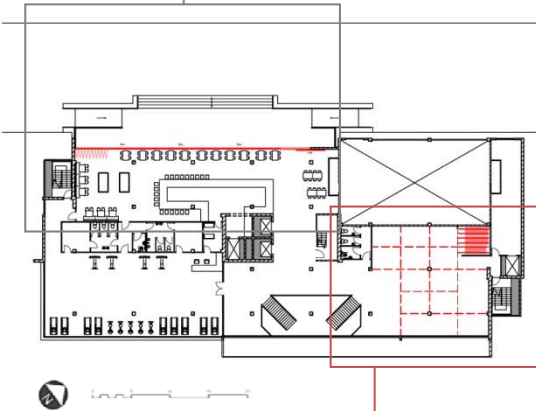
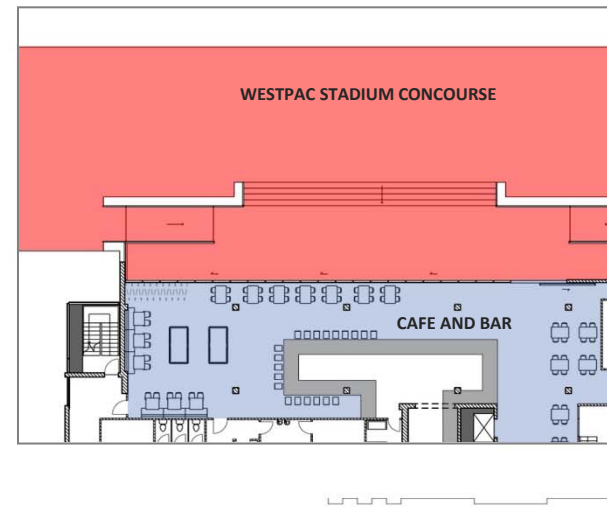
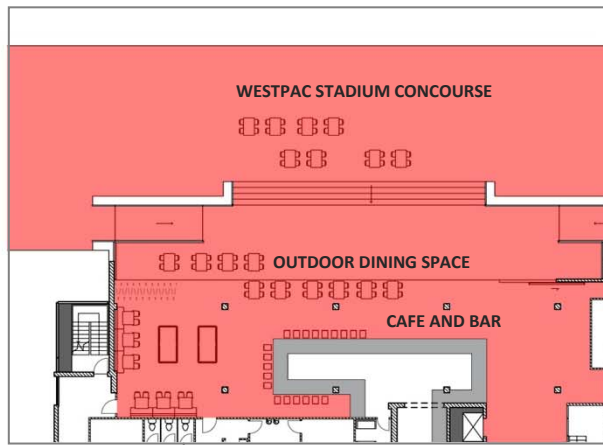


Figure. 76: Potential Configurations of Flexible Spaces on Level 2

Source: Author, 2011

- PUBLIC SPACES ACCESSIBLE TO ALL VISITORS AND GUESTS
- ENCLOSED PUBLIC SPACES FOR EXCLUSIVE/PRIVATE FUNCTIONS

Figure. 77: Interior Perspective - The café and bar on Level 2 can be opened up to the public and the Stadium Concourse to increase the dining area and encourage public interaction.

Source: Author, 2011



Figure. 78: Interior Perspective – Alternatively, the café and bar can be enclosed to provide privacy for exclusive private functions.

Source: Author, 2011



5.3.6. FLEXIBLE DESIGN OF GUESTROOMS AND GUESTROOM FLOORS

Flexibility in guestrooms is achieved through a number of design interventions. Firstly, the varieties of different guestrooms are already designed with different market groups in mind, which is reflected in the size of the room and number/quality of amenities (Figure. 81). Giving guests the choice from a wide range of guestroom types with different price ranges that best suit their needs.

Secondly, the use of flexible furniture with inter-room connectivity effectively provides a new set of suite rooms (Figure. 83) that become available when the market conditions demand it. The multi-use furniture modules allow guestrooms to change in capacity or quality depending on the level of demand, or according to particular guests' requirements.

