

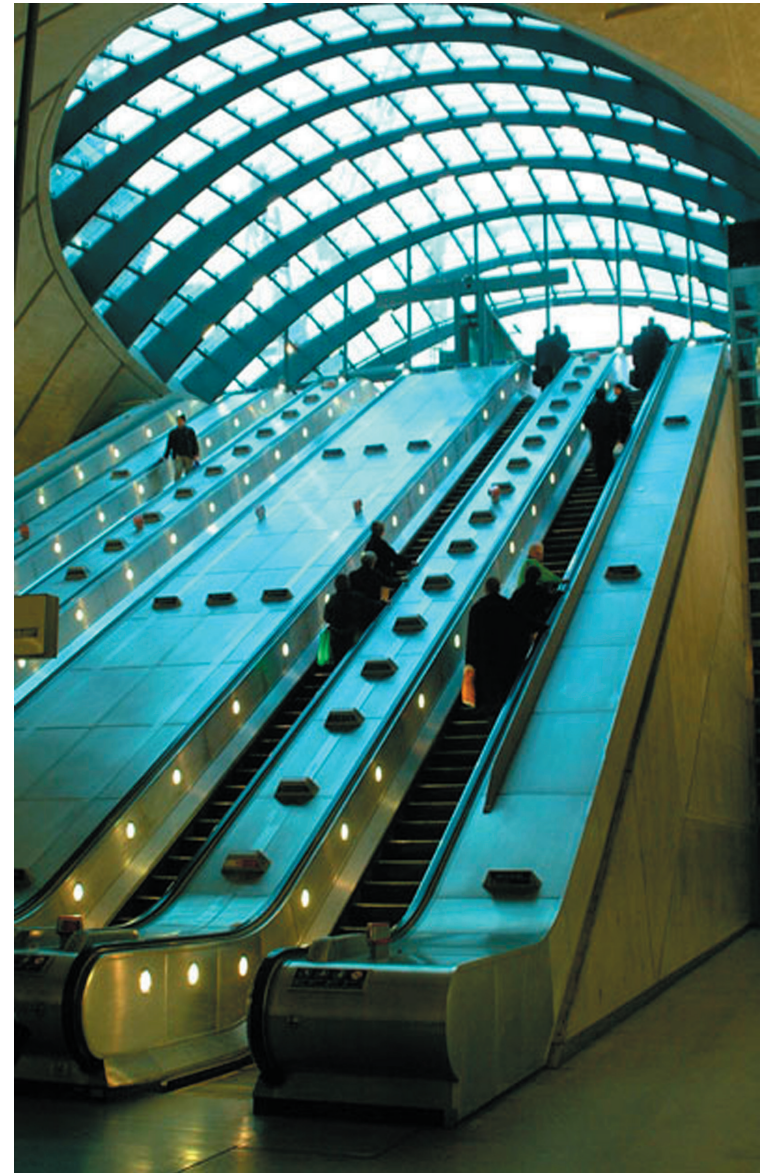
○	—	<b>LIST OF FIGURES</b>	
○	—	<b>INTRODUCTION</b>	
○	—	<b>CONTEXT STUDY</b>	
○	—	<b>FORMULATING THE DESIGN TASK</b>	
○	—	<b>CONTEXT STUDY</b>	
○	—	<b>PRECEDENTS</b>	
—	○	<b>CANARY WHARF</b> JUBILEE LINE EXTENTION LONDON, GREAT BRITAIN	
—	○	<b>TGV STATIONS</b> PROVENCE, FRANCE	
—	○	<b>BRENTWOOD SKY STATION</b> MILLENIU RAIL VANCOUVER, CANADA	
—	○	<b>BONATZ ZERO ENERGY STATION</b> DEUTSCHE BAHN STUTT GART, GERMANY	
—	○	<b>AIRSIDE CENTRE</b> ZURICH AIRPORT SWITZERLAND	
	○	<b>BASELINE</b>	
	○	<b>DESIGN DISCOURSE</b>	
	○	<b>TECHNICAL RESOLUTION</b>	
	○	<b>DESIGN DRAWINGS</b>	
	○	<b>CONCLUSION</b>	
	○	<b>BIBLIOGRAPHY</b>	
	○	<b>APPENDICES</b>	

