



SETTING IN MOTION A BUYING
PROJECT OWN IS
TRANSFER DISTRIBUTION

DiD

WAREHOUSE

TECHNICAL
REPORT

A SELECTION OF OBJECTS ON
DISPLAY SHOULD SEE
THE WAREHOUSE AS AN EVENT
PLACE IN A GIVE-AND-TAKE



INTRODUCTION:

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The technical report is a summary of the building performance according to the baseline document (target setting).

The report is a respond to the target that has been set in the baseline document. Thus, this report will act as a performance tool of the standards set for a sustainable building (SBAT Tool - Jeremy Gibberd).

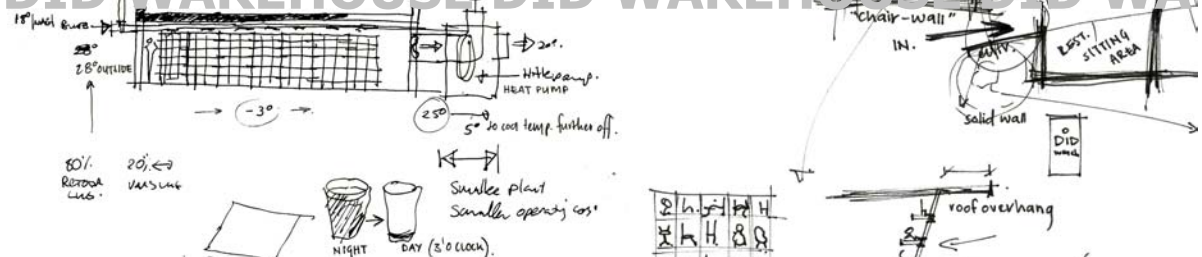
The report is applicable to the building as a whole as well as to the baseline document, and must be viewed together.

Detailed descriptions of every economic, social and environmental target of the building is provided in the baseline document and the technical report is only a reporting tool for the baseline document.

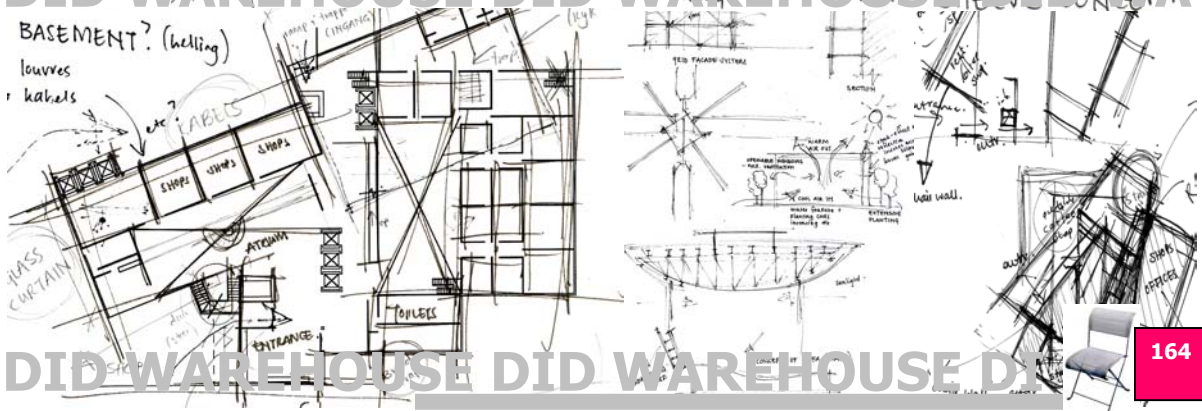
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1. LIGHTING:

Natural light penetrates the building through the north, east and south facades. The amount of glass is minimized on the west façade to minimize traffic noise from the N3-highway, as well as afternoon sun. A fair amount of sun and glare protection is provided by means of louver panels. The north façade has a glass curtain wall with a steel louver panel in front of the curtain wall to minimize the amount of direct rays of the sun, but to maximize the amount of natural light.

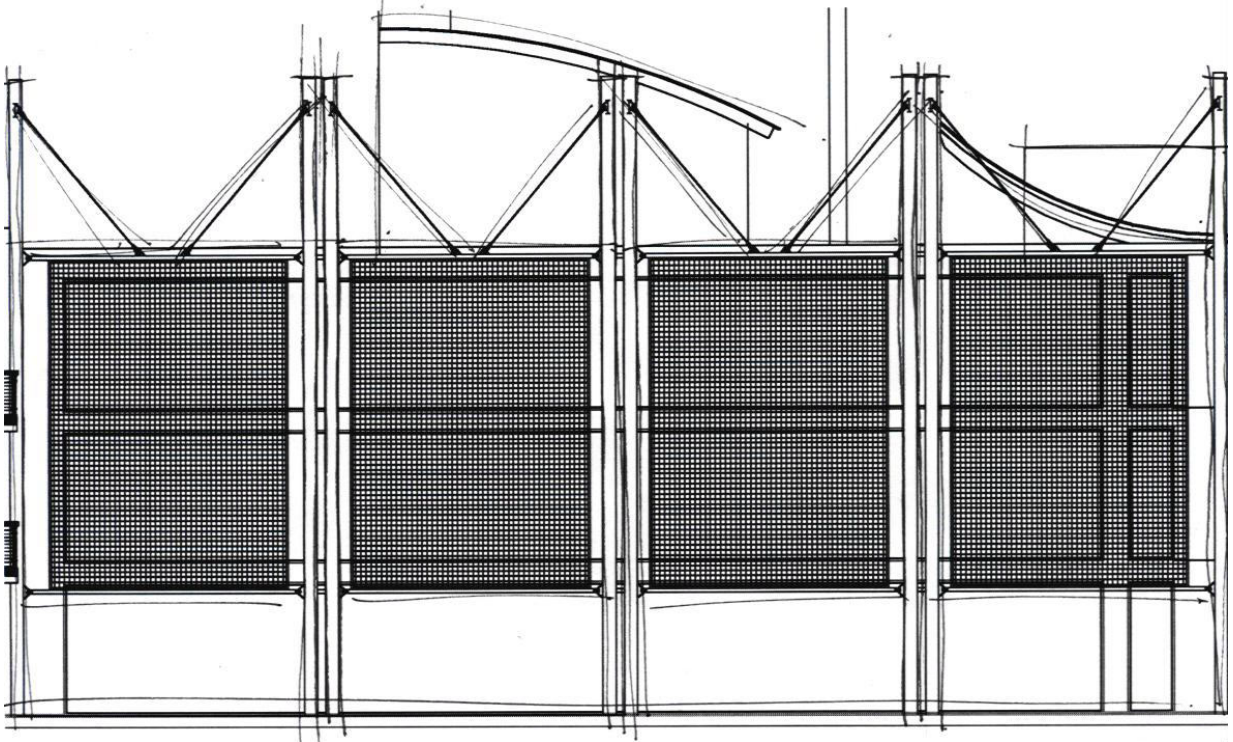


Fig. 80 - An advertising board – act as a louver panel.

