

A NORMATIVE POSITION ON ARCHITECTURE IN A FREE-MARKET ECONOMY

Architecture defines the relationship between constraints

There is no such a 'thing' as architecture!

Engineers calculate a structure, anthropologists analyse urban form, and social psychologists appreciate the social dynamics of various building types. Often an interior decorator will beautify the inside of a building. Landscape architects consider the layout and selection of planting, paving, exterior lighting and furniture

Responsibility for the actual construction will fall to contractors. There is ornamentation as applied by a draftsman – sometimes board members, wives, politicians and other affected parties can be a great source of inspiration here.

Environmental specialists assess the environmental impact. A facilities-manager or user representative will consider the maintenance and operation of the building and services will be designed and installed by a swarm of specialists. Local authorities protect the health and safety of users and the client's expenses and liquidity will be monitored by quantity surveyors, sometimes also acting as project manager.

...What does the architect do?

All these constraints are acknowledged (at financial expense) but their relationship must be determined before anyone can start with construction. First, there has to be an idea of the building. The 'idea' of the building is a concept wherein a place is found for each constraint. Architecture therefore, is planning.

But architects also pride themselves on 'adding value'. In what way does the architect add value? The engineer adds value by making sure the beam depths can carry the foreseen load. The project manager puts pressure on the contractor but how does the building benefit from the services of an architect? The goal of the 'architecture part' is to plan so that each of these forces can manifest in the building with the least compromise to each.

Where the purpose of the building is to make money the developer is best positioned to understand the idea of a building – here the building is simply a commodity. Where the client is a cultural institution seeking some physical manifestation of their paradigm, the cultural critic will be well positioned to give critique on the facades of the building – here the building acts like a sculpture. Therefore the idea of the building (its architecture) answers directly to the client.

It should therefore be clear that the parts that make up the building should be related in the concept (expression of the idea of the building in a diagram) in such a way that the goal of the building is achieved but the constraints are not easy to integrate:

...Therefore, incoherence, or more precisely, randomness, is the underlying structure of all architects' careers: they are confronted with an arbitrary sequence of demands, with parameters they did not establish, in countries they hardly know, about issues they are only dimly aware of, expected to deal with problems that have proved intractable to brains vastly superior to their own. Architecture is by definition a chaotic adventure.¹

The architect therefore is not a specialist but a generalist². The architect must know something about everything and from his understanding of objective reality determine the destiny or form³ of a project. Failure on the architect's part to assume this role, puts the shape-giving activity in the hands of a specialist who considers only 'aesthetics', or user comfort, or return on investment, or environmental impact, or 'social issues'/ brown issues, or functional programming, or symbolism/ semantics, or the human lived experience, or zeitgeist relevance/ style, or material strength, or services integration, or circulation, or safety, or public participation, or building cost, or historical relevance, or contextual significance, or maintenance, or standardization, or the colour of the tiles. If architecture is not the mediator between all the above then it is merely a styling exercise added to the so-called planning phase.

One problem is that each constraint functions on a different scale. The selection of the site may be done at the scale of the city but the selection of roofing material may depend on variables from a scale of climatic regions. It is characteristic of specialists that their field of interest resides in a narrow band of scales – the engineer is interested in dimensions and material selection of structural elements, whereas the social researcher might gain privileged insight into the group dynamics to certain building types. How do these constraints find a fit? In most cases tradition and typology (pattern) is probably sufficient but sometimes the need for a fit with higher production value is too critical to be entrusted to an evolutionary dynamic. Architecture should therefore busy itself with finding a fit which will release more energy from the same inputs.

Architecture seeks the least compromise for each constraint because the profitability of each specialized part lies in hegemony

Like most profitable production processes, construction is subject to specialization. Specialization means that goods and services (staircases, project management, financing, social participation) are made to be more hegemonic severally – one elevator by ABC Elevators will closely resemble, in quality, another elevator of the same range. This is achieved by gaining

¹ (OMA et al: 1995: xix)

² Le Roux, S. Personal communication. 11 February 2005. University of Pretoria – Main Campus. These discussions are part a mentorship program.

³ 'Form', here, subscribes to the meaning of the word as interpreted by Wölflin in his doctoral thesis, 'Prolegomena to a Psychology of Architecture' (1886), wherein he argues 'We assume that in everything there is a will that struggles to become form and has to overcome the resistance of a formless matter.' (Forty, 2004:159)

control over the variables of the production process. Modification of any of the variables of a product or service requires higher input by the manufacturer/ contractor/ consultant and therefore either lowers the profitability of the service or product or elevates the price – depending on the demand in the market for those goods or services. Therefore the fit must ensure the minimum adjustment to each constraint.

But, as was stated earlier, the constraints of a building tend to operate at dissimilar scales. Architecture therefore operates at all the scales – in fact, it is the operator between the different scales.

To achieve the ideal conditions of only one constraint at one scale will mean failure. An architectural discourse that focuses on one scale only is a prelude to a failed concept - architecture does not focus

How then, does architecture relate the different parts of a building to one another if they can not be conceived on scale? Each force must be reduced to an appropriate scale and the forces of similar scale grouped together. In this state the forces can be compared, analysed and finally manipulated.

Architecture then is not the invention of any new solution to any of the constraints. Architecture seems to be the assembly of specialists’ answers to the constraints considering the effect they will have one on each other – across scales.

But how is the impossibly large quantity of information required for a structural plan (engineering constraint) represented together with other constraints in a single comprehensible reality? It is necessary for the partial solution to each constraint to manifest as a **visible, measurable system of elements** – an engineering constraint may manifest as a grid of columns.

