
TECHNICAL DOCUMENTATION

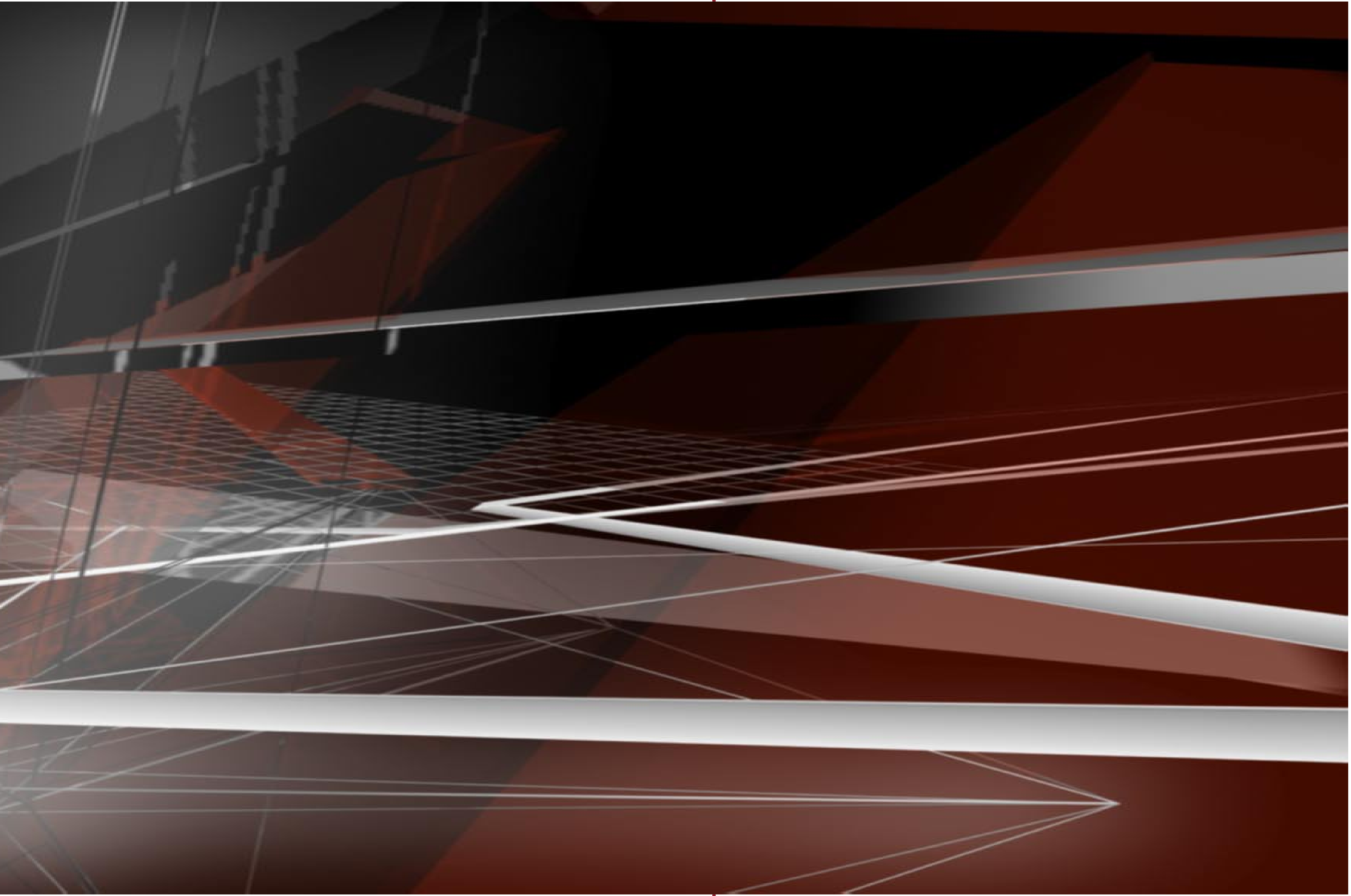


Fig.98

MATERIALS & ELEMENTS:

"For me metal is the material of our time, It enables architecture to become sculpture"

Frank Gehry. (OJEDA. 2003: 78)

The materials used in this project were chosen for pragmatic and aesthetic reasons.
Performance criteria includes: Weight, size (thickness) , potential environmental impact, availability, maintenance, speed of erection and finish.

As the building must be fully recyclable at the end of its useful life, the building must largely be made up of prefabricated elements that are assembled like an Mecano set on site. It therefor goes that the traditional "wet works" that are associated with the South African building industry, must be kept to a minimum.

The building cantilevers over an on-ramp and marginally over the highway and to keep the disruption to traffic caused by construction work to the absolute minimum, prefabricated elements (as in steel columns and beams) would make more sense than concrete. Where steel columns and beams can be placed in position by cranes in a hours, concrete columns and beams require extensive scaffolding that will definitely disrupt vehicular traffic.

<u>Steel:</u>
Steel is used extensively on the heliport section of the building. All steel members must be manufactured according to engineers details and numbered according to these drawings. Steel sections will thus arrive on site ready for assembly. (Drilling and cutting on-site must be kept to a minimum. Exposed steel sections (window frames included) will be 3CR12 stainless steel. It is less expensive than other stainless steels and weathers to the desired color.
Non -exposed steel must be treated with three hour fire-rated spray-on foam/paint.

Fig 98: Walt Disney concert hall by Frank Gehry (under construction)

<u>Aluminium:</u>
A metallic chemical element, symbol Al, atomic number 13, atomic weight 26.98154. It is silver(y), a code color for lightweight performance metals. Aluminium has a very high embodied energy , but this is offset by the fact that aluminium are fully recyclable. Additionally a metal cladding like aluminium also offers the flexibility needed for a sculptural design like this building.
All exterior cladding is aluminium composite panels. A typical panel will consist of two aluminium cover sheets (0,5mm) and a plastic core. The panels will be cut with a CNC machine and numbered, so that each panel has a specific position where it has to be fixed. (CNC technology is the process where an object are laser-cut according to co-ordinates given to the machine by a computer program.) By using CNC technology material wastage are cut down drastically. On-site installation are also more precise and installation time is improved.All aluminium will have a natural anodized finish.