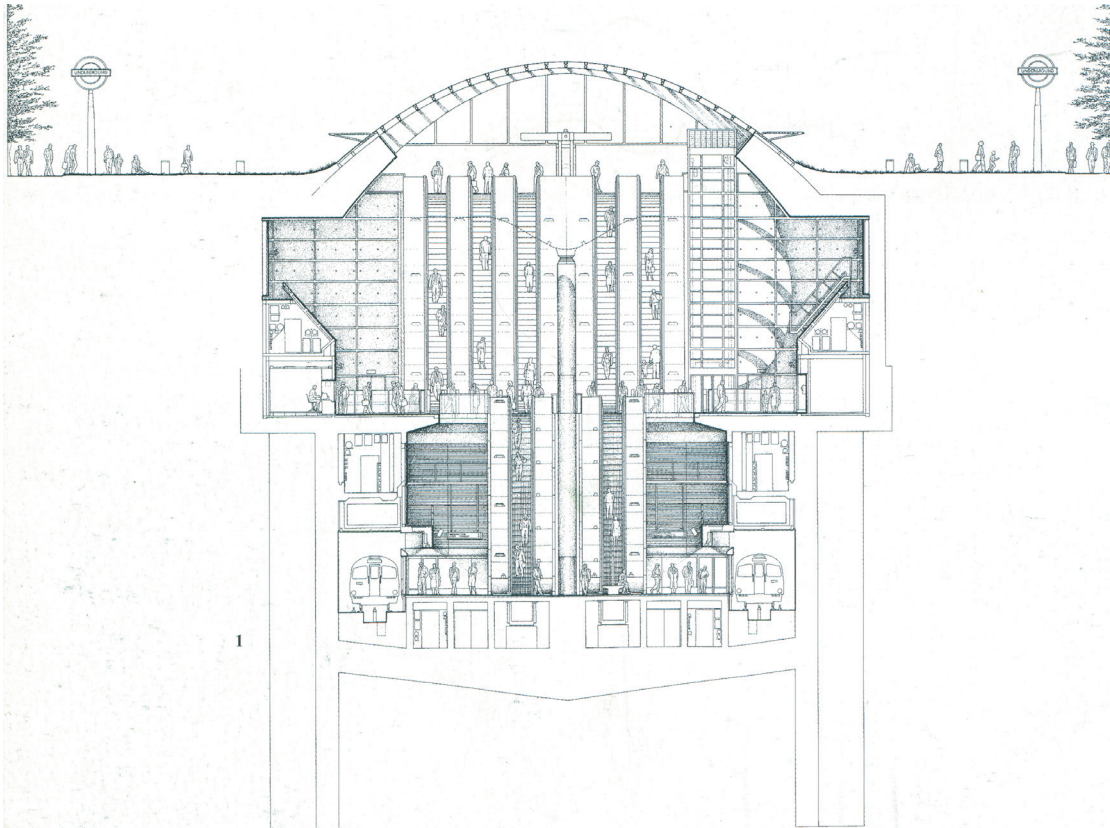
 **CANARY WHARF** JUBILEE LINE EXTENTION, LONDON, GREAT BRITAIN



**FIG 012** (left)  
Open vertical space from  
concourse to platform level

**FIG 013** (right)  
Escalator banks connecting to  
a glass canopy entrance at  
ground level





**FIG 014**  
Section

"The station architecture of the new Jubilee Line Extension has received worldwide acclaim and has brought a new understanding and social awareness about the value that good architecture can bring to a city's transport infrastructure." (Bennet 2004:35)

The Jubilee Line Extension (JLE) completed in 1999 was a £3 billion, 11 station link between the East and West of London. The new underground railway connected new Docklands directly to the centre of the city (Pawley 2000:31). Roaland Paoletti, the

architectural concept developer for the Jubilee Line (2000:35) said the line brought about an architectural intervention in the London underground. This was because until the JLE, the spaces and volumes of all the London underground stations were planned by civil engineers rather than designed by architects; the architects only did the fit-out.

Canary Wharf, the flagship and RIBA award-winning station by Norman Foster, addressed many of the traditional concerns and issues of the London



**FIG 015**

Ticketing machines placed neatly on the side of passenger routes create clear and legible space

underground by introducing innovative solutions in order to change the user's mundane travelling experience into something pleasant. According to Pawley (2000:33), Foster and Partner's design approach focussed on the clarity of circulation, the legibility of spaces and the durability of materials and ease of maintenance.

Similar to Canary Wharf, the Sandton Station is also located entirely underground. The Canary Wharf platform level is approximately 24m underground

(Russell 2000:138). At ground level the three curved steel and glass entrance canopies are the only visible indication of the huge structure lying beneath. Regardless of this the design allows some natural light to filter through down to platform level, and on concourse level the space receives as much natural light as possible (Harding 2000:54). The curved concrete roof stretched out over the concourse level propagates the natural light admitted by the glass canopies above. Artificial light, though furtively, is still the primary source of illumination, but it is the sense of natural light that removes the user's uncertainty in order to create "clear and direct passenger routes" (Harding 2000:54).

Way-finding (also an essential component in the Sandton station design) is made uncomplicated by the naturally-lit, open and vertical central space. Harding (2004:54) accredits the station's clarity to atriums opening up the space. In certain areas cathedral-like spaces are created as the structure gapes from platform to roof. Sightlines are unobstructed with the ticketing machines positioned neatly on the sides of the ticketing hall and the ribbed roof rests on a single row of elliptical reinforced concrete columns that reaches down to platform level. Further reinforcing the design approach, Russell (2000:139) explains that exit stairs, service shafts for both fresh and exhaust air, together with the elevator shafts, are located at either end of the station to maximise free central space. This makes it possible for commuters not to be solely dependent on signage for direction.

Passenger movement is communicated through the spaces and the architecture itself suggests the direction to the platforms and exits.

Canary Wharf expresses a robust rawness through its natural concrete finishes. Durability is further accentuated by the use of stainless steel as cladding to protect the structure. The use of stainless steel and glass creates an aesthetic that assists in conveying clarity and it also minimizes maintenance.

Located in one of Europe's fastest expanding business and commercial centres, Canary Wharf has the highest capacity of the line's stations with 16 000 passengers per peak hour, which could even rise to 40 000 in future. The design had to accommodate the predicted programme by providing 20 banks of escalators to serve the station. The setting also substantiated Canary Wharf's larger budget in comparison to that of the other stations on the Jubilee Line Extension. The design had to rise to the challenge in order to compete and in an area known for its skyscrapers. Comparably, the Sandton station's location will also demand a design that will comply with its competing and ostentatious surroundings.