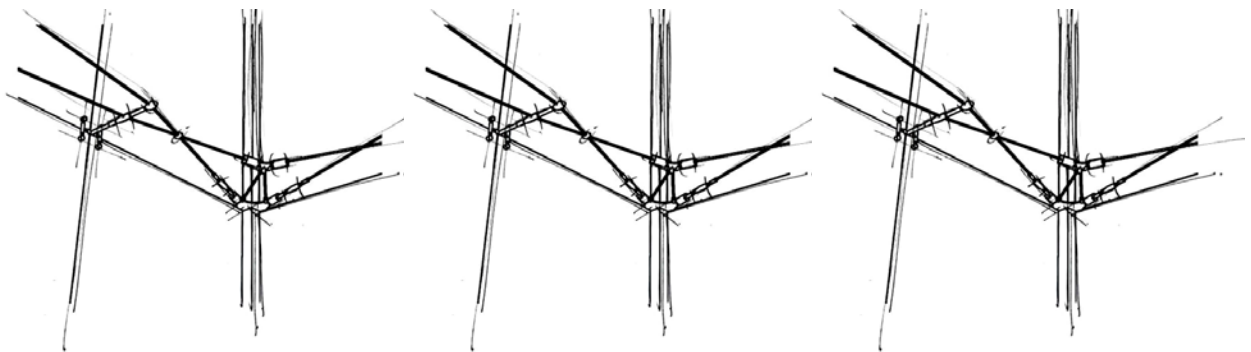


Fig. 81 - Glass curtain wall on the north façade.

An advertising board on the east façade is covered with a shadow net and acts as an advertising board as well as a sun device to block the direct rays of the sun.

Natural light enters the atrium spaces through unobstructed glass panels underneath the roof structure (see Section A-A).

Refer to baseline document (lighting) for detailed information on other lighting qualities and information on DiD Warehouse.

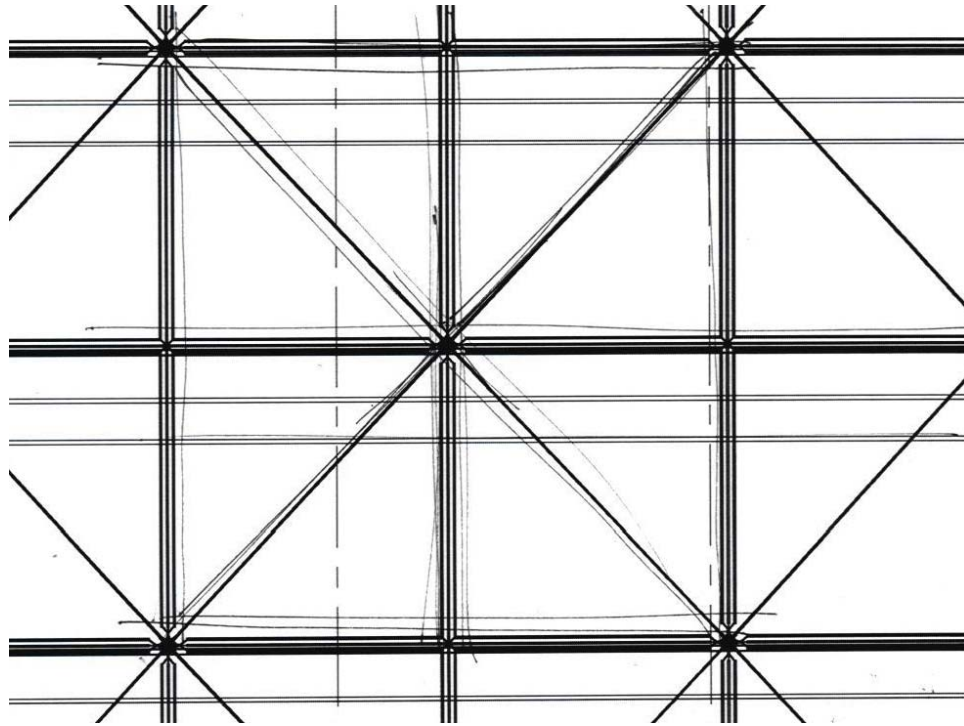


Fig. 82 – The typical louver panel on the north and west façades to protect the building against direct rays of the sun.

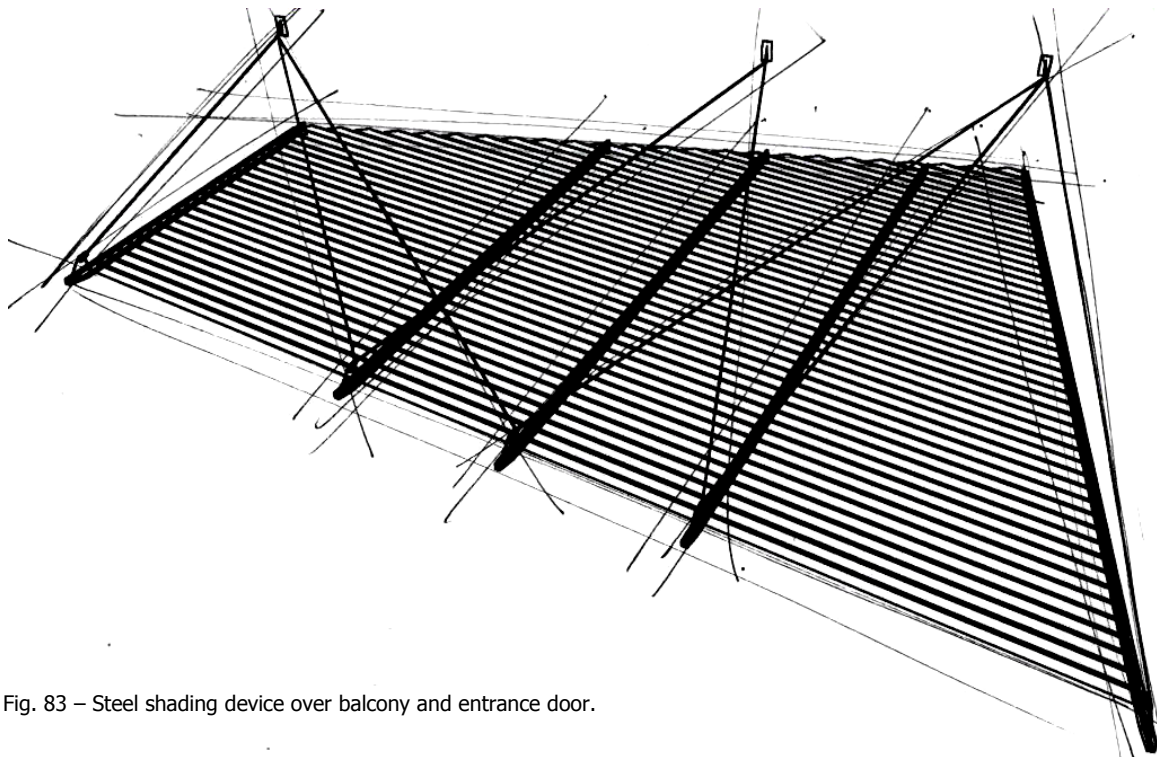


Fig. 83 – Steel shading device over balcony and entrance door.

2. VENTILATION:

The building will be ventilated through cross-ventilation and a rock bin system. Spaces are designed to allow maximum natural cross ventilation and the atrium spaces will act as stack systems to ensure that unwanted warm air during summer will escape through windows at the top.

(See basement plan – position of rock bin system)



2.1 VENTILATION SYSTEM: ROCK BIN [Mechanical engineer – Pieter Nel, 2003]

“A rock bin system” will be implemented to keep the building cool during the summer when hot daytime temperatures occur.

The rock bin is basically a bin filled with rocks. Air will be driven through the openings between the rocks. Because the ground surface has a constant temperature of 15 – 20 degrees Celsius, a suitable position for the rock bin will be underneath the building.

It can be assumed that an internal temperature of 20 degrees Celsius will be provided. A heat pump (air-conditioner) will cool the air a further 5 degrees Celsius. The rock bin will minimize the operating cost of the air-conditioning unit and a smaller plant will be required than usual. It is important to keep cool air inside the building because the cool air will tend to leave through every possible opening, (especially in the atrium spaces).