TECHNICAL ENQUIRY

Fig.99

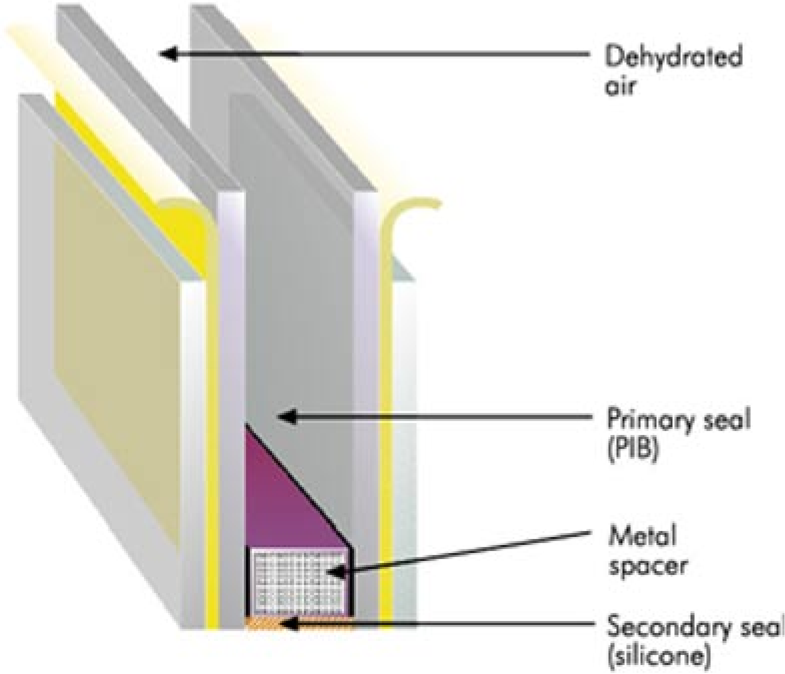


Fig.100

Glass:
A material made from hot liquid materials that, when cooled, do not crystalize but rather remain in an amorphous state. It is so viscous that it becomes solid, yet is completely transparent.

"Above all, though, glass is the most effective conceivable material expression of the fundamental ambiguity of atmosphere: the fact that it is at once proximity and distance, intimacy and the refusal of intimacy, communication and non-communication. Whether as packaging, window or partition, glass is the basis of a transparency without transition; we see, but cannot touch. The message is universal and abstract."

(BAUDRILLARD. 1996:105)

Glass is the infill material in this building. It communicates the fact that the building is inhabited by people who needs protection and it communicates the context of the building to its inhabitants. It also acts as a divider of not only interior and exterior spaces but of interior space. As mentioned elsewhere, the heliport building's interior space are largely determined by the structure of the building. Where interior space needed to be divided further, glass is the main element. (Normally these dividers are white translucent safety glass, which look like sandblasted glass, but is in fact a laminated safety glass.)

Glass elements are also the weakest parts or worst performing parts of the building. Unwanted noise and heat are more likely to find its way into the building through glass elements than anywhere else, and glass does not perform well during fires and other disasters.
Virtually all glazing will be double glazed (sealed insulated glass)to prevent noise levels (emanating from incoming helicopters and traffic)from reaching undesirable levels. To prevent solar energy from penetrating the building a tinted interlayer (Deep coolgrey, HPR) are incorporated. Where glass are used as free standing dividers, floor panels or as balustrades, it must be min 12mm toughened safety glass.Exterior glazing must be 1 hour fire-rated where specified.

Fig 99: The window frames of the Splashback, Backlash building

Rubber:
The disposal of car tyres is of a major concern for environmentalists. Strategies and products exploring the re -use of rubber are therefor advantageous for all concerned. As the theme of the highway play a major role in the overall design theme, the use of recycled rubber and the recycle of tyres are particularly apt,

Recycled rubber mesh flooring will be used throughout the heliport building and on the ramps/passages between the hotel rooms. (This must not be confused with the rubber mats sold at local hardware stores.) The one of the major advantages of these rubber floors is its superior acoustic properties. Because of it's textured surface and the high density of the material it has high sound absorption and sound reduction qualities. It is also low maintenance and will outlast most other floor coverings.

Fig 100: A typical double glazed window section.

Shredded tyres will also be used as a groundcover around the building base.

Fig.101

Fig.102

Concrete:
Concrete is used to encase and protect the fire escape routes in the Heliport, and as a structural material in the hotel building. In the spirit of the "shades of grey" and materials in their natural form theme that prevails throughout the project, all concrete will be off-shutter.

STRUCTURE

The structure of the heliport building is a hybrid of three systems: a rational column and beam system, a truss system and weight bearing skin system. The truss principle are present throughout the design. By fusing these systems the building communicates the idea of entropy and lightness. In contrast to the heliport building, the hotel are firmly grounded and the structural system are rather conventional: a concrete beam and column system.

The main columns are rectangular section steel columns filled with concrete. The concrete improves the compression strength of the columns, and prevent the steel from deforming during a fire. Each of the main columns consist of three elements: two columns connected at or below ground level, and a lateral brace or beam that transfers the weight more equally. The main floor beams runs longitudinally through the building and are connected with square section cross braces and I-beams to provide lateral support. Lateral support are also provided by the concrete encased fire escape staircase and lift shafts.

The structure resting on the main beams operates mostly on the truss principle. The program were fitted in and around this giant truss. Where space had to be "stolen" for programmatic reasons the roof structure were connected to the main beams. Stiffness and equilibrium are provided by cross-bracing and the skin of the building.

Contrary to popular believe, helicopters do have an approach angle for landings and take-offs. The South African Civil Aviation Authority requires a 1:8 approach angle to helipads. Menlyn Park shopping center is approximately 30 meters high on average which translates to 240 meters should the helipads be placed at ground level. The closest helipad is a 135 meters from the shopping center which translates to minimum required height of 13.1 meters above ground level.
As an additional safety factor the pads were designed at a landing platform height of 16,2 meters above natural ground level. (As helicopters land while flying into the wind and the prevailing summer wind are mostly from the north east, a lot of landing approaches will be made over Menlyn's roof.