Constraint	context			system		elements
The structure	of the building is	No.1	a	Grid	of	Columns
		No.2	seven	Storeys	of	Floor slabs
The culture	of the Nguni user-group requires	No.1	at least	10% of usable floor area	of	Privacy

Table 1. Constraints are reduced to a visible, measurable system of elements.

In this example the structure of the building and privacy requirements of a certain cultural imperative finds itself in the concept at a certain scale, for instance 1:200 on an A1 sheet implying that the structure is built from a layout that is most economically described by a diagram in a drawing that is reduced to fit on an A1 sheet of paper. By visualizing these two constraints on a single

scale their spatial requirements can be superimposed as layers and any contradictions identified from where a compromise can be reached. In general, it is alleged that no more than seven such layers can be considered by the average human intellect!

It should be noted that one scale of presentation is not sufficient to fully describe a system – for example, how long is the shoreline of England? The answer is an approximated measurement at a certain scale and will always be different at some other scale. This implies that a single phenomenon will have different characteristics at different scales. At the scale of one person, clinical depression is debilitating. At the scale of her immediate family, it is less upsetting but still a hindrance. At the scale of the extended family it barely elicits gossip but again at the scale of national health it makes quite a hole in most western countries' GDP.

Architecture predicts the effect of the assembly of constraints on one scale on the assembly of constraints on all the other relevant scales

Climatic zones delineated on a 1:50'000 map will indicate precipitation patterns that building materials will accommodate at 1:5. These wall assemblies and window details are conceptualised at 1:5 or 1:1 but they were predicted at 1:50'000. A structural concept at 1:200 might imply beam depths that influence ceiling and roof assemblies at 1:50. It is the function of architecture to co-ordinate constraints from different scales with one another. Architecture predicts the influence of constraints from one scale on constraints of another scale. Very often regional types and traditions already point to acceptable levels of compromise found within a market – usually geographically bound – like particular roof pitches accommodating precipitation endemic to a region or settlement patterns endemic to certain political contexts.

For me then, someone who is responsible for the idea of a building is primarily a draftsman who delineates parts of a building, as suggested by others, to fit these parts together as a building. As is to be expected, these constraints do not fit easily and a compromise becomes necessary.

After such a compromise was reached, and the constraint again isolated, it will be seen that the system of elements have inflected. This inflection points beyond itself towards something else – the fit with another constraint. A collection of such assemblies can be described as the idea of a building which is as unique as the compilation of the constraints. For instance, the idea for a building required a roof (1:100) which required which required both structure (1:100) and sheeting (1:5). Cuts will be made in the rafters to accommodate purlins necessary to carry the sheeting over the eave to the gutter necessitated by the roof angle necessitated by the climate-region-specific behaviour of precipitation. If the structure is then isolated again it will be seen that the roof trusses have attained cuts to the rafters – why? That was the most economical way to put the structural constraint and the climate control constraint in one idea of a building.

The compromise on the part of a part is a function of style

There is of course varying degrees of compromise between the constraints. On the one hand of this continuum, building constraints resemble that which would be easiest to find on a market of mass produced goods: Standard windows; socially acceptable housing types; typical office layouts; deemed-to-satisfy structural layouts. In this sense style denotes a formula for specific parts/ constraints that have shown to be satisfactory – “In this style we solve that problem like this.” It has become viable for producers to produce – *en masse* – those parts that fit into current building ideas with the least compromise needed from the part. The strategy for the assembly of parts is so similar in a market’s ideas for buildings that it is possible for producers to predict the compromise needed from the part – all the similar parts in one market will start to resemble each other – “Are you in the market for a Modernist-/ Tuscan-/ Transvaal Regionalist-/ Johan Slee-building?”

Similarly a ‘mock-sash’ window can be understood when one considers the two most important⁴ constraints that make up the idea for the window.

- Marketability: Cape Dutch styling elicits associations with a South African architectural patriotism, a beautiful Western Cape environment and historical handicraft traditions. Marketability is compromised somewhat by the lowering of the integrity of the styling.
- Price: lower production and maintenance cost due to fewer and simpler moving parts requiring less capital and labour inputs can be achieved with a side hung window than a sash window. The affordability is compromised somewhat by the addition of ‘unnecessary’ elements such as the sash extra’s.

On the other side of the continuum of compromise is ‘organic’ architecture. When one considers the nature of compromises that each constraint makes, there comes a point when the building elements hardly resemble standard types any more. Each element/ constraint inflects so much that it does not just point to an adjacent element/ constraint anymore. All the different constraints start to take on the order of the whole building. The idea of the building becomes evident in every part of the building. Here the resemblance between a single building element/ system and its mass-produced counterpart is the least. There is said to be an idea of the building or a concept that can be conceived of as the ‘form’ of the building. To achieve this form the idea of the building is structured around a certain order for the building systems and elements. Because no assembly of parts are the same and the development of such an organic form is usually quite arbitrary, this mode of design leaves very little place for mass produced building elements, this causes such buildings to be expensive. One gains a high degree of individuality with such designs.

Individuality vs. commonality/ cultural mass/ regionalism

Individuality vs. low production cost.

⁴ “Most important” here refers to appropriateness relative to the building’s stated goal. The goal implies achieving certain values and the level of compromise depends on the values to be achieved.

The question then arises as to how the idea of a building can achieve individuality and marketability while maintaining a competitive production cost?

1. Exploiting the individuality/ newness value of styles from another time or another place. This is more cost effective because the syntax of elements already exists and must only be copied. It is also more cost effective because the technique required for production of such elements is already established and must only be imported or re-established.
2. Existing/ familiar mass produced systems and elements can be used in a new or unknown way. Although the elements might be cost effective the process of finding a fit consumes more design energy.

A question arises as to what style should be employed. The answer lies in the purpose of the project.