RULE OF THUMB:

- 1m³ rock bin for every 10m² of floor area

RULE OF THUMB:

- Flow distance of rock bin 2m
- Airflow 3 – 8 m/s (more than 5 becomes noisy)
- Section area (m²)
- Flow rate (m³/s)
- Formula: Flow rate = speed x area
- Ventilation rate: 2 x volume of room m³/3 600s (energy: baseline document)

Rising warm air will be removed from the internal spaces of the building by means of extractor fans on top of the roof. The extractor fans can be closed during winter and require no maintenance. They will contribute to the removal of hot air, dust and fumes trapped inside the building. The fans will operate with a thermostat, which will activate a damper to open the fans at 3 o'clock in the afternoon, when a temperature of 28 degrees Celsius will probably be reached in the upper floors of the building.

Cold air will move through the atrium where no obstruction exists and floors through louver panels (grills) in the floors. An openable louver panel will be provided for every 10m² floor area. Each panel can open separately – to suit individual needs.

The system will use convection to create air movement. Fans will assist the process and control the movement of air. Fresh air will be supplied to all the spaces and will be more than sufficient in terms of spaces with inadequate ventilation or windows. Note that no smoking will be allowed in DiD Warehouse.

The air requirement according to SABS 0400 (see baseline document) are:

- Educational buildings
 - libraries: 6,5 litre/s
- Food and eating facilities (public)
 - cafeterias: 5 litre/s
 - kitchens: 17,5 litre/s
- Shops
 - malls, arcades, warehouses: 7,5 litre/s
 - sale floors, showrooms: 7,5 litre/s
- Resorts and similar facilities
 - conference rooms: 5,0 litre/s
 - assembly rooms: 5,0 litre/s

The minimum air that needs to be supplied is 5 litre/s (500 litre/s = 0,5 m³/s).

$$5 \times 650 \text{ persons} = 3\,250 \text{ litre/s fresh air requirement} \\ = 3,25 \text{ m}^3/\text{s}$$

Thus, the corresponding minimum fresh air supply is 4,72 litre/s/person.

Calculations:

$$V = V \times A \times 0,7$$

V = flow rate

V = volume of flow rate

A = ventilation duct area

70% factor for max. speed x area

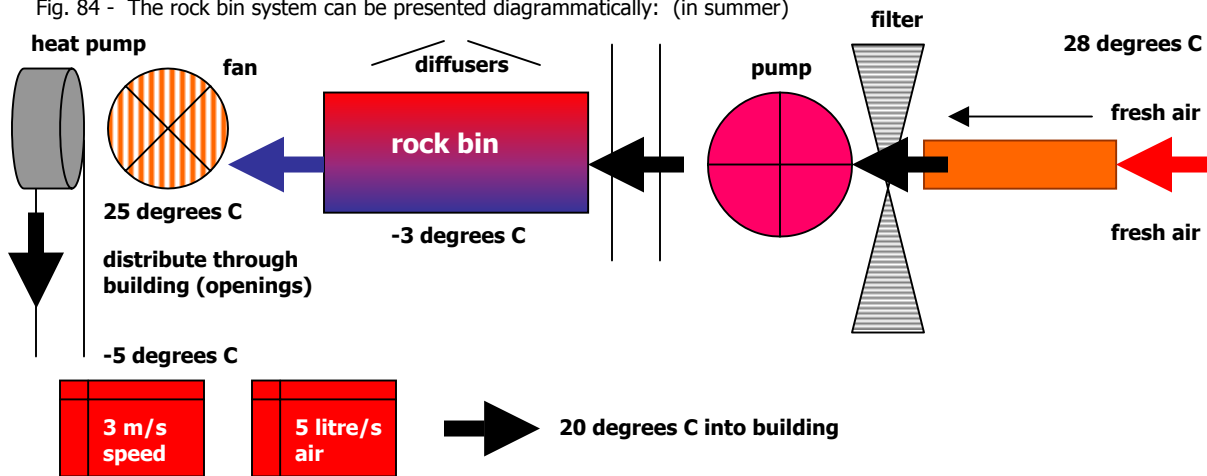
Sales floors, showrooms: (7,5 litre/s air requirement: SABS 0400)

$$7,5 \times 200 \text{ persons} = 1\,500 \text{ litre/s} \\ = 1,5 \text{ m}^3/\text{s}$$

Area of duct > 1,5m³/s
 Size of ventilation ducts = 1 000 x 1 400 (area = l x b)
 Size of rock bins:
 1 m³ rock bin for every 10 m² floor area
 Flow distance: 2 000 (acc. to mechanical engineer Pieter Nel)
 Provide 5 litre/s fresh air and speed of 3 m/s

Internal floor area = 1 963,7m²
 = 196 m³ rock bin to be provided
 = l x b x h
 = 40 x 2 x 2,5
 = 200 m³
 (2 805 = height of basement)

Fig. 84 - The rock bin system can be presented diagrammatically: (in summer)



Air will not go through the system during the winter. The diffusers will be closed and air will only go through the heat pump and then be distributed through the building. The warm air must be kept inside the building and when necessary, be removed by the extractor fans.

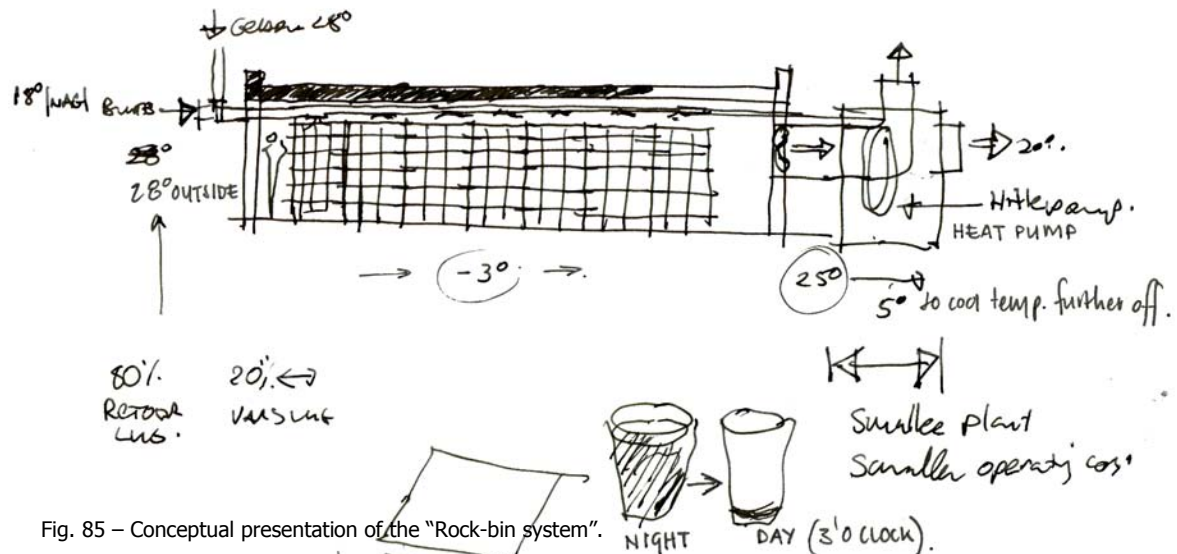
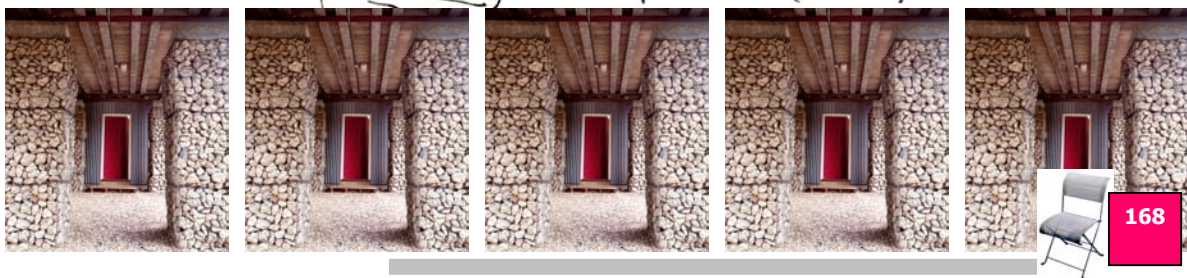