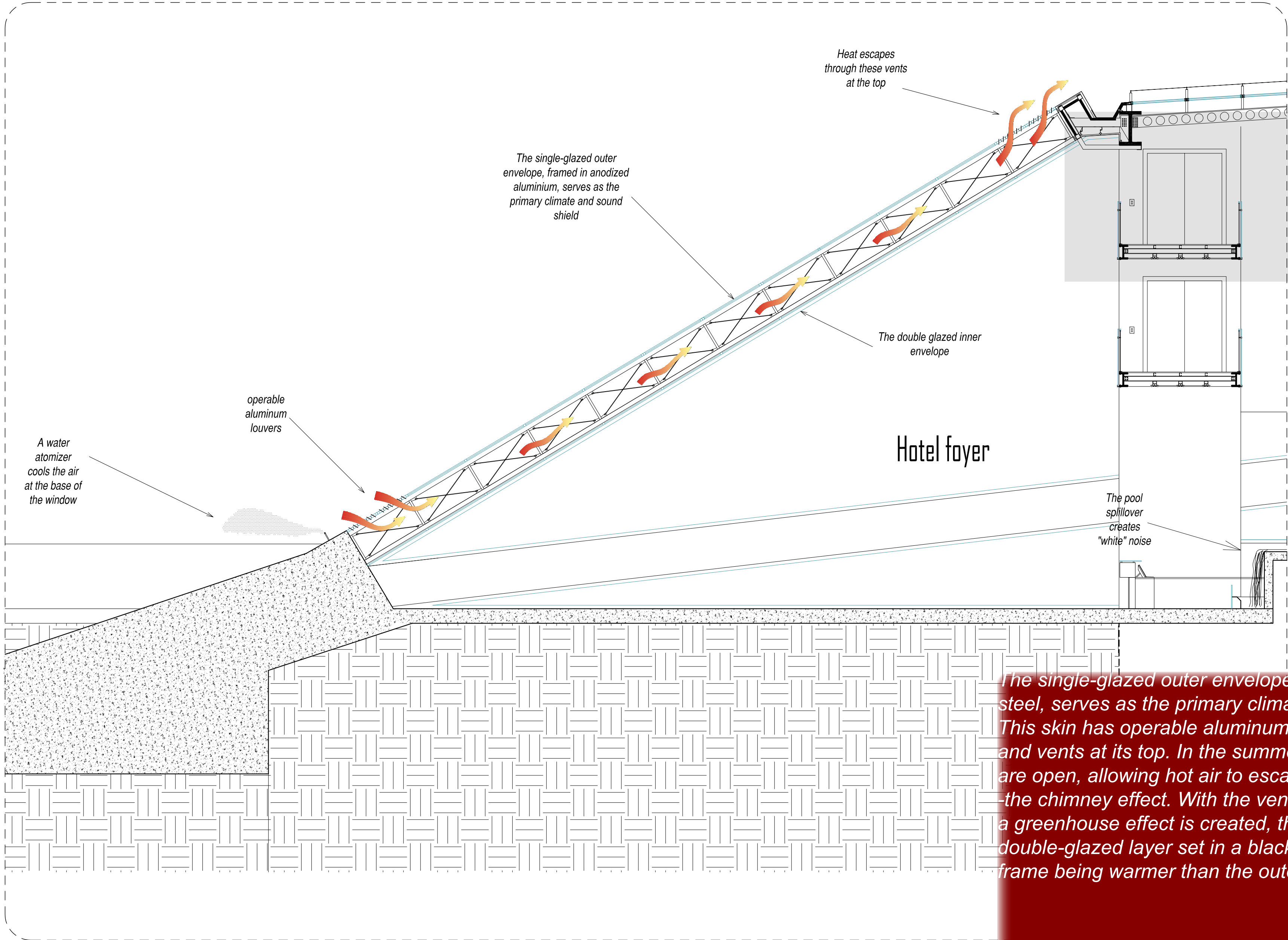
The helipads are kept in the air by non-orthogonal aluminium clad steel columns that cut back to the building at odd angles.

Climate & Occupant comfort:

The incoming helicopters, the location of the building next to the highway and high summer temperatures places a lot of emphasis on occupant comfort. Sites next

Fig 101: Construction of the Diamond Ranch High school.

Fig 102: The structure of the building is loosely based on the structures of billboards.



The single-glazed outer envelope, framed in lacquered steel, serves as the primary climate and sound shield. This skin has operable aluminum louvers at its base and vents at its top. In the summer, these apertures are open, allowing hot air to escape through the façade -the chimney effect. With the vents and louvers closed, a greenhouse effect is created, the inner façade - a double-glazed layer set in a black anodized-aluminum frame being warmer than the outer envelope.

Fig.103

to highways are wind swept, dusty and noisy. These problems are compounded by the incoming helicopters.

Cooling and ventilation:

As noise, dust and wind will be prevalent on the site, natural ventilation via open-able windows will not be an option. The end-user of these buildings will expect maximum comfort, and a mechanical ventilation and cooling system thus becomes essential for this building. Further strategies had to be developed to reduce the load on the ventilation system,.

The centralized ventilation system located on the second floor of the heliport building will consist of the following components: A chiller plant with a buffer tank, medium sized air-handling units, and extractors.

Chilled water will cool the buildings via AHU's.

To reduce the load on the ventilation system water from the entrance pond will be pumped trough the precast concrete floors. To cool this water the catchment pit of the spillover will be 4m below the spill over and evaporative cooling is used as the primary cooling system. After the water has circulated through the floors it returns to the pond and is re-circulated.

Double-skin ventilated facades are also used on the hotel building. (See detail) The sloping window over the foyer / lounge will have water-atomizers to cool the air and glass at the base of the window which will accelerate the chimney effect through the double skin. The water - atomizers will also create a pleasant environment for pedestrians and reduce airborne dust.

The indoor swimming pool acts as a giant heat store and by keeping the pool at an optimum temperature (24deg C) the interior temperature of the hotel will be stabilized at that temperature. All hotel rooms will be mechanically ventilated.

During the winter the swimming pool can be heated via solar panels built into the two helipads directly above the hotel.

The restaurant box is designed to float between the main floor and roof structure thereby allowing air to flow unhindered above and below it.

Insulation:

Insulation plays a duel role in the building: Insulation against unwanted heat gain/loss and insulation against unwanted noise. The roof insulation will consist of Woolblock panels, which is placed at least 50mm away from the exterior cladding, creating an air cushion, Where deep trusses are used, another layer of insulation is placed right above the ceiling plane, thus creating a giant air cushion between the outer skin of the building and the ceiling (see section - departure lounge)

As mentioned elsewhere, most if not all exterior glazing will be insulated and factory sealed. Double glazed sections perform substantially better than single glazed sections, for insulation against heat transfer and for insulation against noise.

Glazing in the heliport building are also protected by roof overhangs from the sun.