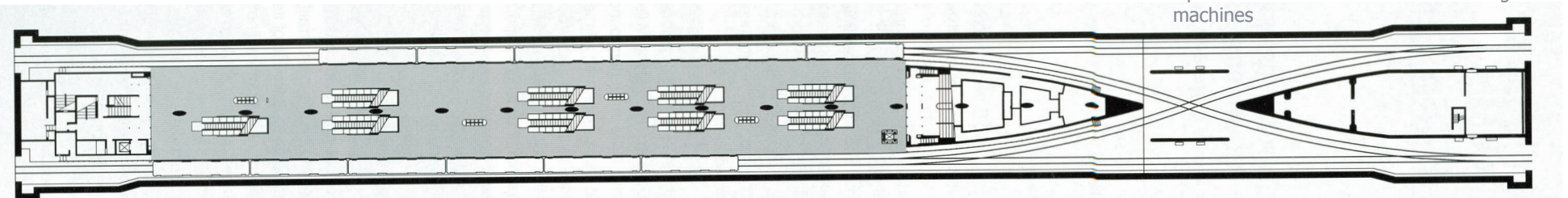
Besides the strategic and technical design issues that make Canary Wharf so successful, it is the station's proportions and the use of stage lighting principles, which highlight and compliment the material and structural compositions, that creates such a pleasant and attractive station space.



**FIG 017**  
Glass and steel canopy entrance



**FIG 018**  
Open concrete concourse with ticketing machines



**FIG 016**  
Plan of platform level

## TGV STATIONS PROVENCE, FRANCE

TGV is the French national high-speed rail service that connects the various parts and cities of France. It is therefore fairly different to the Gautrain. Even though the Gautrain will be connecting three cities and an airport, the close proximity of the stations and the high frequency service classifies the Gautrain in the metro system class. Even so, the new TGV stations that opened in 2001 in Provence, designed by Jean-Marie Duthilleul and Etienne Tricaud of AREP – a French architectural firm based in Paris, are worth investigating as they display the progress and constant possibilities that rail travel offer.

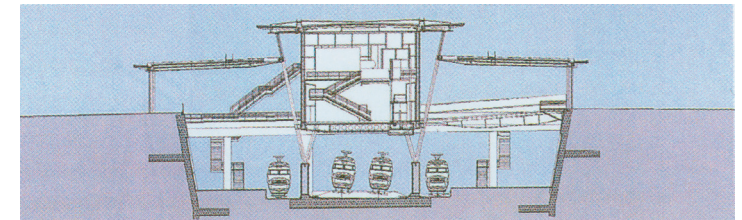
### VALENCE

Catherine Slessor (2003:46) rationalises the design according to the parallel volumes of incoming and outgoing traffic that the Valence station programme has to accommodate. The symmetry of passenger flow is articulated in the station shape and form. A long elevated and centralised concourse area connects all the station components, track and platforms, shops and concessions, and the parking areas surrounding it. The route to the platforms accentuates effectively “a sense of arrival and anticipation.”

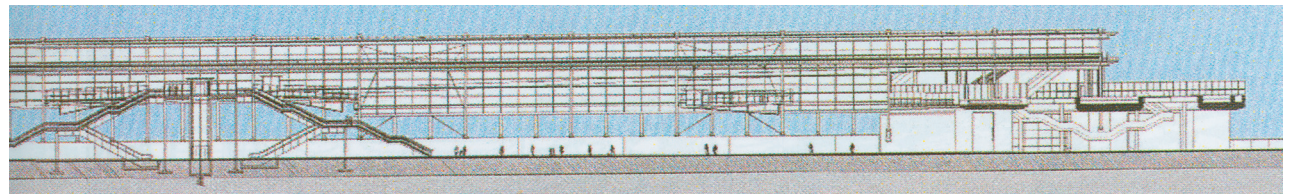
The use of glass connects the user with the macro context, the landscape and the micro context, ranging from the tracks below to other passengers moving through the space. The central glass box, as Slessor describes the concourse, acts as a “watchtower” for passengers to watch and be watched. This is believed to be AREP’s key instrument in creating space that is legible to Valence’s users. This firstly allows the user to be informed of what is happening around him and secondly, to observe where he is in relation to where he is going. The design’s finishing contribution to the orientation process is the contrast created by the light and lucid concourse floating above the firm



**FIG 019**  
Staircase at Valence station expressing passenger routes



**FIG 020**  
Section and photograph illustrating the central glass box floating over the platforms and tracks



**FIG 021**  
Longitudinal Section of Valence station

and rigid concrete and steel platform levels. This binary play between light structure and mass aids the user to distinguish between the station's two major function areas, i.e. the transport service at platform level and the station's services.

The Sandton station will develop such a duality in the design in order to construct legible spaces in which the user can easily distinguish between the various station functions. Further, the idea of spaces where commuters observe their surroundings and the activities taking place about them, while simultaneously being observed by others, is a theory that the Subterranean space will apply to create transparent and interactive spaces.