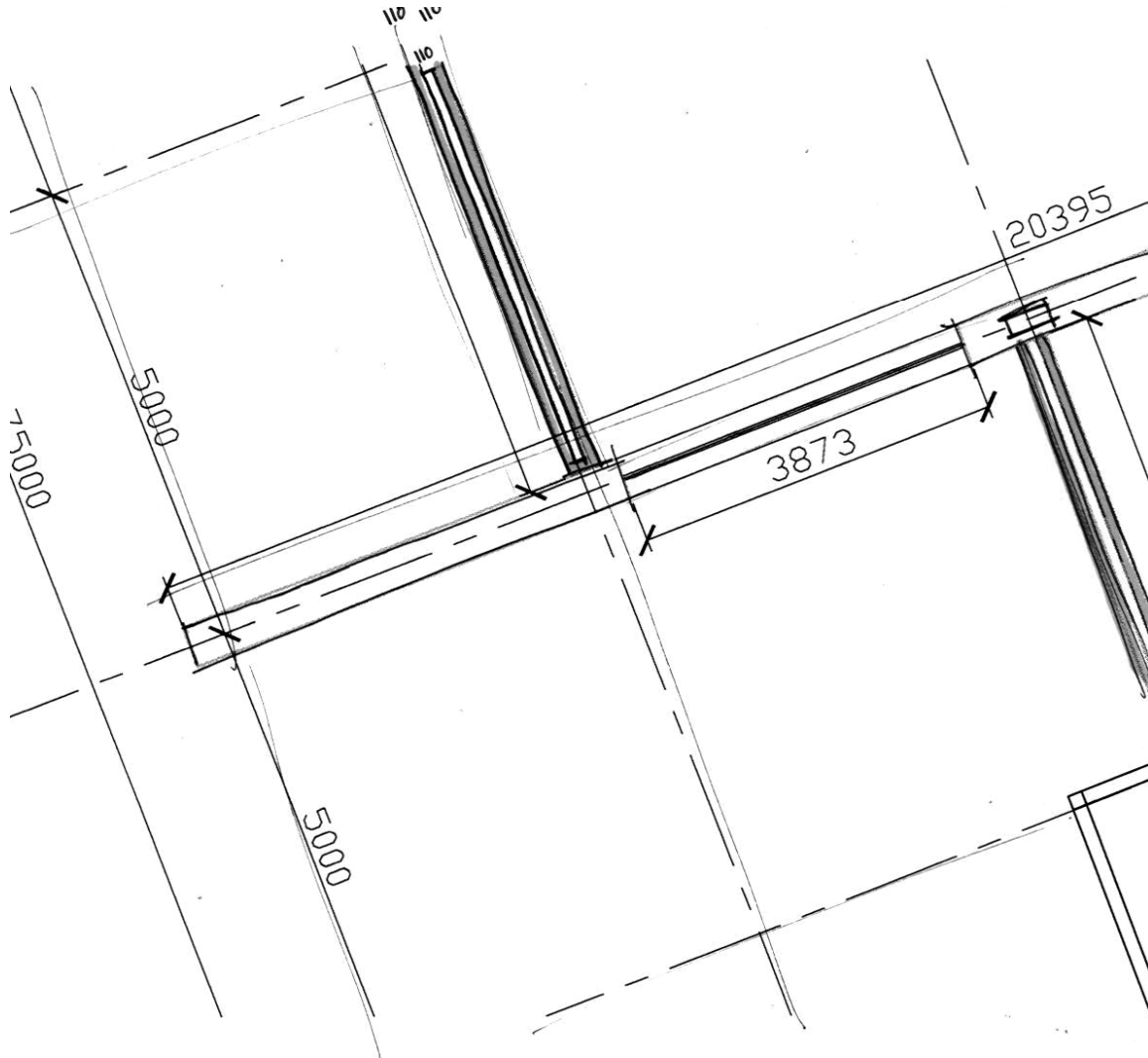
Fig. 85 - Conceptual presentation of the "Rock-bin system".



3. NOISE:

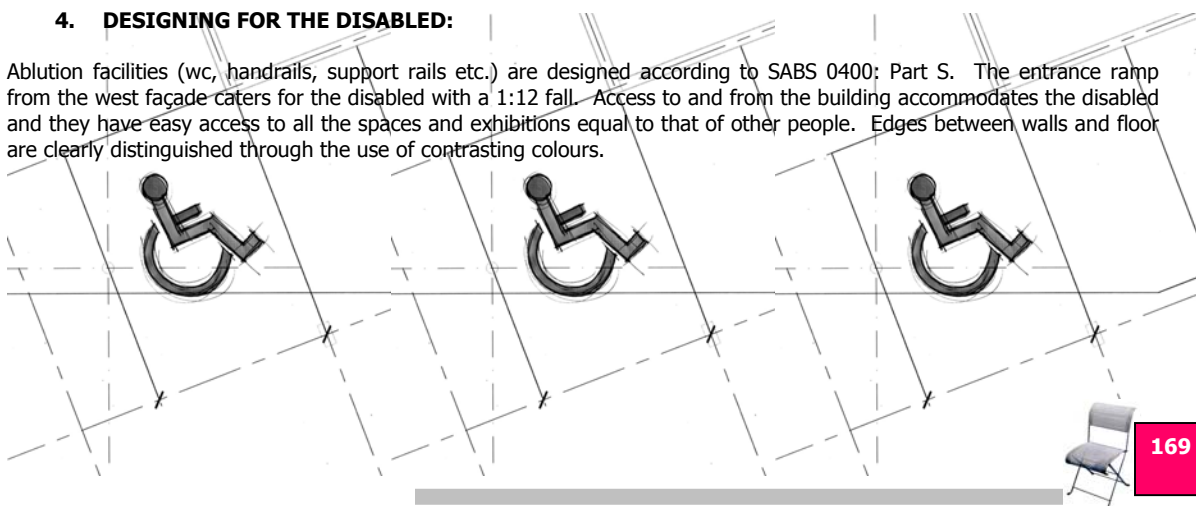
Traffic noise on the west side of the building is limited through a minimum amount of glass on the façade. Windows, doors and walls are fitted with glass wool, mineral wool and underfelt to ensure maximum insulation. Walls are constructed with a cavity (330mm walls with a 110mm cavity), to maximize the results (55dB).

(See baseline document for detailed calculations on the noise levels that will occur in DiD Warehouse).



4. DESIGNING FOR THE DISABLED:

Ablution facilities (wc, handrails, support rails etc.) are designed according to SABS 0400: Part S. The entrance ramp from the west façade caters for the disabled with a 1:12 fall. Access to and from the building accommodates the disabled and they have easy access to all the spaces and exhibitions equal to that of other people. Edges between walls and floor are clearly distinguished through the use of contrasting colours.