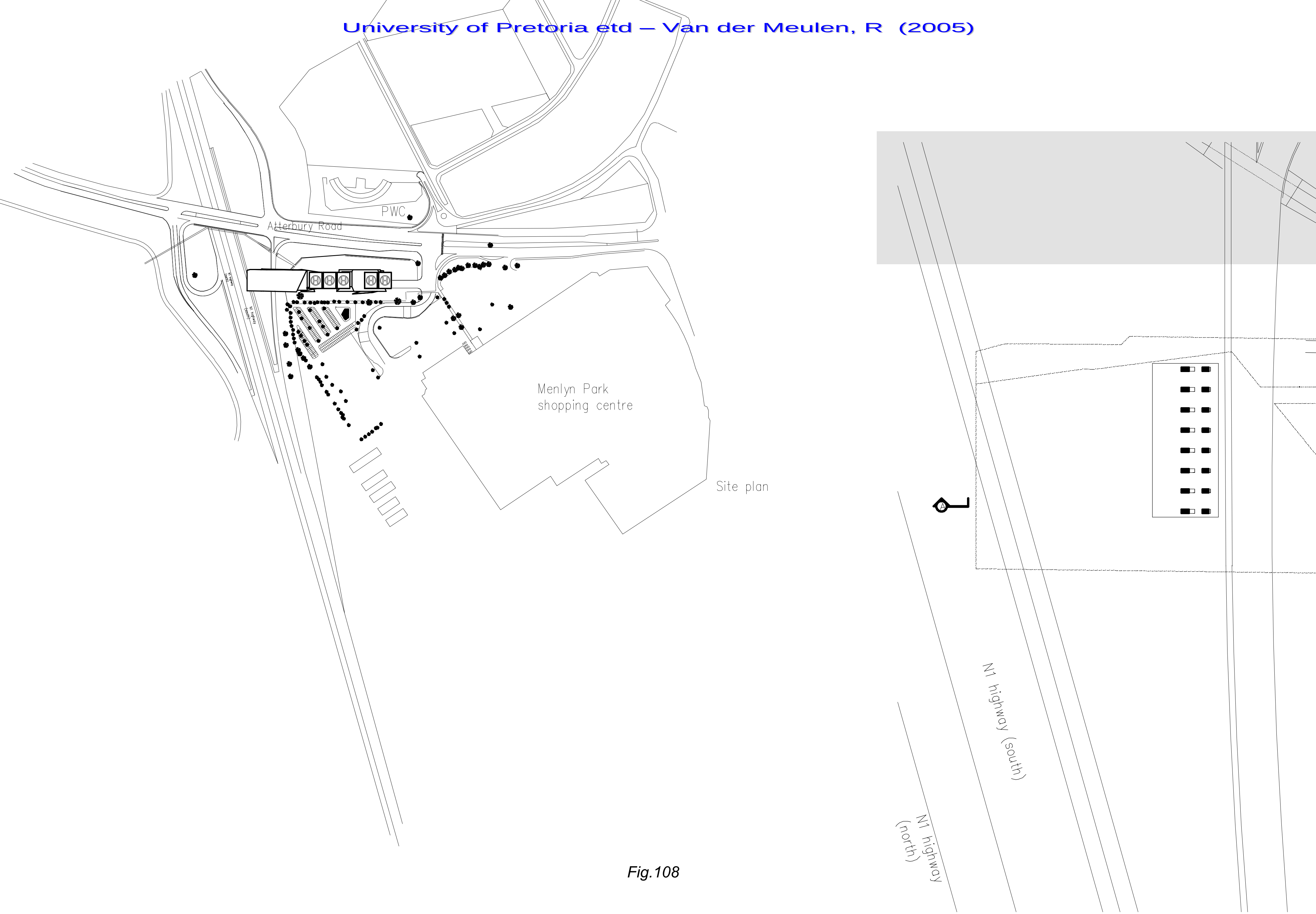

PWC
Atterbury Road
Menlyn Park
shopping centre
Site plan
N1 highway (south)
N1 highway
(north)