A purpose determines goals requiring a strategy for the attainment of values

Purpose is the answer to the question: "Why does it exist?" A purpose will be served by achieving goals. The purpose of a building is derived from the client. The client has a purpose. To serve its purpose the client sets itself goals. These goals usually relate to marketing, ethics, accounting, organizational behaviour, quantitative analysis, finance, operations, economics and strategy (Silbiger).

The properties of a product/ building enter this scheme of goals only in terms of marketing. Most products or services – especially architecture – must compete for the money of a very limited market. Therefore any effort spent on the characteristics of a building must be concentrated on issues/ values that will differentiate the final product. These issues are:

Issue	Determined by	Description
Features	Market analysis	Capabilities and minimum requirements, Operation, sustainability.
Fit	Architectural techniques: modules, grids, space ordering.	Appropriate for use, adaptability, robustness
Styling	Project purpose	Highest value: Expression of that which holds hope for the user Lowest value: Fashion driven image
Reliability	Context/ construction industry	Competence of specialist solutions

Context	Context/ site	Physical, cultural, economic
Size	Feasibility	Accommodation schedule
Service	Maintenance & operator performance	serviceability
Branding	Client strategy	Imagery to elicit values by association

Table 2. Issues related to marketing are the driving forces behind values that will populate the brief.

Such a list of values is called a *brief*.

Design process

The technique used in this discourse a co-linear process – one of *theory* and one of *programming*. These two areas of interest develop independently up to a certain point where they fuse. On conclusion of the *programming* investigation, the two fields converge in something resembling a quantum leap to produce a *concept*. The *concept* is then *resolved* by making decisions about shape, material, size and position (or trade name) of each element and specifying them at a relevant scale.

The two arms of the design discourse can be grouped according to their content:

1. Brief: a list of values and performance criteria required to make the product marketable.
2. Context analysis: Determining how the site on which the building is to be built will influence the building project by considering the physical, cultural and economic constraints of that site.

An example of the process: a decision has to be made concerning the colour of a handrail. A user representative in the form of a political party prefers red because of association with party ideology (political constraint). Red is the most expensive pigment (budget constraint). Red is highly visible but also puts emotional strain on the hallway (ambiguous ergonomic constraint). Red is the colour associated with fire safety elements and can lead to confusion during a fire (semiologic constraint). A famous architect recently built a red handrail near a parking garage to 'disassemble the authority of the main structure', thereby creating a craze among architects for red handrails (stylistic constraint).

The model for integration of these *constraints* will be determined by the current *theories*. If the city council is rededicated to fire safety because of a recent fire it will influence the gravity of the semiologic constraint. If the political party involved was marginalized by recent ideological failure it might handicap the political constraint. If the value of the national currency diminishes power to acquire imported red enamel paint it will hugely consolidate opinion behind the budget constraint. If the users might include mentally unstable people or situations – for instance a mental hospital or a public administration office – it will swing some importance towards the ergonomic constraint. If the building will stand in a fashion conscious society it will vaguely tinge the stylistic constraint with some significance.

Theory investigates the relationships between these issues so that a suitable compromise will be reached in the concept

Summary

Architecture determines the relationship between the elements of a building in considering the *programme*. The *programme* contains the *brief* and an analysis of the *context*. The *brief* which values the client requires for a marketable product. The context is analysed at scales appropriate to the site. A *concept* is arrived at by *programming* the *constraints* in a process of design informed by *theory*

NELSON MANDELA FORUM ACCOMMODATION SCHEDULE

NOTE Ventilation rates are specified as m³ per person per hour
Daylighting is specified as the conventional daylighting factor

Environmental specifications

Name of Room	Ventilation as m ³ per person per hour	Daylighting as % of CIE sky
- Main Auditorium:	- 28	- 0%
- Main Auditorium Foyer:	- 28	- 5% (NB: solar heat gain, glare)
- Conference Auditorium:	- 28	- 0%
- Exhibition Centre:	- 28	- 2%
- Main Kitchen:	- 56 (fumes extracted at source)	- 2% (prep, cooking)
- Parking Garage:	- 2 air changes per hour	- 1%
- Main Foyer:	- 28	- 5% (NB solar heat gain, glare)
- Restaurant:	- 28	- 2%
- Banquet Hall:	- 28	- 2%
- Conference rooms:	- 28	- 1%
- Conference Foyer:	- 28	- 5% (NB solar heat gain, glare)
- Concourse:	- 1 air change per hour	- 2%
- Offices:	- 18.5	- 1%
- Personnel and staff	- 28	- 1%
- Toilets:	- 2 air changes per hour	- 0%
- Retail Spaces:	- 28	- 1%

Thermal installations

Public spaces will be serviced with refrigerated air, heating through radiation with central heating refrigerant pumped in metal radiator-panels in smaller rooms and under-floor pipework in larger rooms (Main Auditorium, Auditorium Foyer; Main Foyer; Lounge; Restaurant a la Carte; Banquet Hall; Banquet Hall Foyer; Congress Levels seminar rooms)

Nelson Mandela Forum

NAME	SIZE	FUNCTION	SERVICE/ UTILITIES/ ACCESSORIES/ COMMENT ENVIRONMENT
SUB4			
Garage	30,718m ²	Public and NMF Parking	Mechanical Ventilation = 2 air changes per hour; 1% Daylighting 1184 parking bays
SUB3			
Garage	30,719m ²	Public and NMF Parking	1184 parking bays
SUB 2			
Garage	30,720m ²	Public and NMF Parking	1184 parking bays
SUB1			
Garage	30,721m ²	Public and NMF Parking	887 parking bays
Perimeter Diaphragm wall			794755m perimeter.
Storage	525m ²	landscaping storage, equipment and stock	
Plant box	1,771m ²	contain soil for vegetation on ground floor	Irrigation,
Plant box	393m ²	contain soil for vegetation on ground floor	Irrigation,
Plant box	262m ²	contain soil for vegetation on ground floor	Irrigation,
Plant box	328m ²	contain soil for vegetation on ground floor	Irrigation,
Plant box	328m ²	contain soil for vegetation on ground floor	Irrigation,
Planting boxes total	3,607m ²		
Parking area	27,114m ²		
SUB 1 TOTAL	30,721m²		