For example, when demand is high or guests demand sleeping space over additional amenities, the beds fold-down to maximise the guestroom capacity (Figure. 84). Conversely, when demand is low, or guests demand quality over capacity, the beds can fold-up to reveal additional amenities such as a couch and dining table. (Figure. 85)

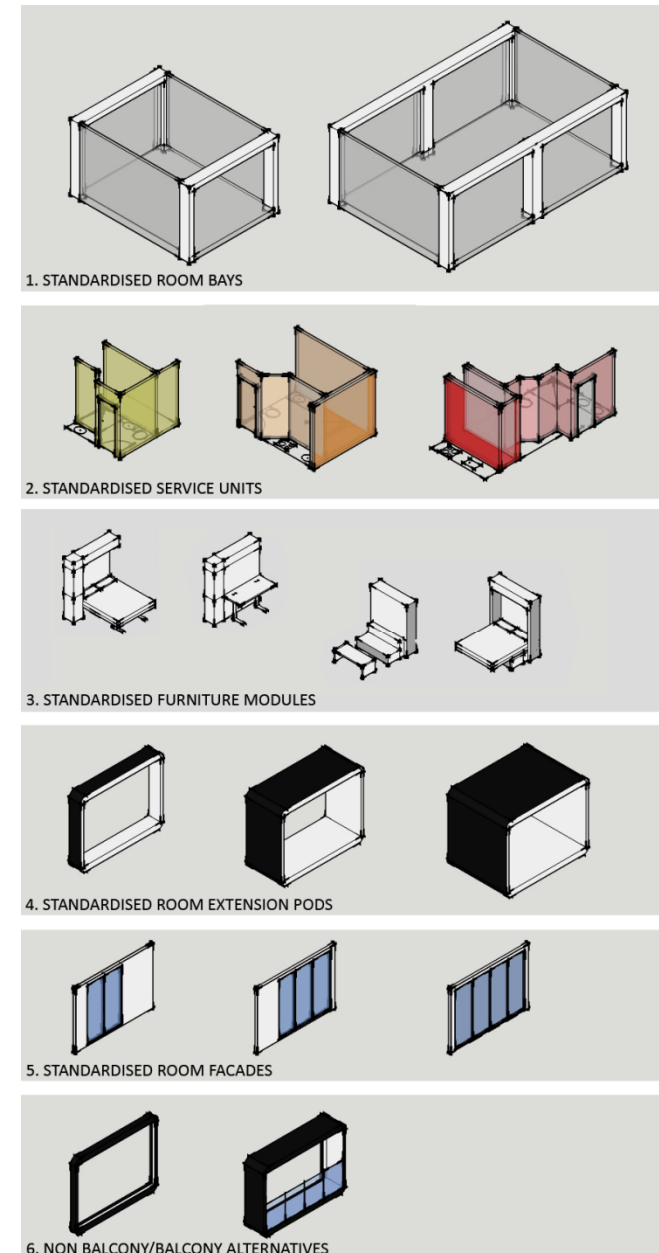


Figure. 79: Catalogue of Standardised Guestroom Components

Source: Author, 2011



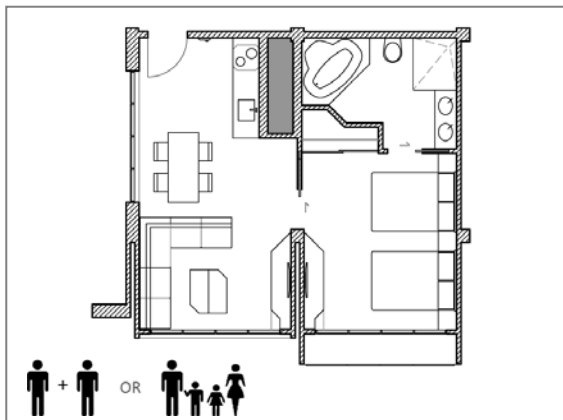
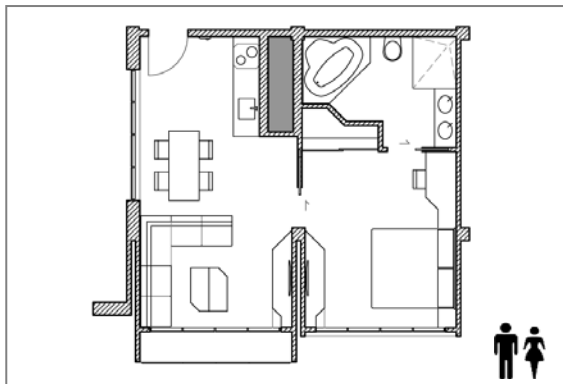
Figure. 80: Diagram of a Typical Guestroom Floor showing the Guestroom Mix