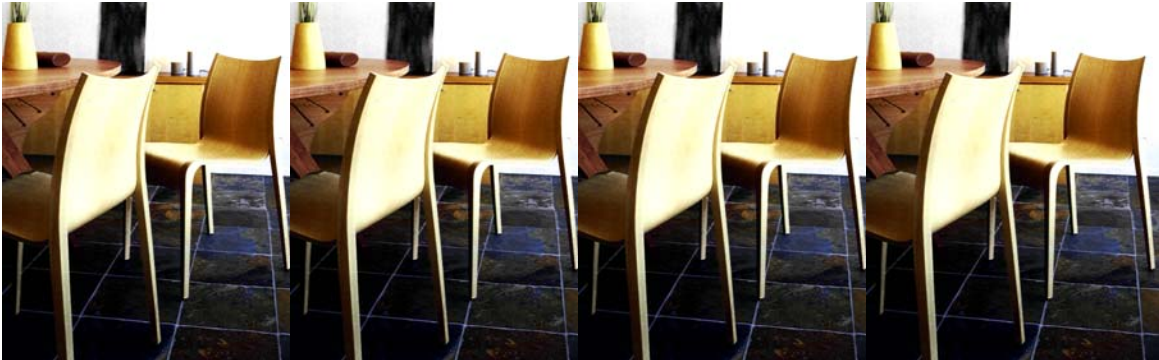


5. SOCIAL SPACES:

Social spaces such as

- gathering/relaxing/waiting area
- cafeteria
- outside sitting spaces
- lunch/juice bars
- informal reading room

are provided to ensure informal/formal social interaction for DiD Warehouse, as well as for the greater Linbro Business Park. Because of the lack of social facilities in the area, DiD Warehouse will provide a cafeteria and juice bar for breakfast and lunch hours in Linbro Business Park.



SOCIAL SOCIAL SOCIAL SOCIAL SOCIAL SOCIAL

6. SECURITY:

DiD Warehouse will comply with all the targets that have been set in the baseline document, by providing the highest possible level of security. (See baseline document – education, health and safety, section 1.4.2).

7. FIRE REGULATIONS:

The regulations of SABS 0400: Part T, are applicable to DiD Warehouse and escape routes, outside spaces, smoking areas, staircases, ramps etc., are designed according to those regulations. (Refer to baseline document).

8. OCCUPANCY:

DiD Warehouse will be occupied 64 hours per week. (See baseline document for detailed calculations). Usable space is calculated for the ground floor level as follows:

- Shops – 313,3m²
- Showrooms – 1 559,6m²
- Cafeteria – 137m²
- Sitting/relaxing/waiting area – 1 170m²
- Administration office – 58,3m²
- Security – 40,8m²
- Exhibition space – 627,8 m²

Total ground floor useable space – 3 906,8m²

Total area (including lifts, toilets, corridors, stores, etc.) – 4 395,3m²

Thus, the total useable space on ground floor level – 89%



9. VERTICAL DIMENSION:

To ensure maximum flexibility for DiD Warehouse, high floor to ceiling heights and access floors will be able to accommodate changes in the short term (daily) and long term (for the full lifetime of the building).

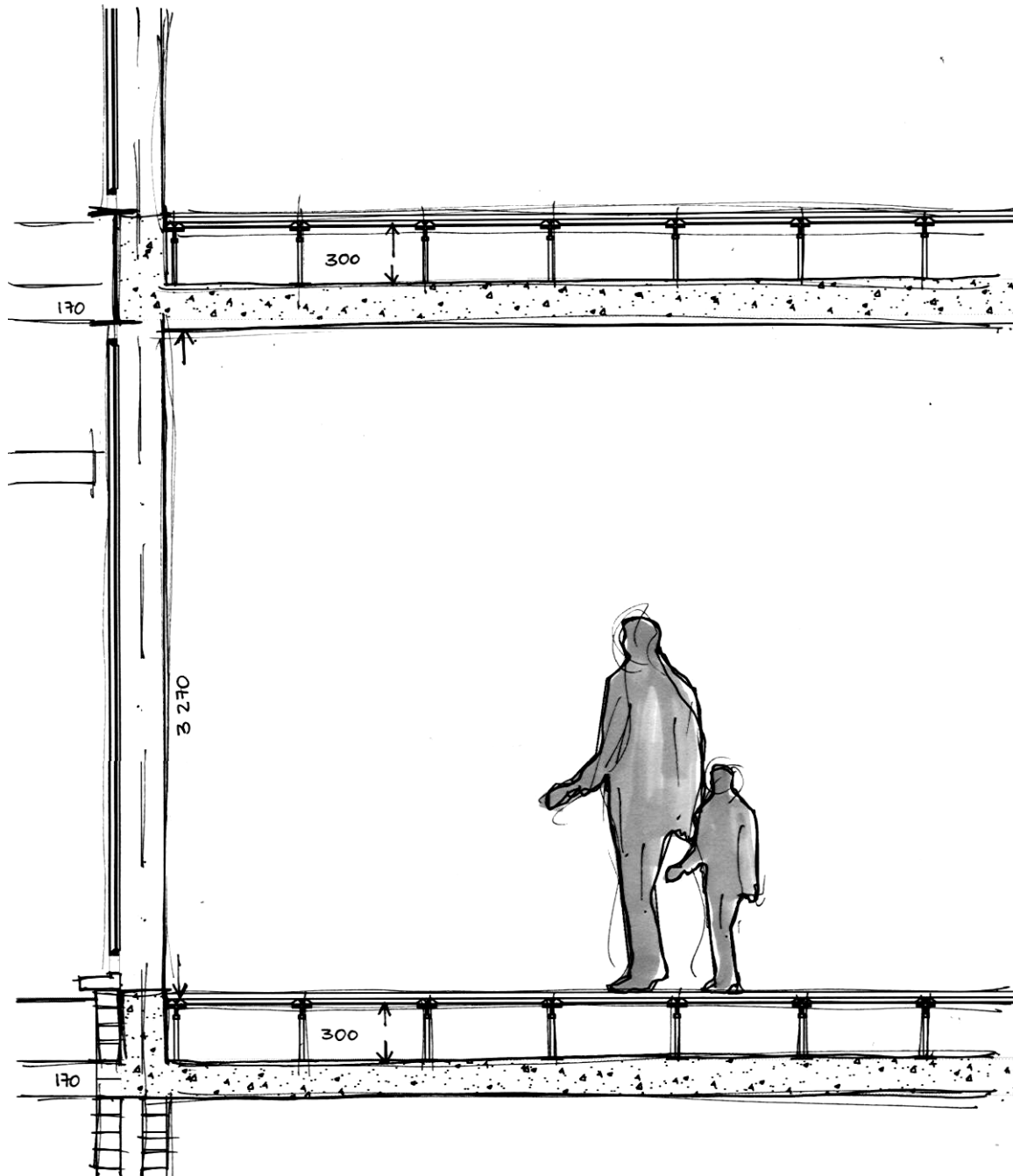


Fig. 86 – A concept section through DiD Warehouse to show floor to ceiling heights and access floors.

10. INTERNAL PARTITIONS:

See construction drawings (plans, section A-A, drywall details). Refer to baseline document for information on internal partitions used in DiD Warehouse. The "glass box" (containing the shops on the northern side) will mainly consist of glass partitions and drywalls. This will maximize flexibility in terms of future changes. Exhibitions will also be designed and constructed out of non-load-bearing drywall partitions.