GROUND FLOOR

Nelson Mandel Forum

Accommodatin Schedule

Kitchen	3,066m²	Provide catering for the Nelson Mandela Forum at maximum capacity of 9'000 guests and 500 personnel: Prepare meals and snacks for the Main Auditorium, the Conference floors, the Main Foyer, the Restaurant a la carte and most significantly, the Banquet Hall. Prepare hot and cold beverages to the Banquet hall. Provide storage for the finishing kitchens. Kitchen will consist of a main kitchen serving finishing kitchens distributed through the centre closer to points of service. The Main kitchen on ground floor will consist of preparation, service, staff facilities, cooking, washing up and storage.	Air change rate = 20 - 60 air changes per hour. Extraction points should be located above machinery where necessary. General ventilation rate of 20 air changes per hour: = 13'291'110m ³ per hour. At 10m/s a total of 370m ² of duct area. 24 X Ø5000 ducts.
Preparation	777m ²		
Service	840m ²		
Staff facilities	240m ²		
Cooking	515m ²		
Washing up	380m ²		
Storage			
Vegetable store	160m ²	Storage for three deliveries per weak	
Dry goods store	110m ²	Three days' supply	
Deep freeze	125m ²	Seven days' supply	
Cold store	109m ²	Daily delivery of perishable goods	
Goods entry	92m ²	Wheiging and checking	
Refuse storage	210m ²		
Cellar, glass wash and store	234m ²		
staff kitchen	50m ²		
Staff toilets and changerooms	315m ²		
Staff lounge	712m ²		
Calorifiers	40m ²		
Boiler room	267m ²		
Hvac plant room	1,104m ²		
Deliveries dock	781m ²		

Nelson Mandela Forum

Accommodatin Schedule

Garage	7,427m ²	Centre parking	238 Parking bays: 6 disabled parking bays + 238 Parking Bays on intermediate level
Courtyard 1	2,467m ²		
Courtyard 2	2,152m ²		
Concession block	4,182m ²		
Grocery store	946m ²	Anchor tenant	
Stalls	895m ²	Rentable stalls (African Theme market)	
shops	406m ²	café's, restaurants, internet café's. concessions	
Fresh Produce Market	4,985m ²		
Staircase	966m ²	Under staircase market	
Market floor	1,880m ²		
Toilets	252m ²	Public toilets unde private ownership	
Lift	135m ²	Lifts and lobby	
Office	467m ²	Offices of market administration, agents.	
Refuse storage	138m ²		
Transnet servitude	2,730m ²	Rail track.	
Services Block	6,337m ²		
Gardern storage	422m ²		
pump room	26m ²		
Transformer rooms	565m ²	Transformers, switching gear and ventilation chambers	
Office	114m ²		
Lift	48m ²	Lift shafts and lobby	
Stair & lift dock	114m ²	Goods lift, fire steps, loading dock	
Utility vehicle garage	111m ²		
Trash sorting	112m ²		
Trash store	131m ²	Trash compactor and bin storage	
Office: trash	45m ²	trash manager's office	
Internal circulation	1,268m ²	roads and paved area, loading dock	
HVAC plant room	915m ²		
pipng chamber	273m ²		
Utilities plant rooms	1,185m ²		
Workshop	343m ²		
Street Buffer	7,322m ²	Bus parking, hard paving to receive taxi's and general public traffic	

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Accommodatin Schedule

Campanile square 3,033m² Hard landscaping with large trees. circular platform.

Waterfront gateway 6,860m² Hard to soft landscaping. Circular planform train track integrated with paving.

GROUND FLOOR 33,346m²
TOTAL

LEVEL 1

Hvac plant room 636m²

Shop floor: 3,327m² Stage set manufacture; textiles; general repair workshop; Manufacture, equipment storage, stock storage, technicians offices, media shop - large format printers, copiers, binders, Publisher, paint shop.

FPM mezzanine 1,064m² offices, storage

Lift 134m² Lift shafts and lobby

Northern administration 1,000m² Security; Accounting; Vault

balcony northern administration 236m²

Security cash box 65m² Cash pick up from vault

VIP Reception 71m² Secure waiting area for High Risk VIP

Mechanical distribution 1,626m² Piping room

Gauge chambers level 1 396m²

General Director's chamber 280m² Reception, Lounge, Office

Housekeeping 2,070m²

Service run 985m²

Perimeter road 3,430m²

Lift 131m² Lift shafts and lobby

Lobby South administration 328m²

Reception south administration 530m²

Staff Lounge 860m²

Staff kitchen 255m²

General arcive 225m²

Staff kitchen queing space 89m²

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Accommodatin Schedule

Staff toilets and changerooms	313m ²
balcony administration reception	36m ²
Balcony staff south administration	134m ²
Administration South	2,033m ²
Goods lift	80m ²
Open Trusswork under Banquet hall	1,492m ²
Parking	7,865m ²
LEVEL 1 TOTAL	29,498m²

