

## 04 | FRAMEWORK

The project is established within a legislative framework which enables the research proposal to develop in alignment with the objectives of the National Disaster Management Policy.

This chapter provides a brief overview of the broader framework of which disaster response and recovery form a part. The study aims to provide an understanding of the Tshwane Disaster Management Plan, as well as of how disasters are mitigated, who is involved, and what national guidelines are proposed.

It outlines the phases of recovery and several proposed displacement options.

By analysing international shelter standards, local building regulations, and current commercial cardboard shelters, a comparative study was undertaken to establish a possible South African derivative.

This study would ultimately establish criteria against which the proposal can be measured.

### 4.1 LEGISLATION

In South Africa the procedures involved in Disaster Management are governed by the Disaster Management Act No.52 of 2002. The Act stipulates that every municipality is responsible for drafting its own Disaster Management Plan in accordance with the National Policy Framework for Disaster Risk Management of 2005.

#### 4.1.1 POLICY FRAMEWORK FOR DISASTER RISK MANAGEMENT

Disaster Risk Management<sup>1</sup> is defined as:

...integrated multisectoral and multidisciplinary administrative, organisational and planning processes and capacities aimed at lessening the impacts of natural hazards and related environmental, technological and biological disasters.<sup>2</sup>

The primary objectives outlined by the policy framework are to develop and implement the following: an integrated institutional capacity for disaster risk management; disaster risk assessment; disaster risk reduction; response and recovery; information management and communication; and education, training, public awareness and research [Table 02].

Coherent development is essential. These objectives are therefore evaluated and structured on three levels: municipal, provincial and national.

In cases where the scale of the disaster exceeds the capacity of an existing contingency plan, other actors may become involved to mitigate the situation [Table 01].

During reconstruction and rehabilitation the organ of state tasked with the primary responsibility for a known hazard must facilitate the establishment of project teams for this purpose. For example, the Department of Housing is responsible for shelter and approved collective centres, and the Department of Water Affairs and Forestry would take responsibility for road and infrastructure repairs in the case of flooding.

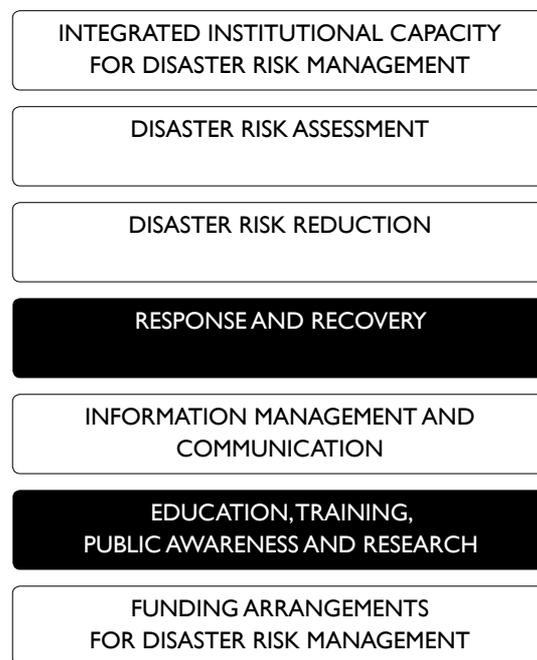
<sup>1</sup> Term used interchangeably with 'disaster management' as stipulated in the Disaster Management Act, but preferred because it is more consistent with the use of the term internationally.