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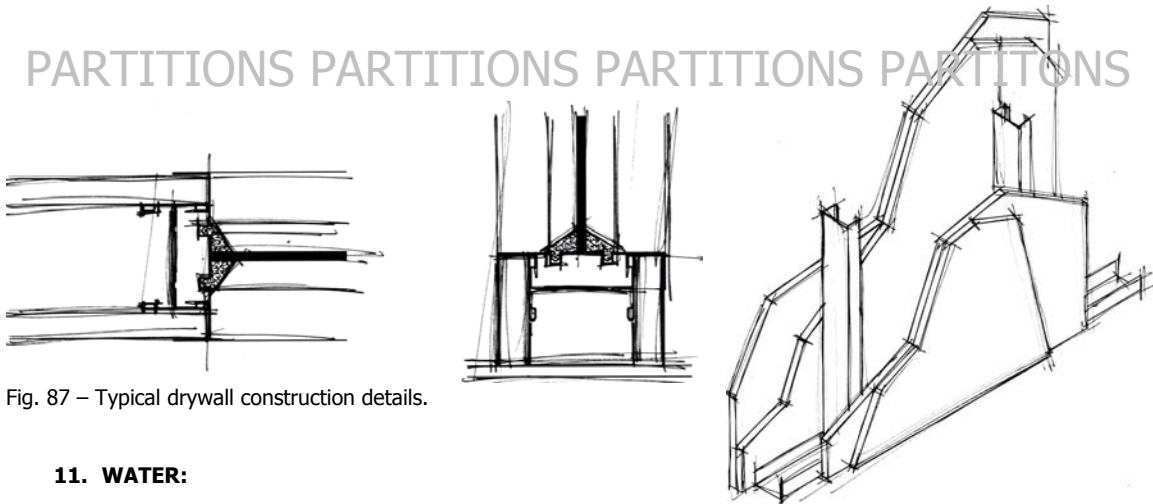


Fig. 87 – Typical drywall construction details.

11. WATER:

Rainwater will be harvested, stored and used for toilet flushing and irrigation purposes. According to the calculations made in the baseline document, a third of the required amount of water will be supplied by collection tanks.

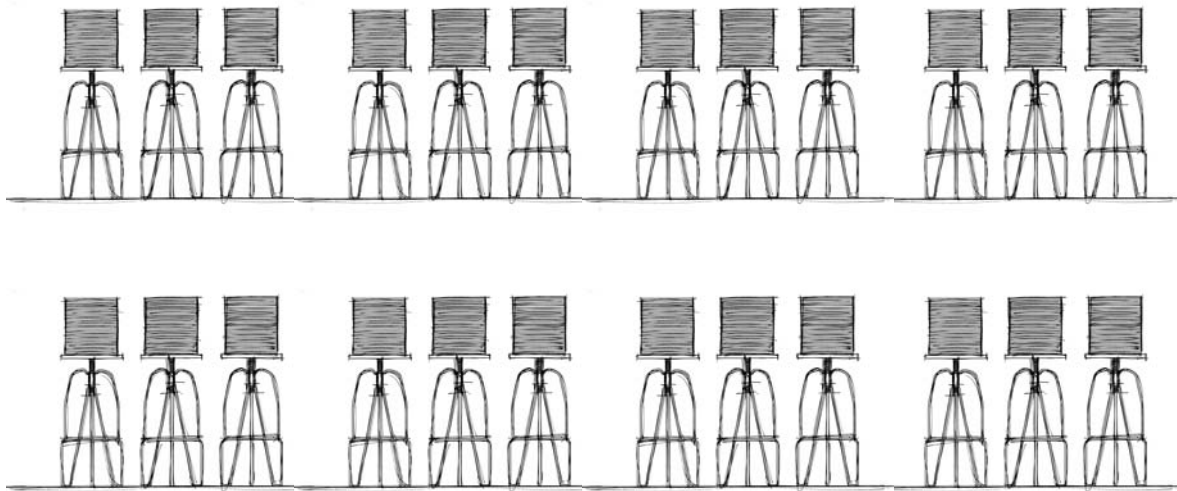


Fig. 88 – Model six stools – designed by Jeff Covey. Spun aluminum of formed maple plywood seat, cast aluminium hub, rolled steel base. The Covey stool collection of San Francisco became the concept for the water tank "chair-design".

12. SITE – PARKING REQUIREMENTS:

Type of building	Parking provision	Loading/unloading provision
Shops	Staff: one car space for each 100m ² gross floor area. Customers: one space for each 25m ² gross floor area.	General minima as follows: Gross floor space not exceeding: 500m ² (minim. space req. 50m ²) 1000m ² (minim. space req. 100m ²) 2000m ² (minim. space req. 150m ²)
Offices	Staff: one space for each 25m ² of gross floor area, or one space for each managerial and executive staff, plus one space per four others. Visitors: 10% of staff parking provision.	General minima: Gross floor space not exceeding: 100m ² (minim. space req. 50m ²) 500m ² (minim. space req. 100m ²) 1000m ² (minim. space req. 150m ²)
Storage buildings (warehouses)	Staff: one space per each 200m ² gross floor space.	General minima: Gross floor space not exceeding: 100m ² (minim. space req. 70m ²) 250m ² (minim. space req. 140m ²) 500m ² (minim. space req. 170m ²) 1000m ² (minim. space req. 200m ²)
Restaurants and cafés	Staff: one space per three members employed at peak period. Diners: one space for each two seats in dining area.	General minima as follows: Dining floor space not exceeding: 100m ² (minim. space req. 50m ²) 250 m ² (minim. space req. 75m ²) 500m ² (minim. space req. 100m ²)
Museums and public art galleries	Staff: one space per two members on duty. Visitors: one space per 30m ² of public display space.	Minimum 50m ² .

Fig. 89 - Parking and loading/unloading requirements.

PARKING REQUIREMENT FOR DID WAREHOUSE:

- **Shops**
 - Ground floor – 352,6m²
 - Total: 352,6m² (3 for staff + 14 for customers)
- **Offices**
 - Ground floor – 33m²
 - First floor – 65,5m²
 - Second floor – 375m²
 - Total: 473,5m² (provision for customers in the other spaces – 19 for staff)
- **Storage**
 - Ground floor – 72,5m²
 - First floor 65,5m²
 - Second floor 65,5m²
 - Total: 203,5m² (1 per each 200m² – 1 parking)
- **Restaurants/coffee shops**
 - Ground floor – 145,3m²
 - First floor – 135m²
 - Second floor – 104,3m²
 - Total: 384,6m² (20 – they have been taken into account in other spaces)
- **Showrooms/galleries**
 - Ground floor – 1114,7m²
 - First floor – 883,2m²
 - Second floor – 318,2m²
 - Total: 2316,1m² (1 for each 30m² – 70 parkings)
- **Skills learning/lectures/workshops**
 - First floor – 98,5m²
 - Total: 98,5m² (as offices, 1 for each 25m² – 4 parkings)
- **Conference room**
 - Second floor – 122,5m²
 - Total: 122,5m² (as offices, 1 for each 25m² – 5 parkings)

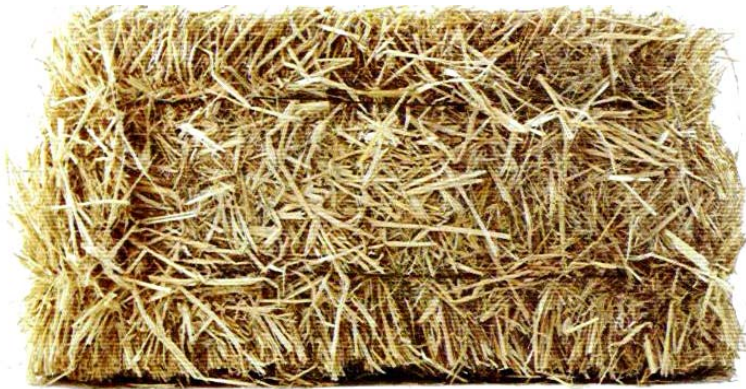
TOTAL:
122 parking bays must be provided on site (49 – basement / 73 – site).