291 Parking bays

LEVEL 2

Main Auditorium	5187 people	Conventions. Congress sessions. Conferences. Plenary sessions. Public gatherings. Rallys.'Cultural' performances. Pop concerts. Indoor sports. Exhibitions.	Overhead projector, Slide projector; Video projection; Film projection; Television and Film cameras; Voting panel; Sound amplification; Acoustic components; Acoustic compatable finishes; Fire escape; Fire extinguishing overhead pressurised self-activating installation; Ventilation = 28 m ³ per person per hour X 5187 = 145'236m ³ per hour; Chilled air; Humidity - 45%; Internal environmental temperature = 18°C; Reverberation time = 2seconds; 0% Daylighting; Artificial lighting 100-500lux dimmable; Emergency signage; Specialist lighting;	
Flat	2,095m ²	movable seating for a maximum of 2804 people	Stackable chairs; Removable tables with conference facilities;	
Storage - chairs and tables	836m ²	Storage for stackable chairs; Storage for stackable tables and cenference equipment	Hard-wearing floor; wall-corners protected; Artificial lighting = 200lux; mechanical ventilation simultaneously activated on light switch; No windows; Maintenance free wall finish; 3X 1500mm lockable double doors.	Direct access to Auditorium "Flat".
Furniture store & workshop	483m ²	Storage for stackable chairs; Storage for stackable tables and cenference equipment		
Under stage	213m ²			
Lift	53m ²	Lift wells and Lobby		
Balcony - fire escape/ workshop smokers	91m ²			
VIP	232m ²	Reception; Lounge; conference; suite		

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Press room	231m ²	Auxhillarry press facility	
Furniture store	108m ²		
Balcony - fire escape	169m ²		
Main Auditorium Foyer	1,689m ²		Revolving door access control; 0.3m ² per person standing area; Ventilation: 145'236m ³ per hour; chilled air; humidity: 45%; Reverberation time: 3seconds; Daylight factor: 5% - beware solar heat gain; hardwearing, high quality floor finish; Artificial lighting: emergency signiage & lighting, 50-100lux dimmable, spotlighting; wall mounted signage; wall mounted art; non-combustible displays.
Stoep - Auditorium	1,206m ²		
Steps - Auditorium approach	1,154m ²		
Main auditorium foyer toilet male:			12water closets; 50urinals; 22 wash handbasins; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryers; waste bins; mirrors.
Main auditorium foyer toilet female:			32water closets; 32 wash handbasins; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryers; waste bins; mirrors.
Main auditorium foyer toilet disabled unisex:			1wc; 1X low-level whb; outward opening door; min 1.9m ² ; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryer; waste bin; vertical mirror.
Cleaner's			cleaners bucket and washbasin.
Auditorium Toilet Total	522m ²		
corridors/ back of house service	345m ²		

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Accommodatin Schedule

Main Foyer	1,416m ²	Revolving door access control; Ventilation: 132'160m ³ per hour; chilled air; humidity: 45%; Reverberation time: 3seconds; Daylight factor: 5%; hardwearing, high quality floor finish; Artificial lighting: emergency signage & lighting, 50-100lux dimmable, spotlighting; wall mounted signage; wall mounted art; non-combustible displays. 8 lifts; 900mm step-width escalator; Public address system;
Reception desk	165m ²	
Lifts	64m ²	7 Lift Shafts
lifts - back of house		
Reception - back of house	202m ²	lifts; stairs; finishing kitchen;
bar	293m ²	Bar counter; Barmans isle; cold storage; glass wash; bookkeeping; administration
Lounge	1,173m ²	2 % Daylighting; Ventilation 28m ³ ; 21 °C Internal temperature; Humidity 30-50%;
Restaurant a la carte	1,200m ²	
Balcony - Foyer	234m ²	
Stoep	1,180m ²	Entrance stairs (Porte conchere); concourse; entrance landing
Main Foyer toilet male:		12water closets; 50urinals; 22 wash handbasins; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryers; waste bins; mirrors.
Main Foyer toilet female:		32water closets; 32 wash handbasins; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryers; waste bins; mirrors.
Main Foyer toilet disabled unisex:		1wc; 1X low-level whb; outward opening door; min 1.9m ² ; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryer; waste bin; vertical mirror.
Cleaner's		cleaners bucket and washbasin.
Change room male		Locker facilities for 1000
Change room female		Locker facilities for 1000

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Accommodation Schedule

Main Foyer Toilet Total	358m ²	
Cloak room	284m ²	hangers for 2800
Banquet Hall	4,900m ²	Capacity for 5187 diners at round tables; Ventilation: 145'236m ³ per hour; Daylight factor 2%; Internal temperature: 21 °C; Chilled air; Underfloor heating; humidity control; Artificial lighting 50-500lux - dimmable - temperatures compatible with culinary presentability;
Balcony - Banquet hall	287m ²	
Finishing kitchen	903m ²	goods' lift: 4X5m
Banquet Entrance Lobby	534m ²	
Banquet lift	131m ²	lift well & lobby
Bar - Banquet foyer	354m ²	Bar counter; Cold storage; finishing kitchen
Banquet Foyer	1,467m ²	0.3m ² per person standing area; ventilation: 145'236m ³ per hour; chilled air; humidity control; Reverberation time: 3seconds; Luxurious floor finish; Artificial lighting: emergency signage & lighting, 50-100lux dimmable, spotlighting; wall mounted signage; wall mounted art; non-combustible displays.
Banquet Lobby	364m ²	
Storage - Banquet lobby	514m ²	
Banquet Hall foyer toilet male:		12water closets; 50urinals; 22 wash handbasins; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryers; waste bins; mirrors.
Banquet Hall foyer toilet female:		32water closets; 32 wash handbasins; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryers; waste bins; mirrors.
Banquet Hall foyer toilet disabled unisex:		1wc; 1X low-level whb; outward opening door; min 1.9m ² ; Artificial lighting: 150lux; Ventilation: 2 air changes per hour - mechanical extraction directly above wc; soap dispenser; mechanical hand dryer; waste bin; vertical mirror.
Cleaner's		cleaners bucket and washbasin.
Gallery		