**FIG 022**  
Duality - robust concrete platforms in contrast with the glass and steel station structure

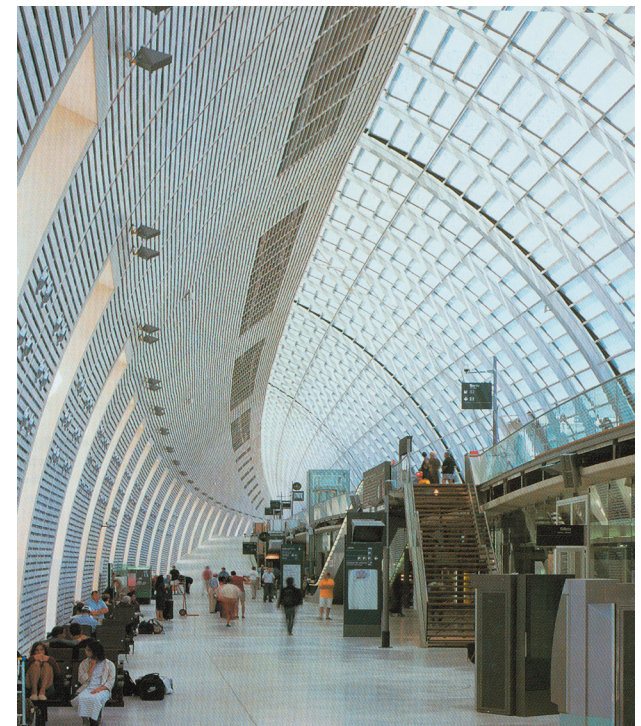
AVIGNON

Unlike Valence, Avignon station has a distinct variation in passenger flow. As Slessor (2003:48) explains, the majority of passengers are departing from the South to the North of France at Avignon while only a few arrive there. The station design replies by separating the departure and arrival areas and assigning distinctive architectural features to each.

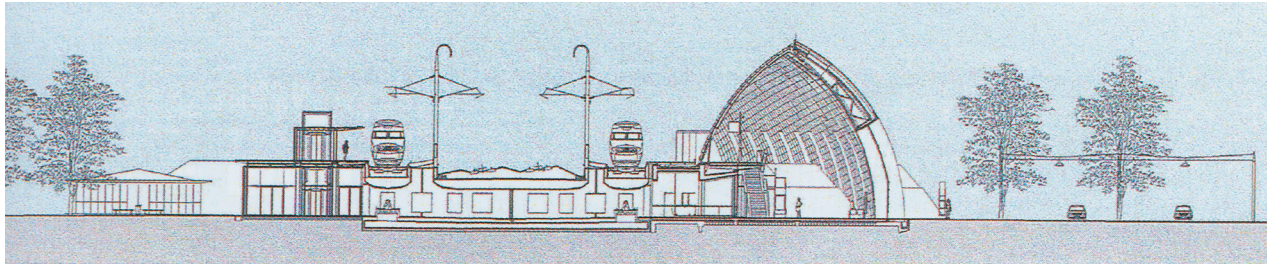
Consequently, the Departures hall illustrates its dominance through its much larger concourse to that of the Arrivals concourse. Slessor (2003:48) describes the bolder Departures pavilion as a sweeping volume reminiscent of an upturned ship's hull, whereas the Arrivals pavilion, only accommodating 20% of the station's traffic, is housed in a more modest steel and glass structure. The concept of splitting departure and arrival access will offer many advantages in terms of station circulation, even if arrival and departure flow is predicted to be more equal in the Sandton station.

The Departures pavilion in Avignon station is divided into two levels; a lower level where passengers enter the station, and an upper platform where trains are boarded. Access to the higher level is granted through a choice of escalators, lifts and a wide ramp/promenade running along the station's length. The hall's vaulted and sloping structure bend slightly in its length and this generates sightlines that indicate the direction to the platforms. It also creates the illusion of a never-ending concourse level. For this reason Avignon station is a prime example of how architectonic elements can be used to subconsciously act as part of the station's information and directional system.

Avignon station also responds to the harsh Mediterranean Provençal climate with the departure hall's South façade sheltered by a thick white sandstone wall, while the Northern façade,



**FIG 023**  
Avignon station's continuous sloping concourse



**FIG 024**  
Section Avignon station

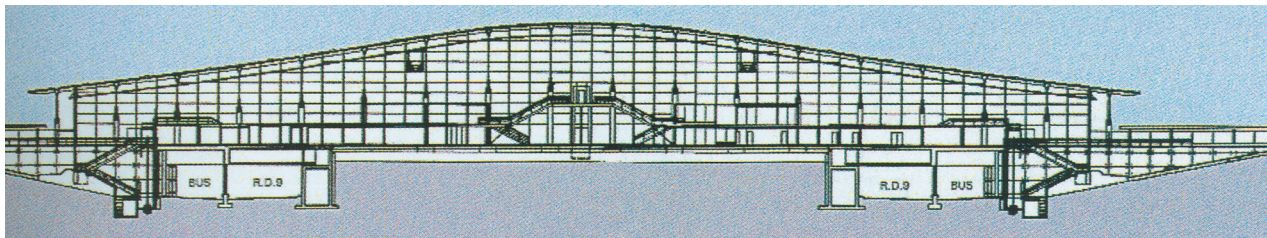


**FIG 025**  
Aix-en-Provence's curving facade indicates the station entrance

**FIG 027**  
Mezzanine levels and bridges offer an overlook on the Aix-en-Provence station activities



Externally the building shape indicates the main entrance with a "slight bulge" in its Western glass façade (Slessor 2003:50). Thus by placing emphases on certain station areas, through the use of architectural features, passengers can be guided through the station to entrance and exit points.