<sup>2</sup> Disaster Management Act (No. 52 of 2002)

Table 04 Roles and responsibilities according to the Tshwane Disaster Management Plan

<p>The procedures involved in disaster management is governed by the Disaster Management Act No. 52 of 2002 and stipulates the various parties are involved as follow.</p> <p>Hierarchy according to disaster scale and classification:</p> <p>Local Municipality [as part of Integrated Development Plan]</p> <p>District</p> <p>Provincial</p> <p>National</p> <p>Non Government Organisations [NGO's]</p>	<p><b>Actors involved during various stages:</b></p> <p><b>Tshwane Municipality</b> [Department of Protection Services]</p> <p><b>District Municipality</b></p> <p><b>Provincial Government</b></p> <p><b>National Government</b></p> <p><b>South African National Defense Force [SANDF]</b></p> <p><b>Red Cross Society [SARCS]</b></p> <p><b>St Johns</b></p> <p><b>Greater Good Foundations</b></p> <p><b>United Nations High Commission for Refugees [UNHCR]</b></p>
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Table 05 Key Performance Areas as indicated by National Policy Framework for Disaster Risk Management of 2005



#### 4.1.2 KEY PERFORMANCE AREAS

Outlined in the framework policy are the key areas where development is encouraged. The aims and objectives of the thesis align with the objectives of the response and recovery component of the policy:

- **Relief Measures:**<sup>3</sup>  
[Key Performance Area 4, Section 4.4]  
The regulation of relief measures initiating the development of regulations to standardise the practice of relief operations in keeping with international standards.
- **Education, Training, Public Awareness And Research:**<sup>4</sup>  
[Key Performance Area 6, Section 6.5 and 6.6]  
Encourages research into the process of auditing existing research initiatives, in order to gain an understanding of DRM processes, and to provide insight into effective disaster risk reduction strategies and measures.

<sup>3</sup> Department of Provincial and Local Government (2007:128)  
<sup>4</sup> Department of Provincial and Local Government (2005:175)

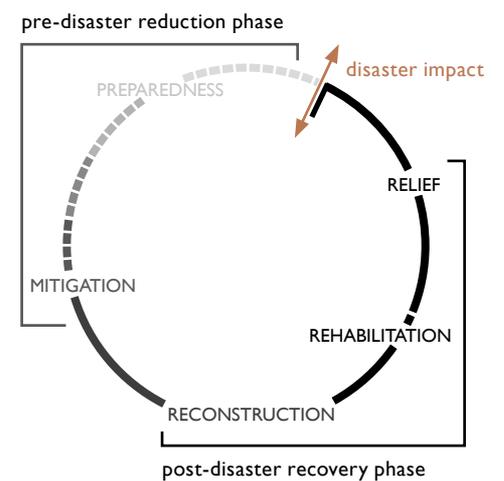


Figure 08 Disaster continuum • Kesten (2004:18) [redrawn by author]

#### 4.1.3 DISASTER MANAGEMENT PLAN

The Metropolitan Municipality of Tshwane is responsible for drafting a Disaster Management Plan as part of the city's Integrated Development Plan [IDP]. Such a plan is administered by the Department of Disaster Risk Management [DDRM] which falls under the Department of Protection Services.

Figure 06 illustrates disaster management as a continuum consisting of pre-disaster reduction [preparedness] and post disaster recovery strategies.

The primary objectives of the plan is:<sup>5</sup>

- Preventing and reducing risk and vulnerability;
- Mitigating disaster severity;
- Ensuring preparedness;
- Promoting rapid and effective responses;
- Ensuring the provision of relief;
- Implementing rehabilitation and reconstruction measures consistently ensuring a developmental focus.

<sup>5</sup> City of Tshwane Metropolitan Municipality (2005:588)