Nelson Mandela Forum

Accommodatin Schedule

Toilet Total - Banquet Foyer	550m ²		
Garage	8,055m ²	Pariking	277 Parking bays + 277 Parking Bays (Intermediate floor)
LEVEL 2 TOTAL	35,601m²		
LEVEL 3			
Garage	8,055m ²	Pariking	277 Parking bays + 277 Parking Bays (Intermediate floor)
Banquet lift	131m ²	lift well & lobby	
auditorium perimeter diaphragm	721m ²		
auditorium backstage	342m ²		
Balcony - auditorium backstage	74m ²		
Loading dock	175m ²		
Goods receiving	225m ²		
Scenery store	76m ²		
Lift	66m ²	Lift well and lobby	
Costume room	9m ²		
Wig & hairdresser's	9m ²		
Specialist make-up	17m ²		
Event management	93m ²		
Male toilet	139m ²	Sanitary and change rooms	
Female toilet	208m ²	Sanitary and change rooms	
Congress toilets	323m ²	Male & Female Sanitary appliances	
Meeting rooms	63m ²		
Concessions & Display	45m ²		
service corridors	161m ²		
Enquiries	59m ²		
Finishing kitchen	113m ²	Service kitchen; staircase; lift	
Dance studio	663m ²	Press lounge; dance rehearsals; seminar	
Councourse	516m ²	Congress corridor, lobby to dance studio.	
Recording lab	166m ²	technician's control room; archives; mixing room	
Recording studio	391m ²		
Lobby- recording studio	42m ²		

Nelson Mandel Forum

Accommodatin Schedule

Press room	365m ²	
Sound lab	230m ²	Recording room; control room; sound mixing room; translation booths; archives; equipment store;
Lobby - press room	14m ²	
Seminar rooms	1,256m ²	Subdivisible seminar room.
Furniture store	33m ²	
Lobby - seminar room	33m ²	
Furniture store	41m ²	
Lobby - seminar room	31m ²	
Furniture store	62m ²	
Balcony - congress level 3	514m ²	
Lift	65m ²	Lift wells
Smoker's balcony	126m ²	
	2,018m ²	
LEVEL 3 TOTAL	20,914m²	

LEVEL 4

Gallery seating - auditorium 1	1,474m ²	tiered, staggered fixed seating.
Perimeter diaphragm wall - auditorium 1	1,036m ²	
backstage	253m ²	
Green room	178m ²	
waiting room	45m ²	
Service lift	53m ²	Lift well and lobby
Translation room	49m ²	Translation booths; lounge & toilet
Recording room	38m ²	
Controle room	41m ²	
VIP office	73m ²	Office for hire accessed by Foyer and auditorium backstage
Controle room - auditorium 2	117m ²	Projection, observation, sound mixing and controle
Lift room	114m ²	Emergency staircase; goods lift

Nelson Mandela Forum

Accommodatin Schedule

Speaker's room	25m ²	Direct access to platform - auditorium 2; access to backstage corridor	
Service corridor	270m ²		
Translation booths - a2	52m ²		
Auditorium 2	1,407m ²	Tiered, fixed raked seating for 1450	Overhead projector, Slide projector; Video projection; Film projection; Television and Film cameras; Voting panel; Sound amplification; Acoustic components; Acoustic compatible finishes; Fire escape; Fire extinguishing overhead pressurised self-activating installation; Ventilation = 40'600m ³ per hour; Chilled air; Humidity - 45%; Internal environmental temperature = 18°C; Radiant heating (under floor heating); Reverberation time = 1second; Artificial lighting 100-500lux dimmable; Emergency signage; Specialist lighting; Fixed seating with conference features;
Foyer and lobbies - a2	207m ²		
Concourse	502m ²	Congress corridor	
Seminar room	433m ²		
projection rm	38m ²		
Furniture store	21m ²		
Councourse	516m ²	Congress corridor, lobby to dance studio.	
Recording lab	166m ²	technician's control room; archives; mixing room	
Recording studio	391m ²		
Lobby- recording studio	42m ²		
Press room	365m ²		
Sound lab	230m ²	Recording room; control room; sound mixing room; translation booths; archives; equipment store;	
Lobby - press room	14m ²		
Seminar rooms	1,256m ²	Subdivisible seminar room.	
Furniture store	33m ²		
Lobby - seminar room	33m ²		
Furniture store	41m ²		
Lobby - seminar room	31m ²		
Furniture store	62m ²		
Foyer Toilets - male & female	343m ²		

Nelson Mandel Forum

Accommodatin Schedule

Enquiry desk	59m ²	
Finishing kitchen	180m ²	Service kitchen; emergency staircase and lift
Display, concession & meeting	73m ²	
Balcony - congress level 3	514m ²	
Lift	65m ²	Lift wells
Smoker's balcony	49m ²	
Foyer - congress level 4	1,740m ²	
Banquet lift	131m ²	lift well & lobby
Garage	8,055m ²	Pariking
Roof deck	3352 people	Open Air events, Demonstrations

LEVEL 4 TOTAL 24,627m²

PARKING BLOCK	62,964m ²
PARKING BASEMENT	95,764m ²
PARKING TOTAL AREA	158,728m ²

PARKING SPACES AVAILABLE

277 Parking bays + 277 Parking Bays (Intermediate floor)

6868 with intermediate parking levels; 5799 without intermediate parking levels; Parking density = 27m² per parking bay

BUILDINGS AND SERVICE 108,136m²

NMF TOTAL 266,864m²

NELSON MANDELA FORUM

FINANCIAL REPORT

Project description

International Congress Centre on Port Elizabeth Waterfront

Site location and details

The Madiba Bay Development Agency seeks to attract investment to the Nelson Mandela Metro inner city by development of a commercial waterfront on the grounds of the Port Elizabeth harbour thereby initiating economic growth through the influx of tourism and stimulating trade through the provision of facilities to support the regional industrial/ manufacturing sector (Coega Industrial Development Zone and Uitenhage).