**FIG 026**  
Section Aix-en-Provence station

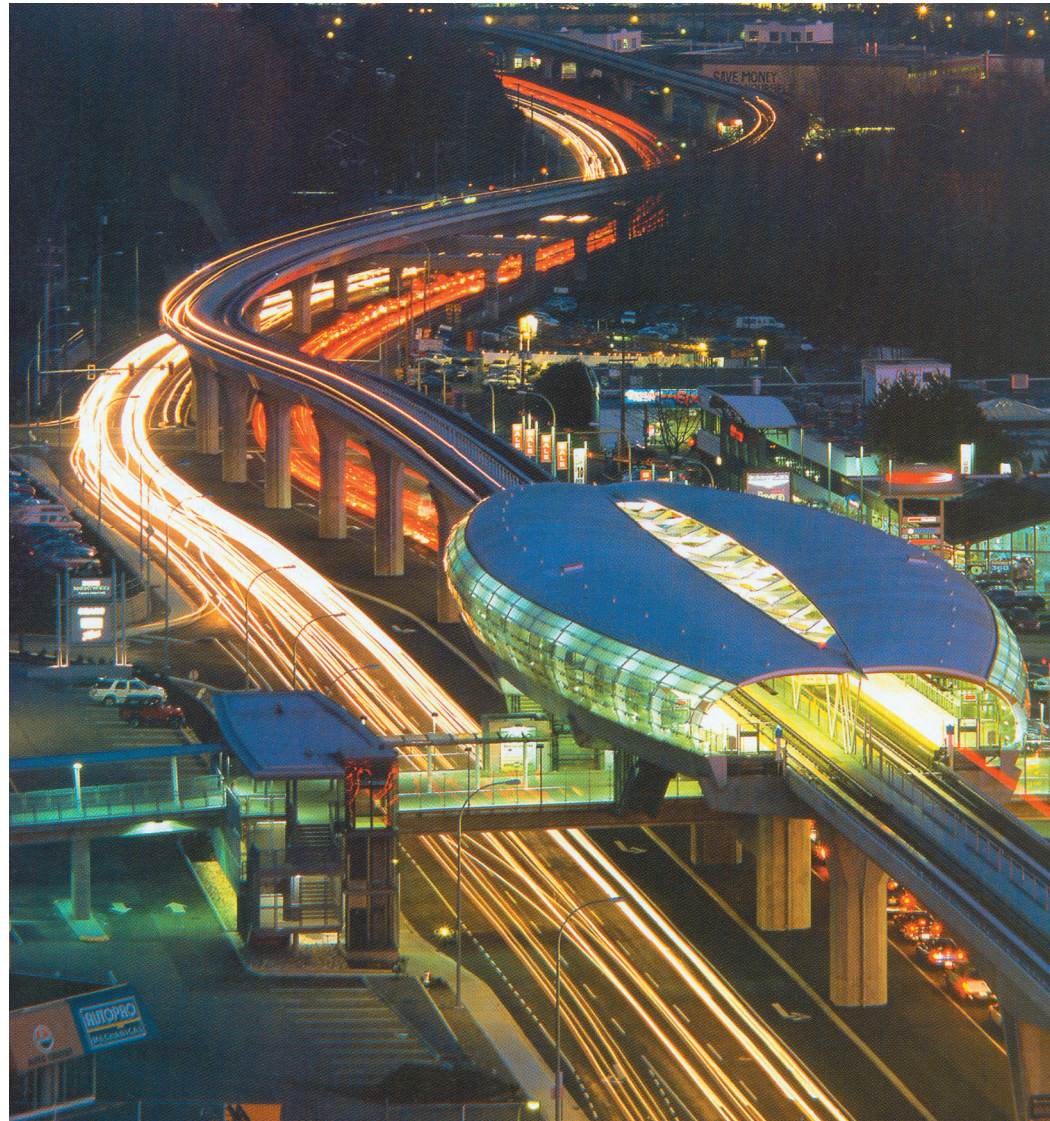
## BRENTWOOD SKY STATION MILLENIUM RAIL, VANCOUVER, CANADA

The Millennium line in Vancouver is the 9-station expansion of the Vancouver Sky train system launched in 2003. The name "Sky station" indicates a contradiction and poses to have no relevance to the Subterranean Space. However, the Busby & Associates-designed Brentwood sky station's application "transparency", to act as advertisement for the system, and to make the station legible and safe, is undeniably relevant.

In general, the Millennium line's design shifted focus to the commuters experience. Randy Gragg, an architecture critic explains (2003:137) that according to Lecia Steward, project head, the intention was to create stations that would allow a sense of ownership. The project team even formulated a requirement list based on a public participation exercise. The wish-list emphasised: visibility for safety's sake, the use of warmer materials such as wood and ambient night-time lighting.

Brentwood is the line's model station as it exhibits all the qualities the ideal station design had to meet. Abrahams (2003: 57) comments that the use of glass assembles a transparent structure which minimizes passenger confusion. The gentle swell in the middle of the structure provides adequate room for services such as stairs and lifts, while opening up the structure and giving clear views over the platforms. Additionally, it allows the station to act as a neighbourhood landmark. The station's visibility, especially from the freeway below, also plays a key role in encouraging people to use the train system.

Wood is incorporated in roof elements. Gragg (2003: 138) contributes the use of wood in structural elements, throughout many of the stations, as a means to grant the public its wish for the use of the material, but also as a measure to limit vandalism on the less resistant material.