Source: Author, 2011

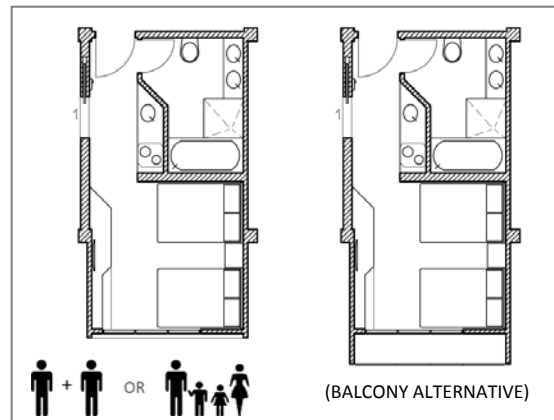
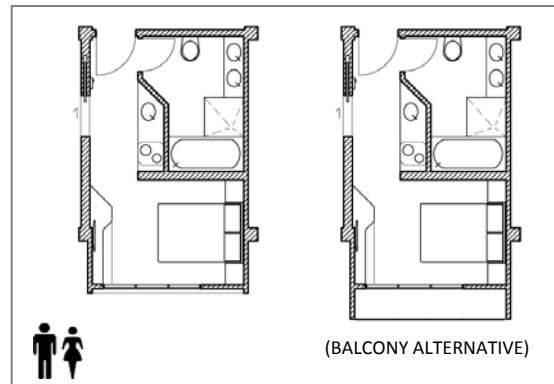
Figure. 81: Typical Guestroom Types and Proposed Interior Layouts

Source: Author, 2011

LUXURY SUITES ★★★★★



STANDARD ROOMS ★★★



ECONOMY ROOMS ★

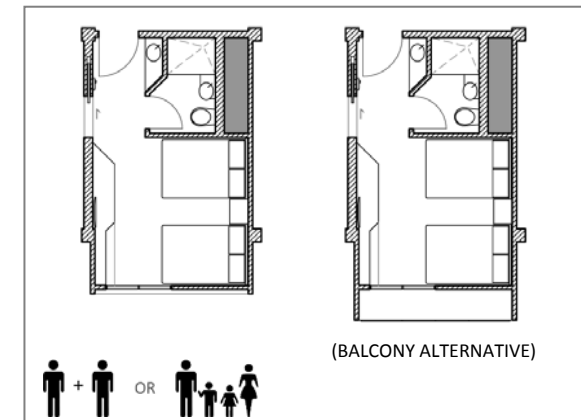
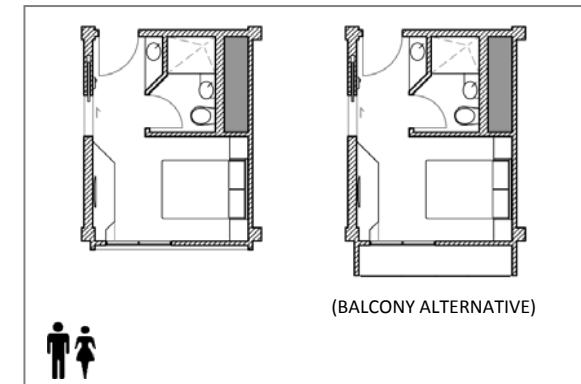




Figure. 82: Diagram of a Typical Guestroom Floor showing the Location of Flexible 'Paired' Guestrooms