The proposed site, belonging to the South African Railway Service, is located on a piece of dormant industrial land defining the border between the inner city and the operational harbour precinct. The site is deemed free of any lease agreements or tenants. The terrain is nominally flat, being a man-made reclamation supported on solid bed-rock at an assumed depth of 16m below grade. Grade is assumed to be 4m above Mean Sea Level requiring extreme waterproofing for basements. The Nelson Mandela Metropolitan Municipality, seeking iconic imagery for its 'Destination Marketing' branding strategy, has allowed discretion concerning Bulk, Coverage and Maximum Height restrictions to fall to the design team.

The design team have developed a proposal for a large scale auditorium, convention facilities and a banquet hall. Four levels of basement garages provide parking for the Forum and the transport nodes surrounding the site in an effort to pedestrianise the precinct. The centre also allows for full functionality of the harbour entrances and maintains the operational railtracks on the site through the establishment of servitudes. The design allows for partial withdrawal of the railway within a 5-20 year period.

Estimating method

The feasibility is based on rough market rates and no elemental estimate has been done at this stage

Drawings and Cost information

The estimate is based on rough line drawings

Contract planning particulars

Land purchase date	01 Jan 2006
Start of design and procurement	01 Jan 2006
Start of construction period	01 Jul 2007
End of construction period	30 Apr 2010

Exclusions

The cost of roads to the site and infrastructure in surrounding areas are excluded

Assumptions

Effective Parking areas are counted as rentable area as the operation of parking facilities will be leased to a private operator.

Clearing will be done on the whole site

Cost/m² estimate will be based on recent experience of the author. It is here assumed that the project cost is will be an average between a training cen currently under construction in Midrand at R4000/m² and the cost of the recently completed Constitutional Court which is rumoured to wheigh in at an astonishing R15 000/m². We will assume a modest R 6 000/m²

Bulk services contribution to Local authority assumed at 45% of appreciation in land value.

Development costs are assumed

Interim rates and taxes as 8% of current land value p.a. X 18months = R 6 808 140.00

Rates and taxes after approval will be 8% of R 1000/m²Xland area/8% p.a. X 34motnh construction period = R 25 719 640.00

Proffesional fees are assumed

Occupancy as per Edie Grossfield Market Survey May 2004

Tenant 3	195 m ²	178 m ²	
ADMINISTRATION	2 470 m ²		
FOYER	251 m ²		
GARAGE	7 318 m ²		
Parking Spaces			278 parking spaces
STORAGE			
Storage/ workshop/ plant	5 274 m ²		
Vierendeel storage& services	3 727 m ²		
HVAC plant	963 m ²		
Utilities	755 m ²		
duct	89 m ²		
duct	68 m ²		
Staff administration & welfare	765 m ²		
	TOTAL	#REF!	
LEVEL 2			
GARAGE	9 886 m ²		368 parking spaces
CONCOURSE	1 395 m ²	1 043 m ²	
BALLROOM	4 826 m ²	3 700 m ²	
RECEPTION	7 960 m ²	5 113 m ²	
AUDITORIUM	5 295 m ²	3 666 m ²	
	TOTAL	39 275 m²	
LEVEL 3			
GARAGE	9 886 m ²		368 parking spaces
CONCOURSE	2 287 m ²		
CONGRESS	1 239 m ²		

AUDITORIUM	2 762 m ²		
TOTAL	16 174 m²		
LEVEL 4			
CONCOURSE	1 552 m ²		
GARAGE	9 886 m ²	368 parking spaces	
CONGRESS	3 977 m ²		
AUDITORIUM	4 289 m ²		20000 m ²
TOTAL	21 256 m²		
TOTAL CONSTRUCTION AREA	266 864 m ²		
TOTAL RENTABLE AREA		5 000 m ²	
TOTAL INCOME GENERATING AREA		100 000 m ²	

1st EFFICIENCY RATIO (Rentable: Construction Area) 0.02
 2nd EFFICIENCY RATIO (Income Generating Area: Construction Area) 0.37

Building footprint 34 565 m²

Construction parameters

Planning design and documentation 1-Jan-06
 Commencement : 1-Jul-07
 Completion : 30-Apr-10
 Pre-contract period in months : 18 mo
 Construction period in months : 34 mo

Project cost estimation

Construction costs at current rates

Clearing and bulk earthworks	115472 m ²	R 95 /m ²	R 10,969,840
building & services	108136 m ²	R 6000 /m ²	R 648,816,000
parking block	62964 m ²	R 2500 /m ²	R 157,410,000
Parking basement	95764 m ²	R 4000 /m ²	R 383,056,000
Landscaping	10024 m ²	R 1200 /m ²	R 12,028,800
Paving and roads	22695 m ²	R 1200 /m ²	R 27,234,000
Bulk services contribution	45% of appreciation in land value = R1000-R500X0.45	item	R 25,530,525
			R 1,265,045,165
Preliminary and General Items [Overhead construction costs]		13.0%	R 164,455,871
Detail design contingency		1.5%	R 18,975,677
General risk contingency		2.0%	R 25,300,903