Fig.108

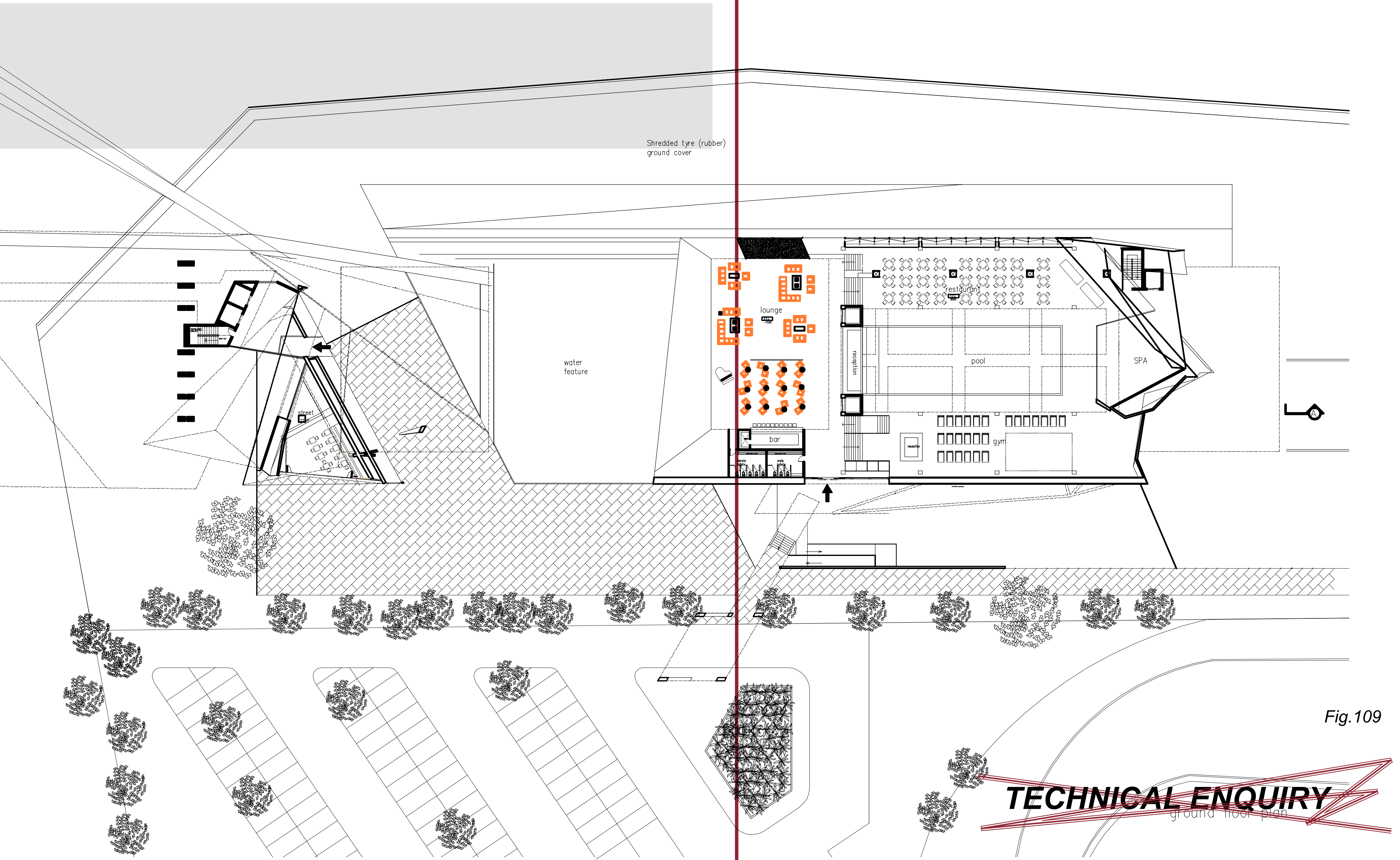
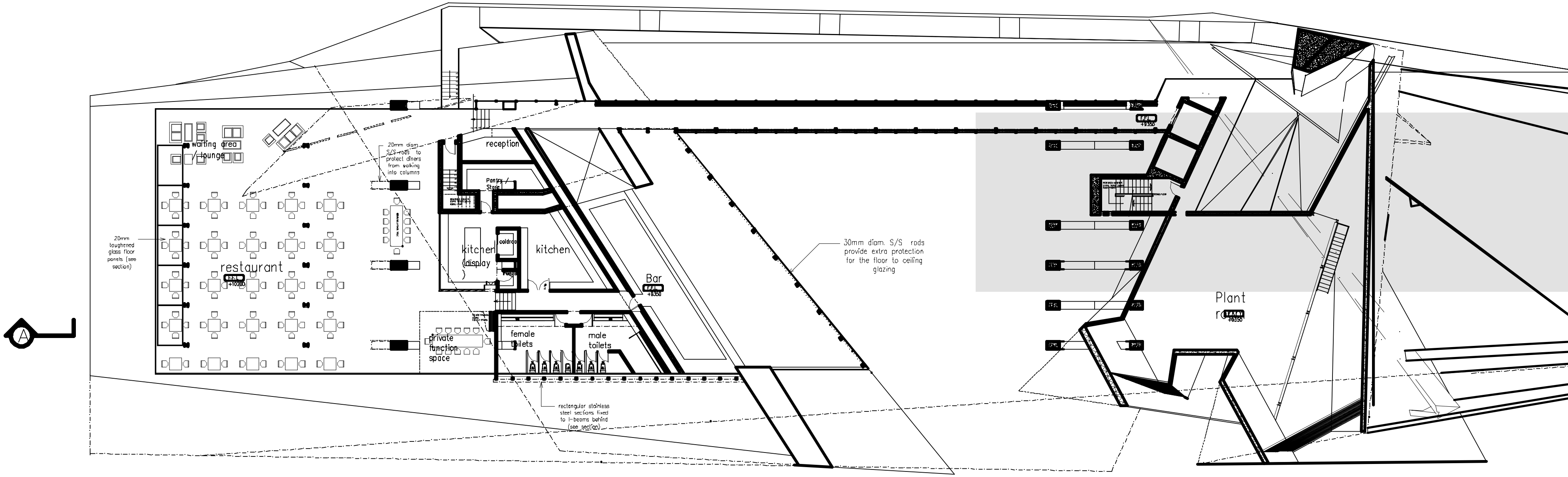
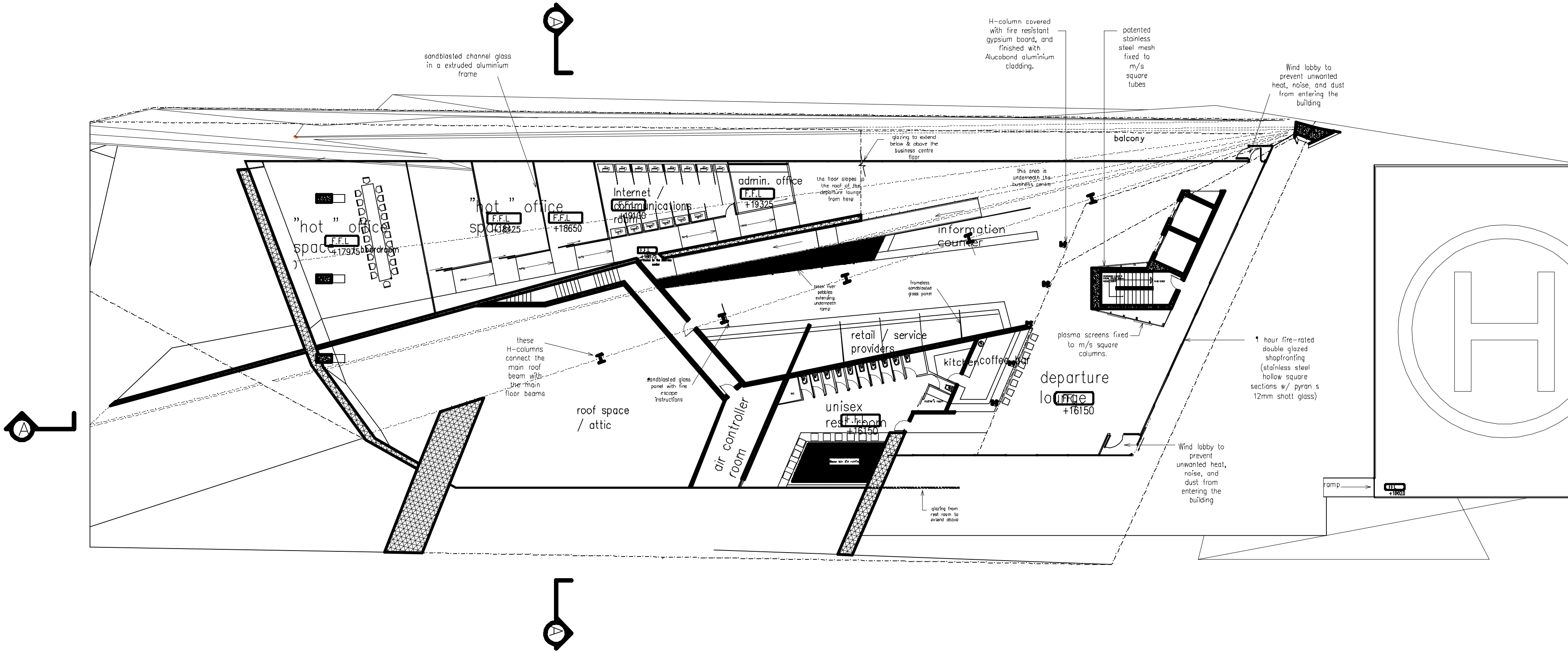