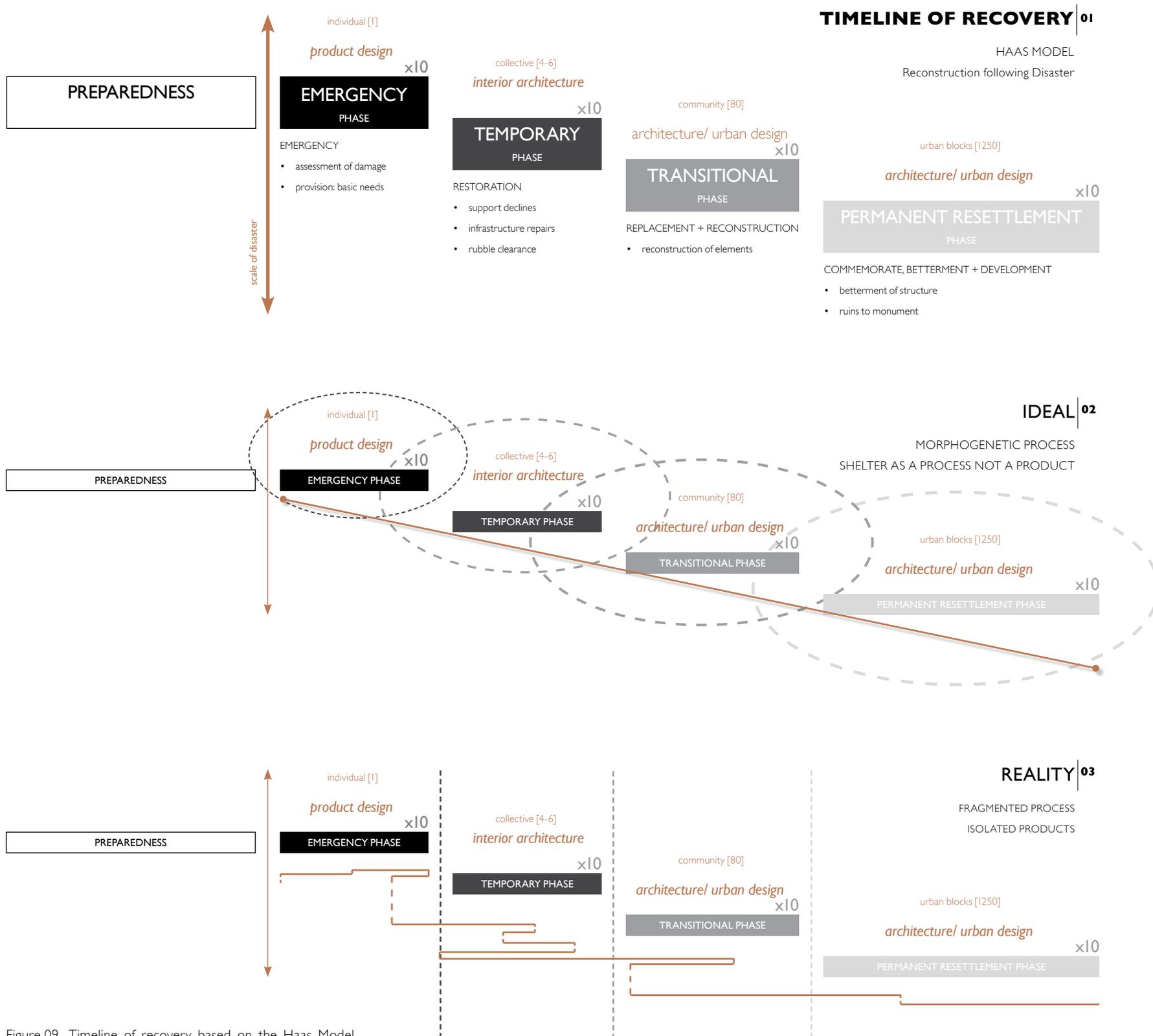


Figure 09 Timeline of recovery based on the Haas Model  
• Sadler (2004:20) [adapted and redrawn by author]

## 4.2 TIME LINE OF RECOVERY

### 4.2.1 TERMINOLOGY

Clarification of relevant terminology for the purposes of the discussion:

#### ► Preparedness:<sup>6</sup>

“Means to ensure in times of disaster appropriate systems, procedures and resources are in place to assist those affected by the disaster and enable them to help themselves.”

(UNDP: Overview of Disaster Management: 1992)

#### ► Response:<sup>7</sup>

“...in relation to disaster, means measures taken during or immediately after a disaster in order to bring relief to people and communities affected by the disaster”

#### ► Recovery:

“Refers to those actions after a disaster, which attempts to bring order to the disaster site and aids in bringing the situation back to normality.”