**FIG 028**  
The luminous Brentwood station hovering above ground

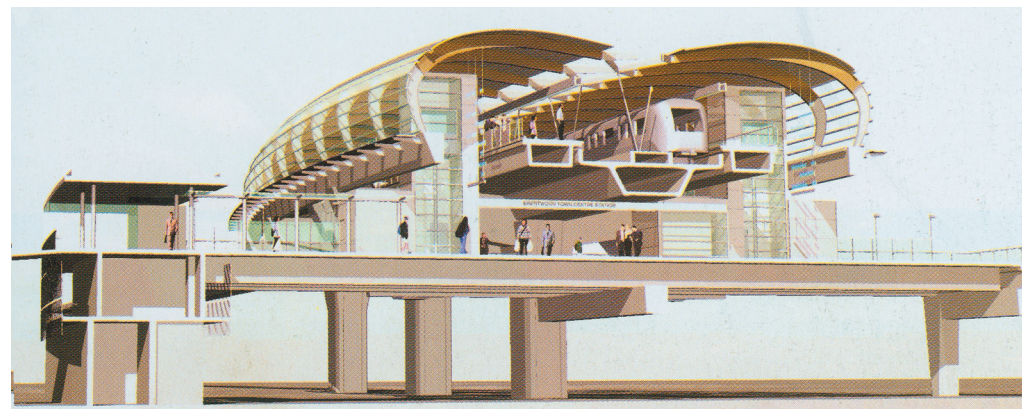


The concept of transparency can be utilised on various levels and in various scales within the Sandton station design. Besides the various advantages the use of translucent and transparent materials give in terms of legibility, safety and security, it can also offer numerous advertising and marketing opportunities. This ranges from promoting the Gautrain transport system, to the Sandton station, the shops in the station and the products they sell.



**FIG 029**

Brentwood's combination of wood, glass and steel creates warmer natural tones for aesthetic appeal and transparency for safety



**FIG 030**

3 dimensional section

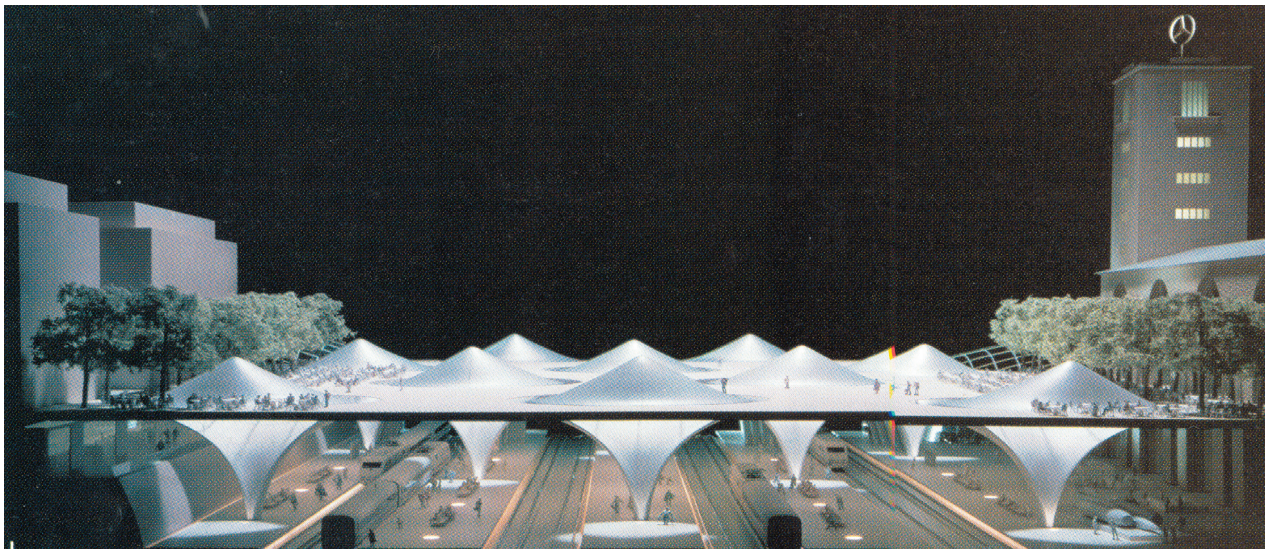
## — O — **BONATZ ZERO ENERGY STATION** DEUTSCHE BAHN, STUTTGART, GERMANY

Ingenhoven Overdiek und Partner's winning proposal in the international competition for a new underground station in Stuttgart's city centre concentrated on a sustainable solution. Davey (2003: 66) explains that the environmentally conscious approach consists of a no-heating, cooling or mechanical ventilation imperative. The station design relies on the utilisation of passive systems to ensure thermal control and user comfort.