Shredded tyre (rubber)
ground cover
water
feature
lounge
restaurant
pool
SPA
reception
bar
gym
street
TECHNICAL ENQUIRY
ground floor plan

Fig.109


waiting area / lounge
restaurant
reception
kitchen (display)
kitchen
Bar
female toilets
male toilets
private function space
Plant room
20mm toughened glass floor panels (see section)
20mm diam. S/S rods to protect diners from walking into columns
30mm diam. S/S rods provide extra protection for the floor to ceiling glazing
rectangular stainless steel sections fixed to I-beams behind (see section)


sandblasted channel glass in a extruded aluminium frame
H-column covered with fire resistant gypsum board, and finished with Alucobond aluminium cladding.
patented stainless steel mesh fixed to m/s square tubes
Wind lobby to prevent unwanted heat, noise, and dust from entering the building
balcony
"hot" office space
boardroom
Internet / communications room
admin. office
information counter
retail / service providers
kitchen
coffee bar
departure lounge
+16150
unisex rest room
air controller room
roof space / attic
these H-columns connect the main roof beam with the main floor beams
plasma screens fixed to m/s square columns.
1 hour fire-rated double glazed shopfronting (stainless steel hollow square sections w/ pyran s 12mm shott glass)
ramp

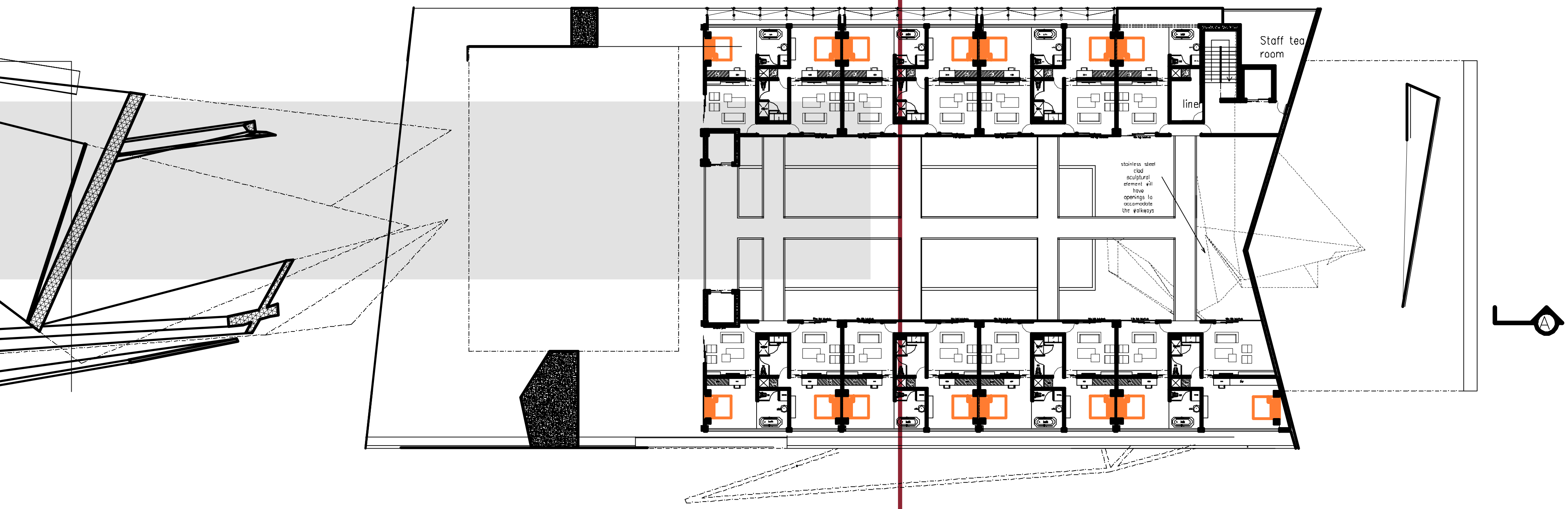


Fig.110

2nd Floor

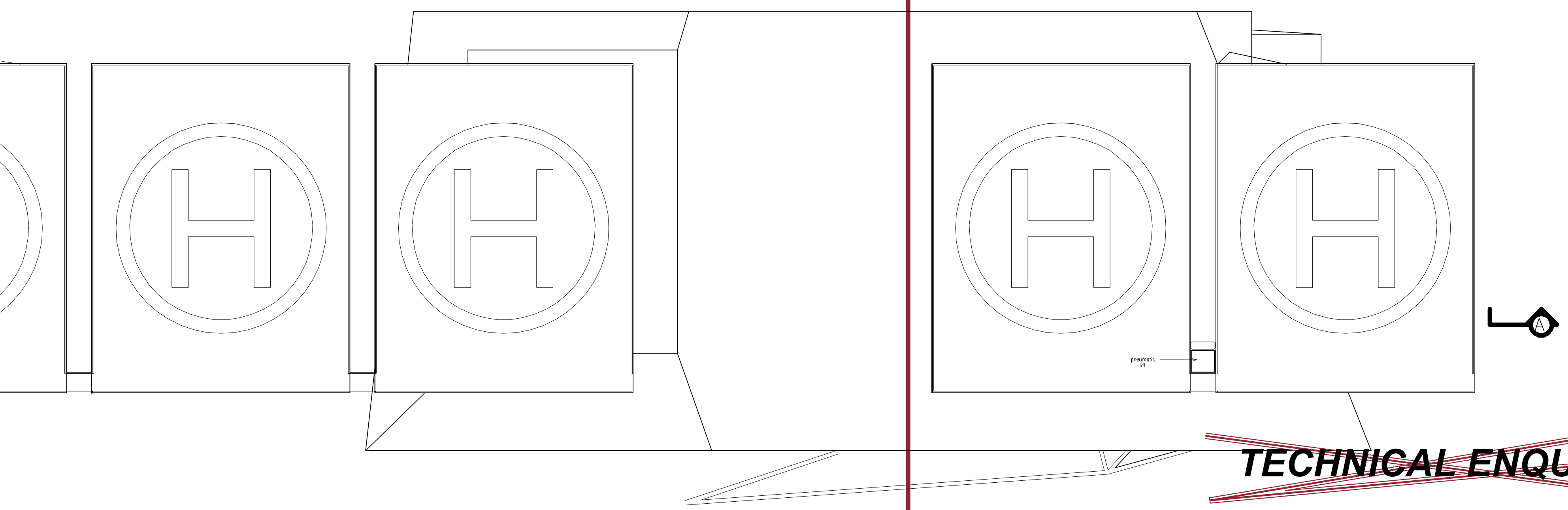
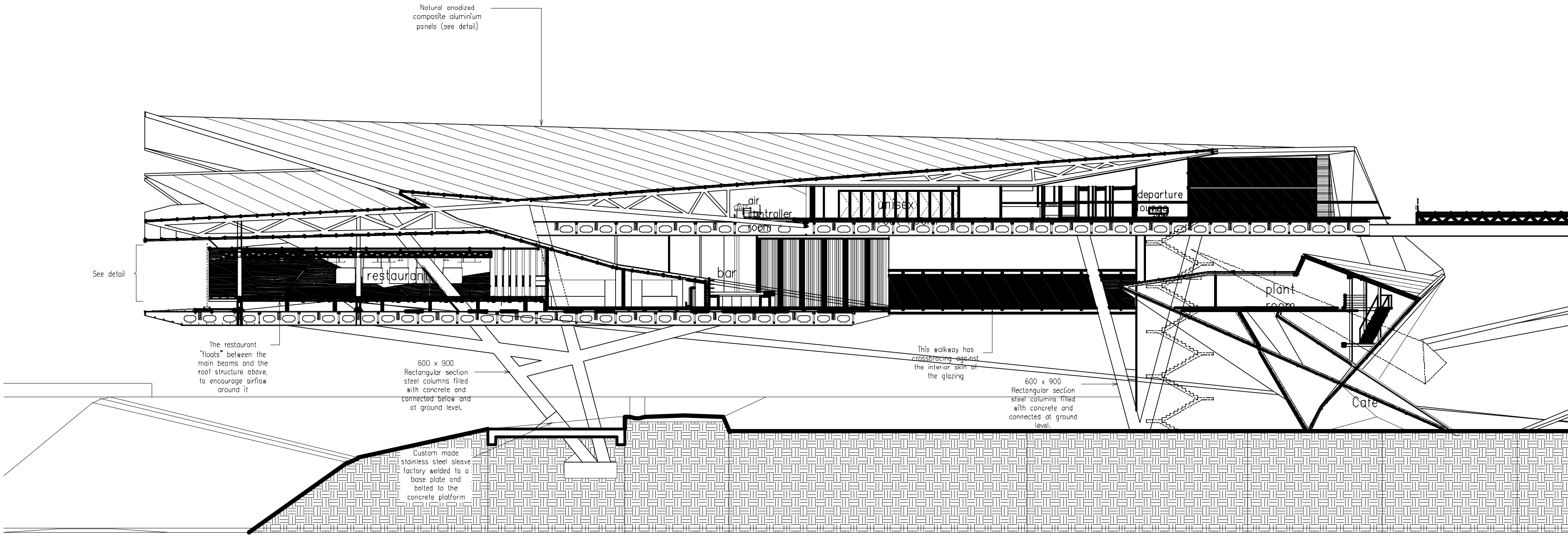