13. RECYCLING AND REUSE:



Organic and glass recycled bins is provided on the neighbour site next to DiD warehouse. Other buildings will use the same bins and a collector will collect the waste once a week. Adequate space are essential and use of the bins will be clearly specified.

ORGANIC AND GLASS RECYCLED BINS ON SITE
ORGANIC AND GLASS RECYCLED BINS ON SITE
ORGANIC AND GLASS RECYCLED BINS ON SITE



14. MATERIALS:

Materials with low embodied energy will be used.

- steel balustrade
- brick walls
- concrete slabs
- steel and concrete columns
- plasterwork (Coprox – clay coloured pigmented plaster)
- tiles – natural clay tiles
- natural stone wall (entrance walls)
- enamel double coated steel louvers
- sheet metal roofing

(See construction drawings for detail information on materials).

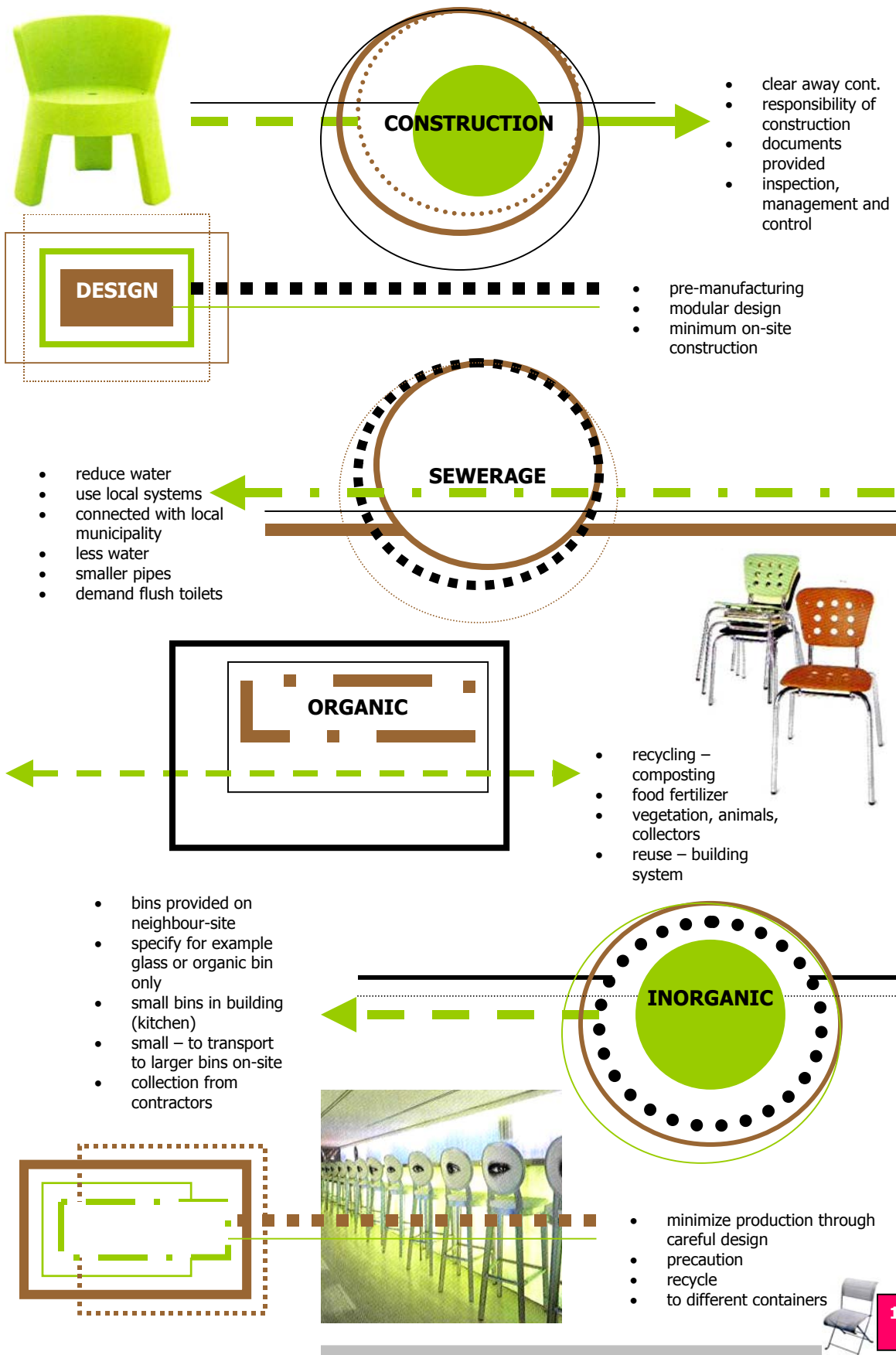


PURPOSE	MATERIAL	COMMENT
External sewers	Vitrified clay	Considerably cleaner than that of synthetic pipes
Hard paving	Recycled concrete slabs	Consist, in part, of secondary raw materials
Ground floors	Hollow ceramic elements	Demands less material and use less energy than a solid concrete floor
Ground floor insulation	Mineral wool, EPS	Production process requires less energy
Balconies	Sustainable durable wood elements	Class II does not need to be treated when used externally (renewable) Production of aluminum is harmful to the environment (high energy)
Flat roof construction	Softwood rafters and roof coverings	Do not contain environmentally harmful adhesives, in contrast to plywood
Internal window frames	Sustainable wood	Production of steel frame is more environmentally damaging than a softwood frame (>quantity material)
Internal doors	Honeycomb with hardboard skins	Plywood pollutes more than softwood (the amount of material <)
Internal stairs	Softwood	Direct reuse Steel has a high energy content
External stairs	Sustainable durable wood	Material is renewable Recycling no problem
External balustrades	Sustainable durable wood	Steel needs to be treated (corrosion)
Installing glazing	Dry glazing	Dry glazing with a rubber sealant – great durability
External wall rendering	Ceramic tiles	Considerably longer life-span than a layer of render
Plasterwork	Flue-gas gypsum	From electricity power plants – preferable to natural gypsum – less energy is required to manufacture
Exterior paintwork (wood)	Natural paint, boiled paint	Natural paint and high-solid alkyd paint – interior on wood and high solids alkyd paint for outside
Internal waste	Ceramic	Production process is considerably cleaner than synthetic pipes
Water supply	PE, PP	PP – suitable for hot and cold water pipes and PE – only cold water pipes
Taps and shower heads	Water saving	Flow-limiters – reduction in use of tap water and energy consumption without a loss of comfort

Table 90 – Sustainable building materials



Fig. 91 - WASTE RECYCLING AND REUSE – DID WAREHOUSE (useful input to another):





[Du Preez, 2003:30]

TRIPLE BOTTOMLINE REPORT - PERFORMANCE PRIORITISATION





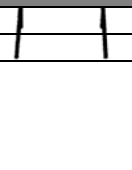


	Criteria	No requirement 1	Low requirement 2	Medium requirement 3	High requirement 4	Essential 5
SO	Social					
SO1	Occupant comfort					
SO2	Inclusive environments					
SO3	Participation and control					
SO4	Education, health and safety					
SO5	Labour practices & decent work					
SO6	Human rights					
SO7	Society					
SO8	Long-term responsibility					
SO9	Corporate citizenship					
	ECONOMIC					
EC1	Local economy					
EC2	Efficiency of use					
EC3	Adaptability & flexibility					
EC4	Ongoing costs					
EC5	Capital costs					
	ENVIRONMENTAL					
EN1	Water					
EN2	Energy					
EN3	Recycling & reuse					
EN4	Materials & components					

Fig. 92 – Building sustainability – DiD Warehouse.