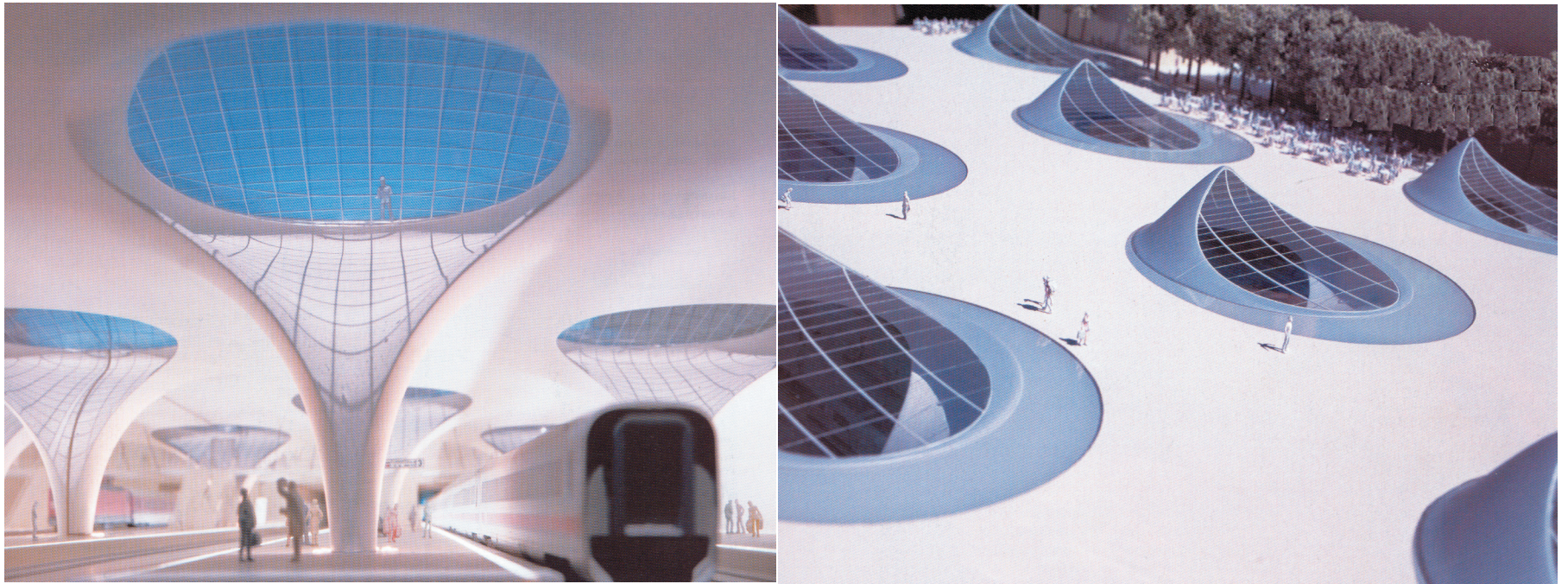
Expected to be completed in 2013, the station design incorporates a public park located above the station and will have a concrete shell roof structure. The park has a number of "light eyes;" organically formed circular openings that are responsible for passive ventilation and illumination. The openings are carefully planned to provide adequate natural light at average, but to prevent intense heat gains. The concrete shell utilises the Venturi effect of winds to further advance the station's air flow.

The light eyes, planned to consist of poured concrete clad with glazing, also creates a link between the subterranean platforms 12m below ground level and the activities commencing above. The station is planned to produce a social atmosphere with the provision of shops and catering opportunities on an opened concourse level.

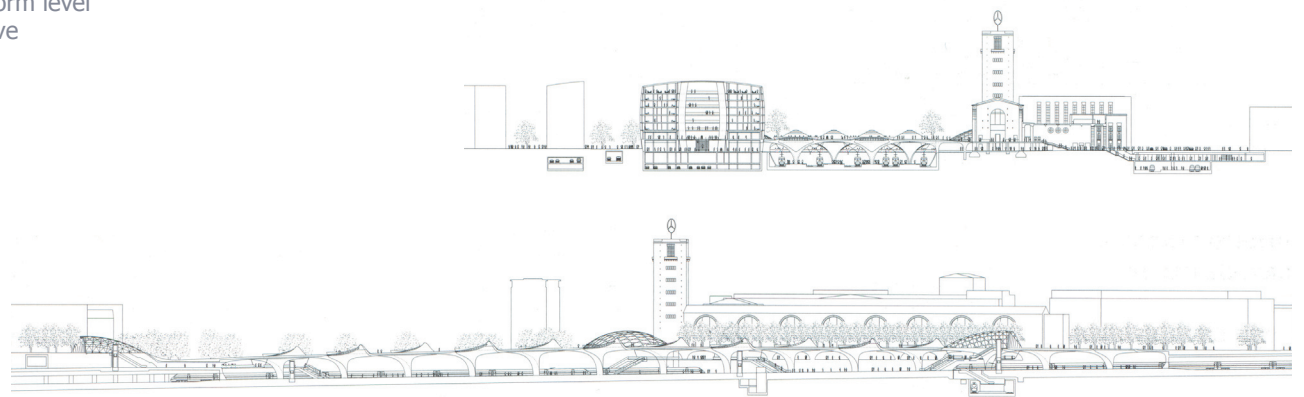
The Sandton station, besides from also being an underground station, is quite different to the Bonatz Zero-energy station as it is not developed to such extensive sustainability standards. However, the Sandton station will strive to create a sociable atmosphere in the station itself and in its surroundings above, by creating a public space (to be developed by Landscape architects and urban designers) on ground level above the station. "Peepholes" at ground level, through which to look down on the platform level or on to other activities in the station is also suggested.