Fig.111

TECHNICAL ENQUIRY


Natural anodized composite aluminium panels (see detail)
See detail
restaurant
air controller room
unisex
departure lounge
bar
plant room
Cafe
The restaurant "floats" between the main beams and the roof structure above, to encourage airflow around it
600 x 900 Rectangular section steel columns filled with concrete and connected below and at ground level.
This walkway has crossbracing against the interior skin of the glazing
600 x 900 Rectangular section steel columns filled with concrete and connected at ground level.
Custom made stainless steel sleave factory welded to a base plate and bolted to the concrete platform

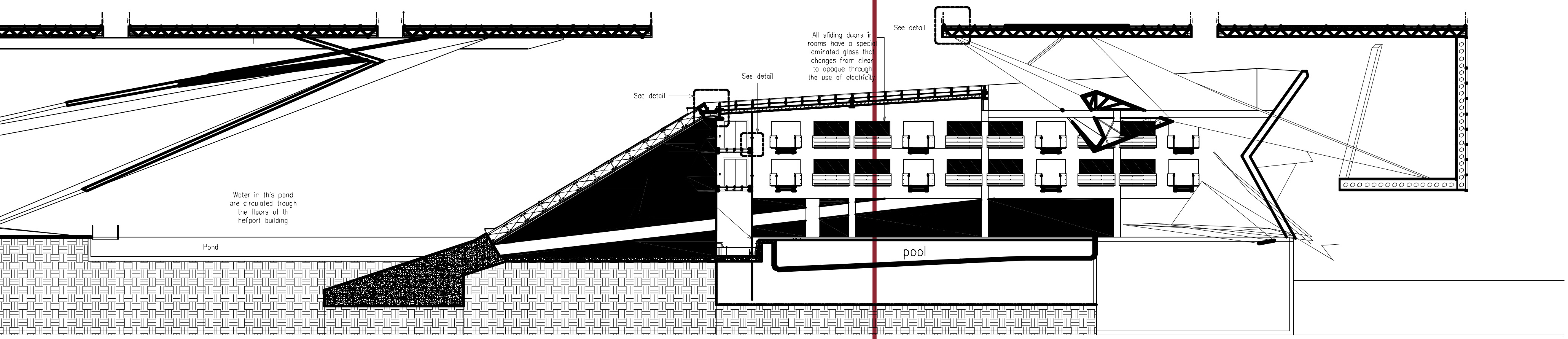
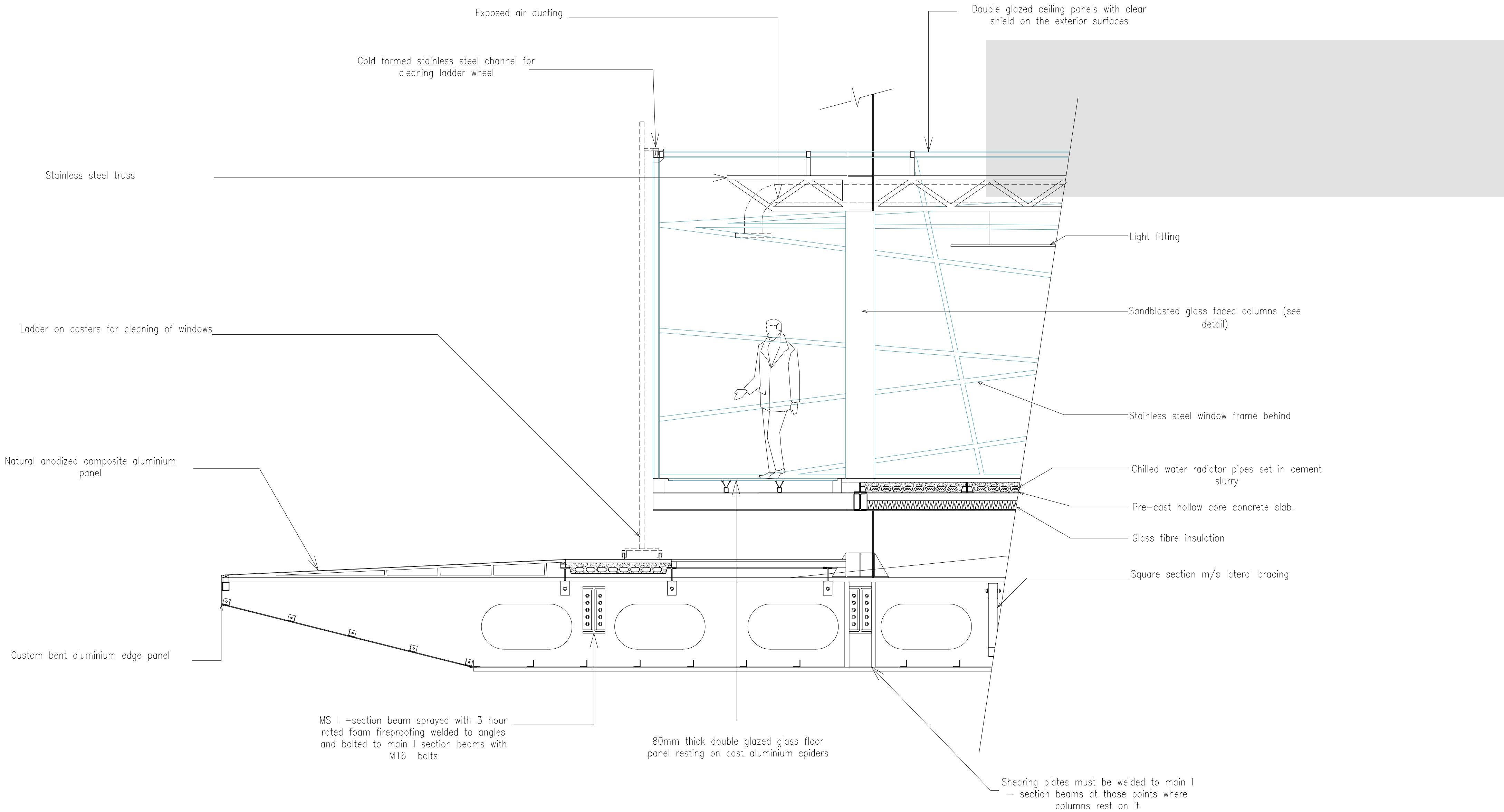