(UNDP: Overview of Disaster Management: 1992)

#### ► Reconstruction:

“Are the actions taken to re-establish a community after a period of rehabilitation subsequent to a disaster.”

(UNDP: Overview of Disaster Management: 1992)

#### ► Mitigation:<sup>8</sup>

“...means measures aimed at reducing the impact or effects of a disaster”

### 4.2.2 RECOVERY PHASES

Response and recovery operations comprise various phases. Based on the Haas<sup>9</sup> Model, they are identified as follows:

- a.) EMERGENCY RELIEF PHASE
- b.) TEMPORARY PHASE
- c.) TRANSITIONAL PHASE
- d.) PERMANENT PHASE

The scale and magnitude of the disaster would determine the need and duration of any or all of the above mentioned phases. However it is suggested postulated that each phase lasts roughly 10 times as long as the preceding phase.

Figure 07 illustrates the ideal situation where each of the various phases become integrated into a morphogenetic process with re-usable elements that can adapt to benefit the phases that follows.

Davis<sup>10</sup> stresses that it is vital not to design in isolation; “It is important to emphasize at the outset that shelter must be considered as **a process, not as an object.**”

In reality the recovery process consists of a fragmented and isolated series of products and interventions.

**The hypothesis encourages designers to stop viewing shelter as only a temporary solution, but to rather see it as a starter kit with the potential of becoming a home.**

The emphasis of the project falls on filling the gap between short-term relief provided in an emergency phase and the time frame left over until [or whilst] reconstruction is taking place.

The thesis therefore investigates an appropriate response for the temporary phase (period of grace)..

The temporary phase represents the crossover between the emergency relief phase (which can last anything from a couple of hours to a few days) and the transitional phase.

Because temporary solutions are designed before knowing the scale of the damages it needs to mitigate, it is required to have the greatest amount of flexibility. The shelter has to be used within the emergency phase if for any reason relief efforts would require. It should be able to sustain the relocation option, if required, for an acceptable amount of time within the function of providing a period of grace.

4.2.3 The proposed solution should be able to be used in various situations to mitigate a variety of damages. It should be flexible enough to be used independently with the potential to morph into a new dwelling when more resources become available.

### 4.2.4 HOUSING DAMAGE

Figure 10 shows the five categories of damage<sup>11</sup> to housing and the respective modes of action.

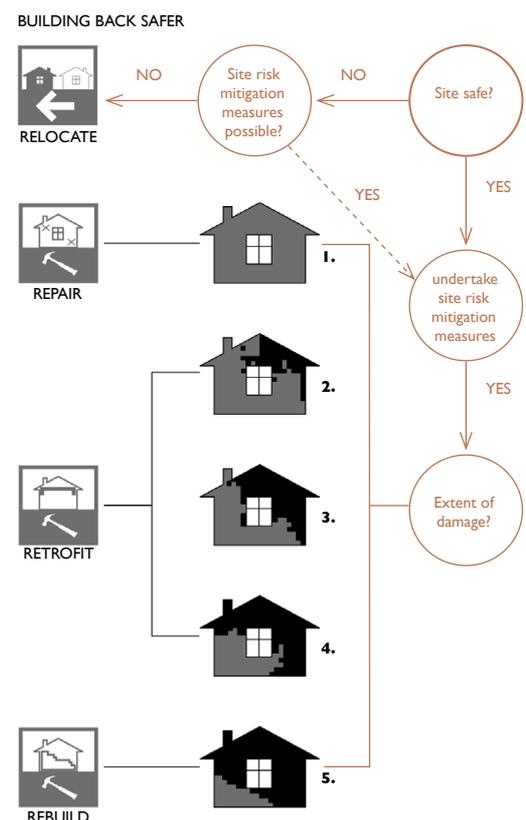


Figure 10 Categories of housing damage • United Nations (2008:142) [redrawn by author]

6 Kesten (2004:xi-xii)  
7 Disaster Management Act (2002:10)  
8 Disaster Management Act (2002:8)

9 Sadler (2004:20)  
10 Davis (1978:33)

11 United Nations (2008:142) [field edition]

### 4.3 STAGES OF DISPLACEMENT

Displacement due to disaster should be avoided whenever possible. It prolongs the emergency and temporary phases, hindering reconstruction initiatives and self-sufficiency.