**FIG 031**  
Model of the proposed Bonatz Zero Energy station



**FIG 032**  
A punctured concrete shell illuminates the platform level and makes a connection with a public park above

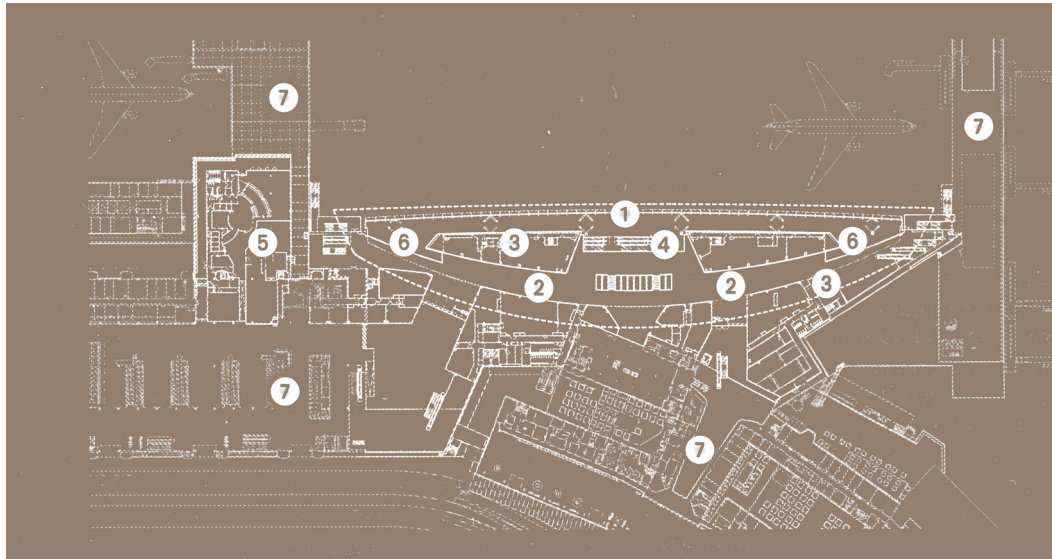
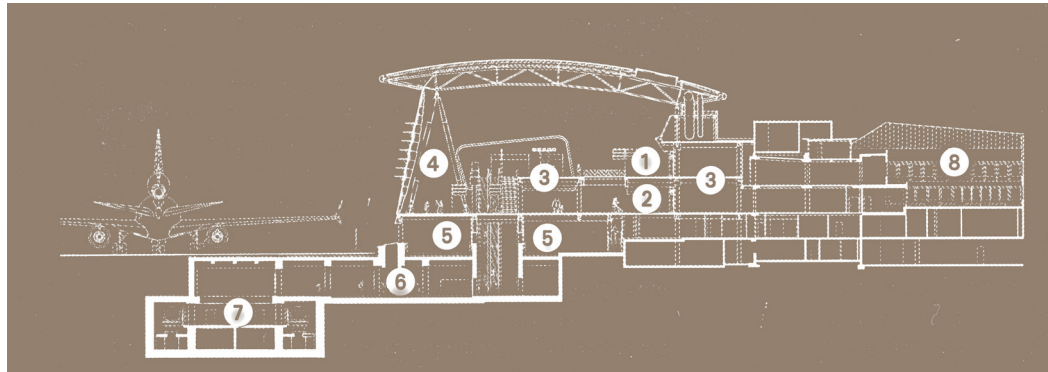


**FIG 033**  
Bonatz Sections



**AIRSIDE CENTRE**

**ZURICH AIRPORT, SWITZERLAND**



**FIG 034**  
Plan and Section

Train stations are fairly different from airports. Besides the fact that airports are complex technical buildings, both are transportation hubs that deal with passenger and circulation related issues, but airports require passengers to book-in in advance. Therefore, depending on whether the passenger is on a domestic or international flight, there is at least an hour to spare before the plain can be boarded and so the time a passenger spends at the airport far exceeds that of a commuter boarding a train in a metro station.

During the time spent waiting for the boarding call, passengers are tempted by various retail outlets, bars and restaurants. For this reason airports have become very commercially driven, especially in the international departures lounges where passengers spend two or more hours splurging on last minute gifts, souvenirs and a last taste of the country's cuisine. In arrival halls, passengers are not that exposed to commercial activities, as they tend to leave directly to their destination.

Marcus Field (1995:39) asserted that: "...the speedy, efficient manoeuvring of passengers from ground and into the air is no longer the principal concern of airport operators: enticing customers into a shopping mall is... passengers are expected to shop till they drop..." He also explains that many airport expansions are directly related to the need for retail space and consequently airports are turning into shopping malls.

The recently completed Airside Centre at Zurich airport has a refreshing take on the trend and shifts commercial integration in another direction. Designed by Grimshaw, Itten & Brechbühl and Arup, Spring said (2004:33) their aim was to produce a design that wasn't commercially compromised.

The Airside centre is an international passenger terminal, departure lounge, shopping and catering combination, which passengers enter after passport control. It offers the usual duty-free shops, cafés and bars, but without crowding and cluttering the space. The shops and catering facilities are presented subtly to allow passengers to choose between indulging in shopping activities or to wait while looking out over the runway. Shops are inserted in unique freestanding two storey structures, centrally placed in a lofty open volume space, though some retail activity spill to the sides of the concourse levels. This allows passenger flow to continue unhindered, while also giving the retail component of the centre a unique identity which makes the space more legible. Retail activities commence in its own environment, though it is unquestionably part of the holistic functioning centre.

The “malls”, as Spring (2004:35) refers to the enclosed timber shopping additions, shield passengers who prefer a more tranquil waiting experience, from the commercial noise of the concourse. In addition, access to these shops is provided from the concourse side and café bars are neatly placed at either end of the malls to optimise circulation space. The timber malls provide a cool and reserved departure lounge with a warm and natural element which supports a relaxed and comfortable atmosphere.

The Subterranean Space’s integration of commercial entities will correlate with the basic strategy followed in the Airside centre, with its extended departures lounge. This implies a design that offers direct routes to platforms, as well as indirect routes along retail and catering activities. Commercial entities should be introduced into the station structure in such a way that they are distinguishable from the main station structure/function so that they are able to function independently.



**FIG 035 (top)**  
The tranquil waiting lounge overlooking the Zurich Airport runway

**FIG 036 (bottom)**  
The timber finished retail components are inserted next to passenger routes and function independently to avoid interfering with passenger flow

## DESIGN INFLUENCE

The Precedents offer valuable solutions and principles that are to be applied in the Sandton station. Communication, circulation, interactive transparency, response to volume, commercial integration and social requirements are key factors. The abstract and aesthetic qualities of the spaces influence, support and compliment the above mentioned and cannot function in isolation. Spatial relationships, atmosphere and cognitive expressions should influence and motivate the product and purpose; forming elements of the design that will achieve the most.



**FIG 037**  
Cafe bars are positioned at either end of the “malls” along the passenger routes