Fig.112

Section A–A

TECHNICAL ENQUIRY



Detail : Restaurant box

Fig.113

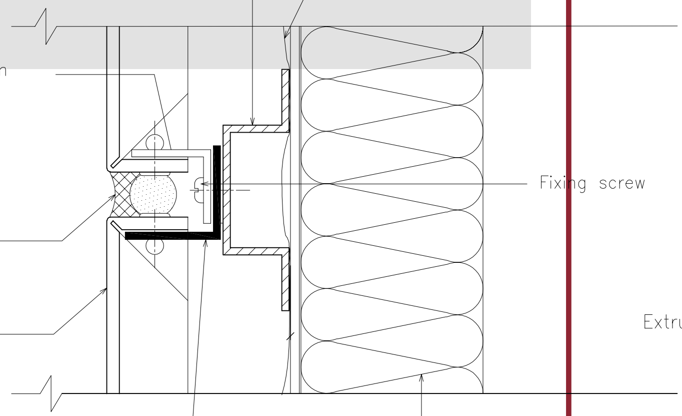


Fig.114

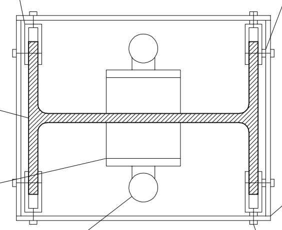
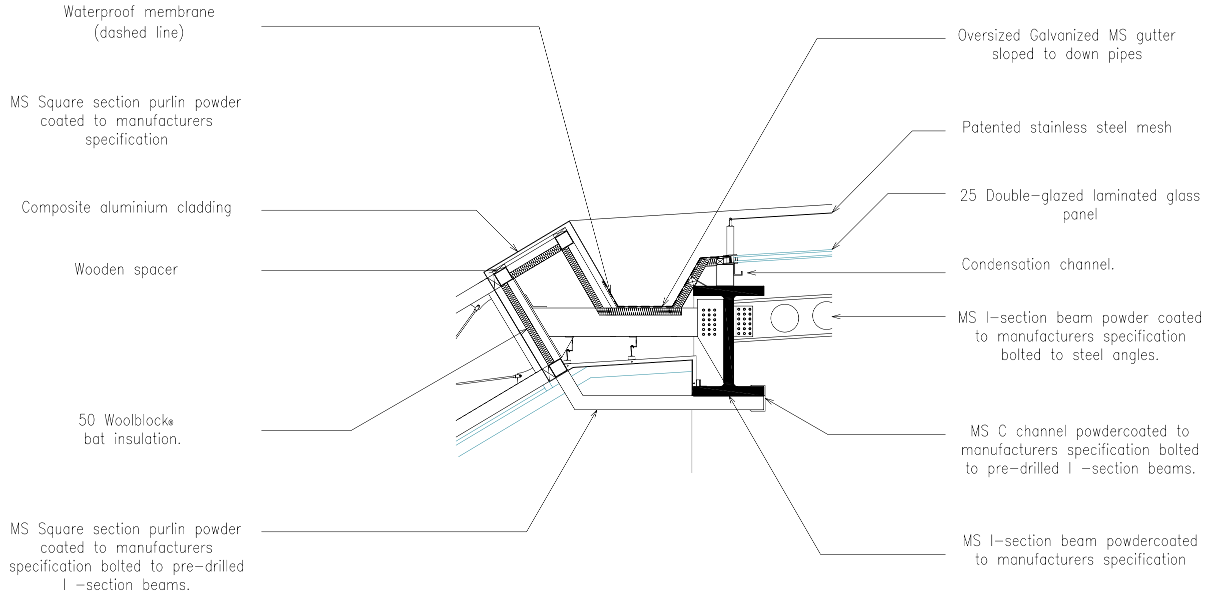


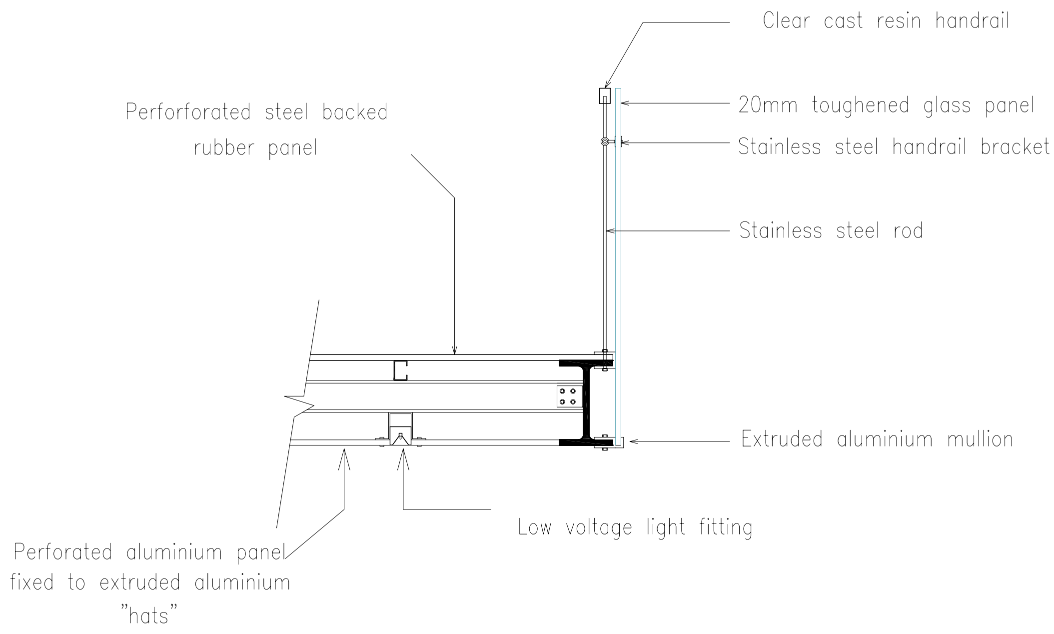
Fig.115

TECHNICAL ENQUIRY

Fig.115



Detail : Hotel roof edge



Detail : Ramp

Fig.116

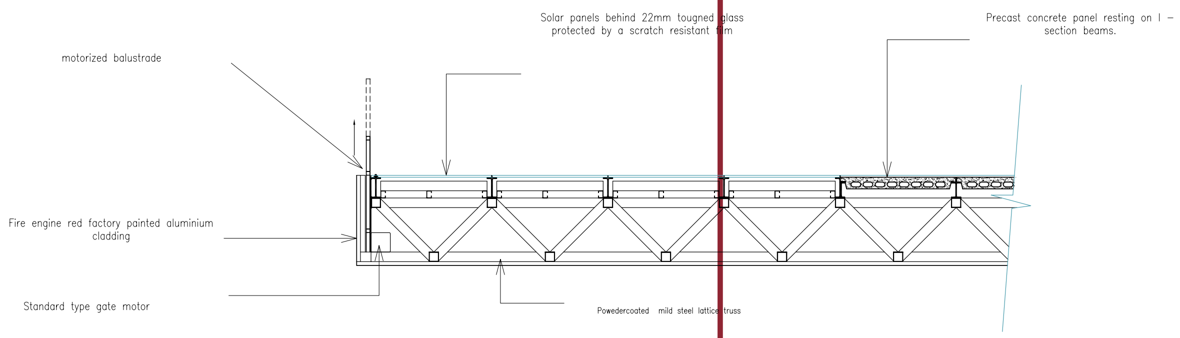


Fig.117

TECHNICAL ENQUIRY