Source: Author, 2011

Figure. 83: Typical 'Paired' Guestroom Variations in Different Modes of Use

Source: Author, 2011

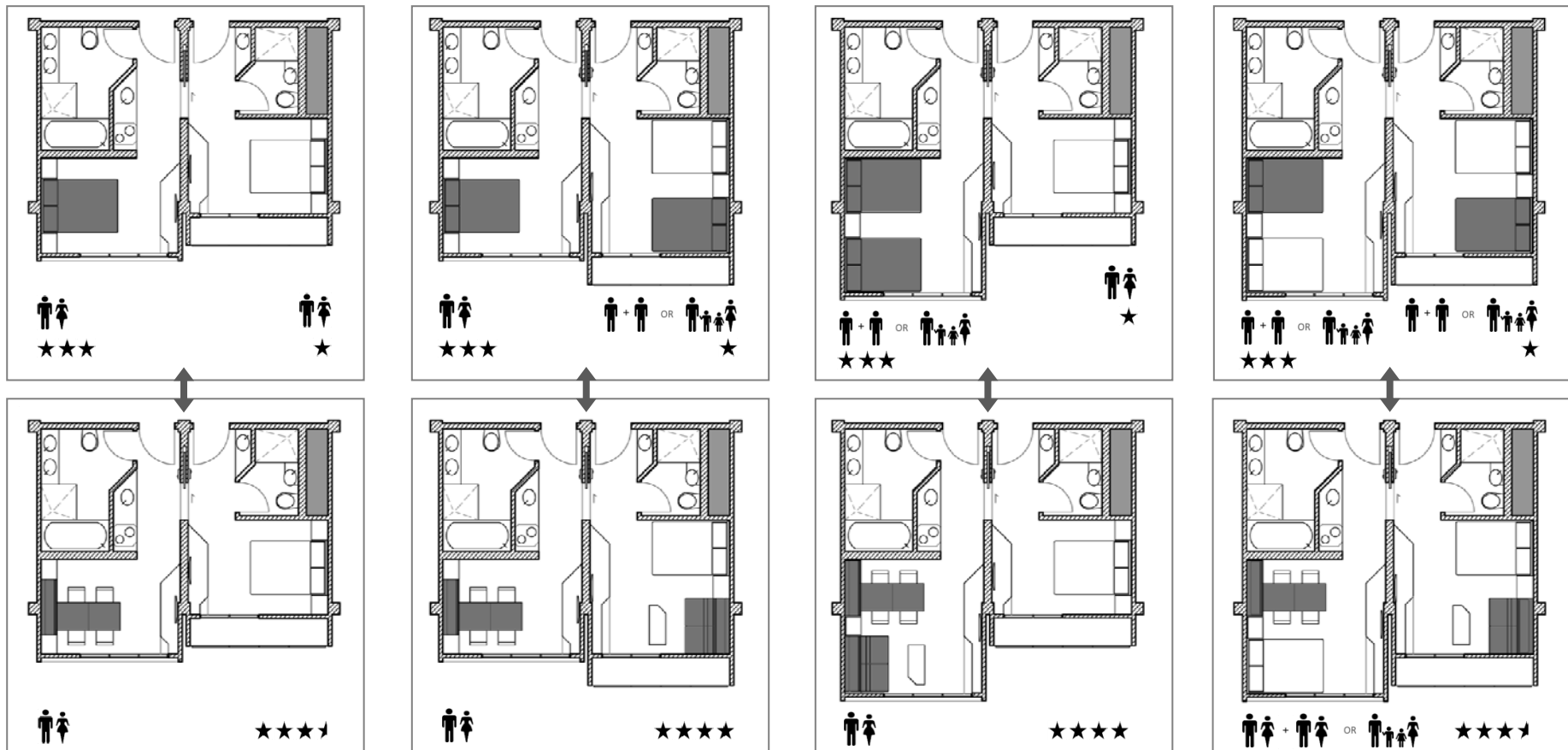


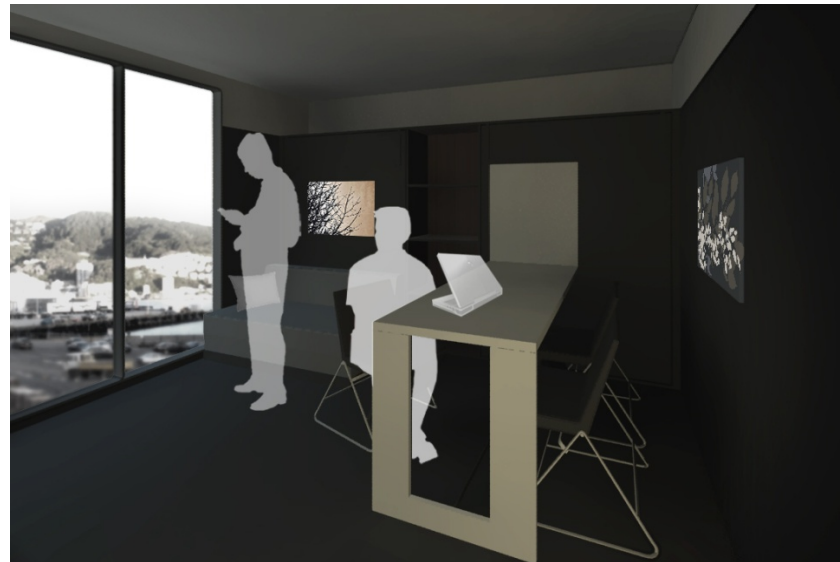
Figure. 84: Interior Perspective - The beds fold down to accommodate a family of 2 Adults and 2 Children

Source: Author, 2011



Figure. 85: Interior Perspective - The beds are folded up to allow the couch and table to be folded out, transforming the room into a lounge setting

Source: Author, 2011



5.3.7. EXPRESSING HOTEL FLEXIBILITY THROUGH THE BUILDING EXTERIOR

One of the secondary objectives that were derived from the previous design proposal, was the idea of expressing the hotel flexibility through the exterior. This was achieved in this design through the articulation of different guestroom types as cantilevering pods of different lengths, which has both practical and visual benefits.

Instead of creating variations in the widths of guestrooms, the decision to provide different guestroom sizes through varied lengths allowed the structural modules to be kept regular to achieve