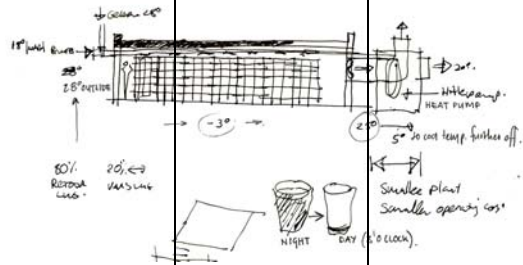





	CRITERIA	TARGET SET	BUILDING PERFORMANCE	REFERENCED	ACHIEVED Y/N?	SCALE 1 - 5
S01	Occupant comfort					
S01.1	Lighting/solar quality	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5 (excellent)
S01.2	Ventilation	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
S01.3	Noise	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
S01.4	Views/access to green outside	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
S01.5	Thermal comfort	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
S02	Inclusive environments					
S02.1	The disabled	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
S03	Participation and control					
S03.1	Environmental control	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4 (good)
S03.2	Social spaces, amenity, community involvement	(Target setting)	(Techn. report)		Yes	4
	Education, health and safety					
S04.1	Education	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
S04.2	Safety and security	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
S04.3	Health	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
S04.4	Smoking and fire control	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
S05	Labour practices and decent work					
S05.1	Employment					
S05.2	Labour/management relations					
S05.3	Diversity and opportunity					
S06	Human rights					
S06.1	Strategy and management					
S06.2	Non-discrimination					
S06.3	Freedom of Association and Collective Bargaining	(Will be able to	scale achievement after completion of	DiD warehouse)		
S06.4	Child labour					
S06.5	Forced and compulsory labour					
S07	Society					
S07.1	Community					
S07.2	Bribery and corruption					
S07.3	Political contributions					
S08	Long-term responsibility					
S08.1	User health and safety					
S08.2	Services					
S08.3	Advertising					
S08.4	Respect for privacy					

Fig. 93 – Assessment table for DiD Warehouse in terms of Sustainability



	CRITERIA	TARGET SET	BUILDING PERFORMANCE	REFERENCED	ACHIEVED Y/N?	SCALE 1 - 5
SO9	Corporate citizenship					
SO9.1	Corporate values					
SO9.2	Corporate governance					
SO9.3	Stakeholders					
SO9.4	Investing for the long-term					
SO9.5	Accountability and responsibility					
SO9.6	Transparency					
SO9.7	Tackling corruption					
SO9.8	Employee relations					
SO9.9	Engaging with local communities					
SO9.10	Building capacity					
SO9.11	Engaging in dialogue with government					
EC1	Local economy					
EC2	Efficiency of use					
EC2.1	Useable space	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5 (excellent)
EC2.2	Occupancy	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EC2.3	Space use	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EC2.4	Use of technology	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
						
EC2.5	Space management	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EC3	Adaptability and flexibility					
EC3.1	Vertical dimension	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EC3.2	Internal partitions	(Target setting)		(Baseline doc.)	Yes	5
						
EC3.3	Services	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
	Ongoing costs					
EC4.1	Maintenance	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EC4.2	Cleaning	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EC4.3	Security/care taking	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EC4.4	Insurance/water/energy/sewerage	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EC4.5	Disruption and downtime	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EC5	Capital costs					

	CRITERIA	TARGET SET	BUILDING PERFORMANCE	REFERENCED	ACHIEVED Y/N?	SCALE 1 - 5
EN1	Water					
EN1.1	Rainwater	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EN1.2	Water use	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EN1.3	Planting	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	5
EN2	Energy					
EN2.1	Location	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN2.2	Appliances and fittings	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN2.3	Ventilation system				Yes	4
EN2.4	Heating and cooling system	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN3	Recycling and reuse					
EN3.1	Toxic waste	(Target setting)	(Techn. report)	(Baseline doc.)	No	0
EN3.2	Inorganic waste	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN3.3	Organic waste	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
						
EN3.4	Sewerage	(Target setting)	(Techn. report)	(Baseline doc.)	No	0
EN3.5	Construction waste	(Target setting)	(Techn. report)	(Baseline doc.)	No	0
EN4	Materials and components					
EN4.1	Embodied energy	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN4.2	Material/component sources	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN4.3	Manufacturing processes	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
EN4.4	Recycled/reused materials and components	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4
						
EN4.5	Construction processes	(Target setting)	(Techn. report)	(Baseline doc.)	Yes	4



TARGET & ASSESSMENT TOOL TARGET & ASSESSM

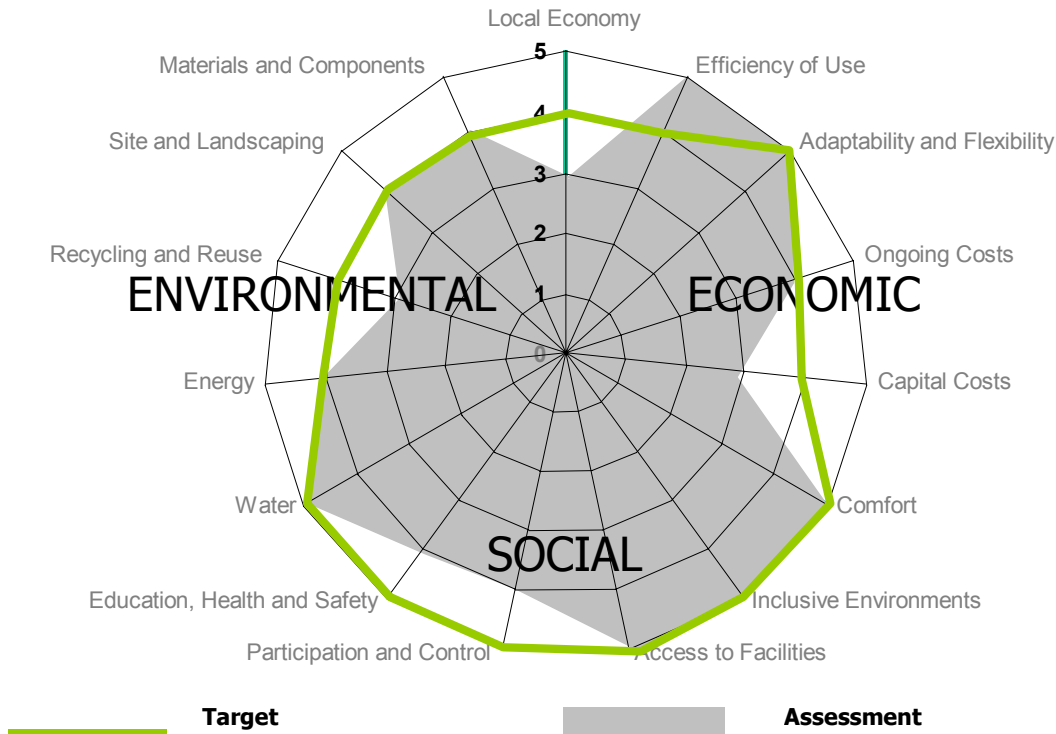


Fig. 94 – Target and assessment tool for DiD Warehouse.

TARGET & ASSESSMENT TOOL TARGET & ASSESSM