Total R 1,473,777,617

Escalation

Precontract escalation in building cost up to tender date:		R 216,480,805
Escalation rate	0.8%/month	
Period	18 mo	
Start	01/Jan/06	
End	01/Jul/07	
		R 1,703,780,490
Escalation in building cost during construction period :		R 170,438,044
Escalation rate	1.0%/month	
Period	18 mo months	
Start	01/Jul/07	
End	30/Apr/10	
Cash Flow	0.60	
Haylett allowance for non adjustables	0.85	
Total escalation		R 386,918,849
ESTIMATED TOTAL BUILDING COST AT :	30/Apr/10	R 1,860,696,466

Professional Fees

	%	On Amount	% construction Fee	Subtotal
Architect	5.3%	R 1,860,696,466.25	50.00%	R 98,616,912.71
Structural Engineer	6.0%	R 372,139,293.25	20.00%	R 22,328,357.59
Mechanical Engineer	6.0%	R 186,069,646.62	10.00%	R 11,164,178.80
Civil Engineer	10.0%	R 186,069,646.62	10.00%	R 18,606,964.66
Electrical	5.0%	R 93,034,823.31	5.00%	R 4,651,741.17
Geotechnical	2.0%	R 9,303,482.33	0.50%	R 186,069.65
Lighting Design	5.0%	R 9,303,482.33	0.50%	R 465,174.12
Traffic	3.0%	R 9,303,482.33	0.50%	R 279,104.47
Fire Design	10.0%	R 9,303,482.33	0.50%	R 930,348.23
Electronics	10.0%	R 1,860,696.47	0.10%	R 186,069.65
Environmental Managers	5.0%	R 186,069,646.62	10.00%	R 9,303,482.33
Landscape Architects	3.0%	R 37,213,929.32	2.00%	R 1,116,417.88
Acoustic consultants	8.0%	R 37,213,929.32	2.00%	R 2,977,114.35
Empowerment & Procurement	6.0%	R 37,213,929.32	2.00%	R 2,232,835.76
Wind consultants	8.0%	R 930,348.23	0.05%	R 74,427.86
Graphic Design	7.0%	R 18,606,964.66	1.00%	R 1,302,487.53
Artwork consultant	10.0%	R 186,069.65	0.01%	R 18,607
Urban Designers	12.0%	R 18,606,964.66	1.00%	R 2,232,835.76
Town Planners	12.0%	R 1,860,696.47	0.10%	R 223,283.58
Project managers	5.3%	R 930,348,233.12	50.00%	R 49,308,456.36
Legal team	30.0%	R 372,139.29	0.02%	R 111,641.79
Quantity surveyor	3.3%	R 930,348,233.12		R 30,701,491.69
Average Professional fees as % of escalated construction cost			13.81%	R 257,018,003

TOTAL BUILDING COST INCLUDING PROFESSIONAL FEES R 2,117,714,469

Development Costs

Legal fees, etc.		R	372,139	
Town planning fees - for proclamation		R	1,860,696	
Environmental impact monitoring, etc		R	35,000,000	
Plan approval fees		R	100,000	
Site survey		R	350,000	
Geotechnical investigation		R	9,303,482	
Legal fees, etc.		R	372,139	
Pre-opening management costs		R	86,000	
Finance raising fee	1.0% of total capital cost	R	18,191,508	
Development fee	3.0% of escalated construct. cost	R	68,880,000	
Other Sundries		R	5,000,000	
Rates and taxes	interim	R	6,808,140	
	after approval	R	25,719,640	
Plan approval fee		R	907,752	
Non-recoverable expenses		R	900,000	
Letting commission and marketing cost	5.00% of building cost	R	93,034,823	
Sub-Total				R266,886,321
TOTAL CAPITAL COST EXCLUDING :				
LAND COST, FINANCE CHARGES AND VAT RECOVERY				R 2,384,600,790

Land Cost

	AREA	RATE	AMOUNT
Land cost (including transfer fees)	1154728 m ²	R 500	R 577,364,000
TOTAL CAPITAL COST EXCLUDING :			
FINANCE CHARGES AND VAT RECOVERY			R 2,961,964,790

Finance Charges

Interest charged		11.00%	
On expenditure of	R	2,384,600,790	R 352,521,651
Compounded monthly at an annual rate of :		0.92%	
Period in months :		34 mo	
From :		1-Jul-07	
To :		30-Apr-10	
Adjusted by a cash flow factor of :		0.40	
On land cost excluding VAT of :		#####	R 356,239,092
Compounded monthly at an annual rate of :		0.92%	
Period in months :		53 mo	
From :		1-Jan-06	

To :		30-Apr-10			
Sub-Total					R 708,760,743
TOTAL CAPITAL COST					R 3,670,725,533
Less transfer fees	7.0%			R (40,415,480)	
Sub-Total					R 40,415,480
TOTAL PROJECT COST					R 3,711,141,013
ESTIMATED NET INCOME			Handover date		30/Apr/10
ATTENDEE EXPENDITURE ON FOOD AND BEVERAGE					
attendance of average attendees per event		5000			
occupancy rate		35%			
days p.a.		365			
attendee expenditure on food and beverage		R 100			
					5,292,500
EVENT HOSTING					
Maximum nr attendees		5,000			
occupancy rate		35%			
events per year		52			
cost per attendee		R 500			
					3,770,000
CONCESSIONS		5000 m ²	@	R 70	R 350,000
NET INCOME PER MONTH					R 9,412,500
GROSS ANNUAL INCOME EXCLUDING VAT					R 112,950,000
Less operating costs @	50.00%				R (56,475,000)
Less vacancy factor of	5.00%				R (5,647,500)
NET ANNUAL INCOME EXCLUDING VAT					R 50,827,500
NET RETURN ON TOTAL CAPITAL EXPENDITURE IN FIRST YEAR					1.37%