greater structural efficiency. The dynamic building façade as a result of these design interventions, successfully express the ideas interior building flexibility through the building exterior.



Figure. 86: Interior Perspective - The ends of guestroom corridors are glazed to reveal views of the exterior

Source: Author, 2011



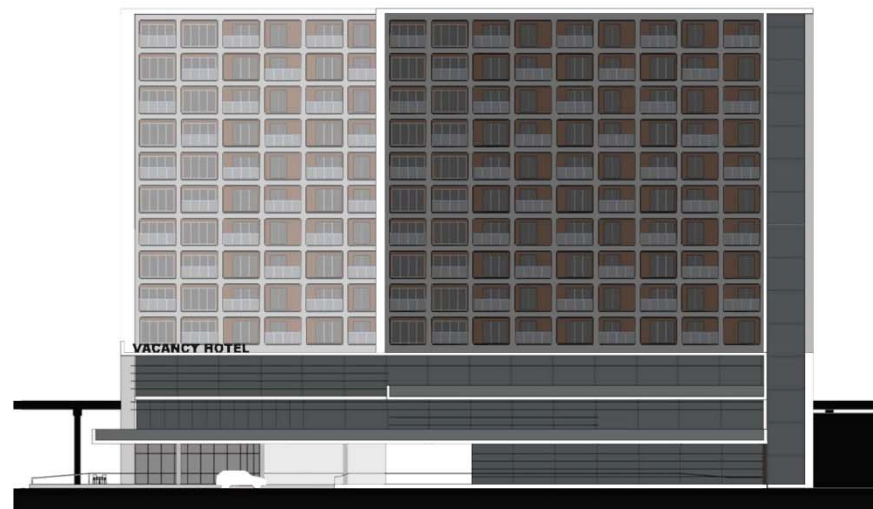
SOUTH ELEVATION



WEST ELEVATION



NORTH ELEVATION



EAST ELEVATION

Figure. 87: Elevations

Source: Author, 2011



Figure. 88: Exterior Perspective from Waterloo Quay

Source: Author, 2011



Figure. 89: Exterior Perspective from Westpac Stadium Concourse

Source: Author, 2011

[6] DISCUSSION AND CONCLUSION

6.1. DISCUSSION

EVALUATION OF FINAL DESIGN PROPOSAL

Based on the main objective of this thesis that is to explore how architectural design can improve hotel business performance, the final design proposal (Section 5.3) has tested how the design of a flexible hotel has the potential to improve hotel performance by allowing the hotel property to be adaptable and responsive to short-term demand fluctuations.

While the research has shown that a hotel with the right facilities and at the right price is able to attract more customers when demand is low. Adding additional hotel facilities and amenities not only increase the costs of investment, which leads to higher room rates that reduce hotel competitiveness. But the changing nature of demand type in the short-term, also means certain facilities will have less value to particular consumer groups and be underutilised at those times.

The final design proposal has shown how a combination of polyvalent design and movable building components allow the public spaces to be flexible and able to change in function, capacity and architectural quality to suit the needs of different market groups. This allows the hotel property to have a large variety of different public facilities, which can selectively be offered to guests according to the particular demand conditions at the time.

Additionally, the final design proposal has also shown how both hotel operators and guests can benefit from the flexible design of guestrooms that change in quality and capacity to better accommodate different demand conditions. When demand is low, hotels usually have a high number of empty hotel rooms that are a waste of resources, the design of flexible design of guestrooms in the proposed hotel design allows 'paired' rooms to be reconfigured into suites that offer greater comfort and quality to better utilise empty rooms and offer added value to attract more customers.

Conversely, when demand is high, the flexible furniture in guestrooms transform into beds to increase the capacity of the hotel. This not only extends the revenue earning potential of the hotel, it also increases the maximum capacity of the hotel to accommodate otherwise unable to be accommodated demand.

Because the success of flexible design interventions rely on the level of integration and compatibility with fundamental programmatic and operational requirements. This has been a secondary objective in the final design proposal, which has shown how the flexible design interventions have been achieved without the compromise of fundamental design objectives, such as the logical and dedicated circulation paths for public visitors and staff, and efficient building structure and services.

Taking a holistic approach to hotel design when implementing and evaluating flexible design strategies is essential for overall hotel success, of which the final design proposal has aspired to achieve.

6.2. CONCLUSION

In conclusion, this research has proven that flexible hotel design has the potential to improve hotel performance by allowing the hotel property to more effectively and efficiently accommodate changing demand conditions. The thesis argues that highly profitable hotel developments require hotel design to be highly market orientated, but also needs to take into consideration the changing market conditions to further match hotel supply with demand.

The research has discussed the methodologies and considerations of conventional hotel design, and the impact different market segments have on tangible design considerations (see Chapter 2). The research identifies that there is a knowledge gap in market orientated hotel design that currently ignores the problems and opportunities caused by short-term demand fluctuations.

These demand fluctuations are commonly represented in guest nights or occupancy rates, but a closer analysis revealed (see Chapter 3) that the type of guest also changes significantly from day of the week to month of the year. While the bulk of this information is discussed in the realm of hotel management and marketing, this thesis argues the importance of rethinking hotel design in response to short-term demand fluctuations.

A hypothesis was established that flexible hotel design has the potential to enhance hotel performance by allowing the hotel property to be more responsive to short-term demand fluctuations. This was followed by an examination of flexible architecture and flexible hotels as a way of allowing the hotel to physically respond to changes in demand (see Chapter 4).

While the topic of flexible architecture is extremely broad, it was found that due to the short-time period and re-occurring nature of demand fluctuations, certain flexible design strategies were found to be more practical than others. Internal-based flexible interventions were found to be more feasible and realisable, namely the concepts of multi-use space, movable internal partitions and flexible built in furniture. These changeable building elements give hotel spaces the potential to be reconfigured quickly and easily in response to changing circumstances.

These flexible design strategies were further tested in proposed hotel designs (See Chapter 5), which demonstrated how flexible design of the public spaces and guestrooms is able to make better utilisation of the building resources and attract more customers during when demand is low by offering the facilities that particular market groups desire. At the same time, flexible design allows those spaces to be reconfigured to take advantage of high demand levels, by increasing the capacity of the hotel, therefore increasing the revenue earning potential of the hotel property.

The findings of this research could be a basis for a prototype - high occupancy - flexible hotel, which would be the ultimate proof of this thesis.

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