In cases where displacement becomes unavoidable, the United Nations<sup>12</sup> transitional settlement and reconstruction principles suggest six main displacement options. These alternatives are briefly discussed, ranging from micro-displacement options to the last resort.

Examples of the types of disaster victims as well as recent refugee related displacements are included to illustrate the application of such options in the local context.

#### 4.3.1 HOST FAMILIES:

+ Integration with the surrounding community remains the best option for sudden settlement needs in the case of micro-displacement. Displaced persons filter into the existing infrastructure and services, and they benefit from having a local support network and being able to remain close to family and friends.

- The weakness of this option is that it becomes difficult for government and aid organisations to reach a dispersed community in need, which may still be far from the necessary medical services and other aid. Given that some areas have already fragile public services, the durability of such a solution becomes dependent on how long the extra load can be sustained by the surrounding community.

#### 4.3.2 COLLECTIVE CENTRES:

+ Collective centres<sup>13</sup> [such as community halls] are a good option for immediate shelter needs as they can be pre-identified and can therefore be better

equipped for such situations. The affected community is easily identified and much needed services can be homogeneously distributed.

- This option is not as durable as that of host families. In principle such centres should operate for a short time. Prolonging the duration of this type of solution increases the risk of creating dependency relationships, as the community is isolated from its social support network.

- There is also the probability of overcrowding and the unfamiliar communal setting may not be compatible with the local culture. Lack of privacy and other environmental stress factors aggravate the situation.

#### 4.3.3 RURAL SELF-SETTLEMENT

+ Rural self-settlement has similar benefits to those of host families: integration, support, and encouragement of livelihoods to develop.

- There is a big risk involved in disrupting the livelihood patterns, land-use patterns and natural resource management<sup>14</sup> processes of the surrounding area. Dispersed communities, as in the case of the host family option, are difficult to access.

- It is also of concern that once people settle in an area it becomes very difficult to relocate them to more appropriate locations. In such events evictions should be avoided or arrangements made beforehand for alternative accommodation.

#### 4.3.4 URBAN SELF-SETTLEMENT

+ It is always beneficial if displaced communities are able to remain in environments they are accustomed to. Independence is encouraged, and close proximity to services and work is a positive factor. If an urban community becomes displaced the familiar environment of urban self-settlement provides stability.

- Ownership rights may become a problem. It is also difficult to upgrade a settlement once a community becomes dispersed.

As is the case with rural self-settlement, it is very difficult to relocate people once they have settled in.

#### 4.3.5 SELF-SETTLED CAMPS

+ This option increases the potential for self-sufficiency and self-determination. Shelter is arranged according to the existing social construct, although potential hazards inherent in the construction methods and materials used can cause disaster to happen again.

- As the land in this instance is not provided and approved by the government there is the risk of harassment and exploitation by the owner. Concentrated volumes of people in extreme poverty breed competition and violent outbreaks over food, work and other limited resources can occur.

#### 4.3.6 PLANNED SHELTER CAMPS

+ Government-allocated sites for planned camps can be provided rent free. Under these circumstances it would be much easier to evaluate the needs of the affected population and distribute relief supplies accordingly.

+ Camp layouts affect successful occupation and the general wellbeing of the inhabitants. Attention should be given to circulation, permeability, clustering of family units, and localized cooking and sanitary areas at safe distances to prevent the spread of fire and disease.

- Unless diligently run, such camps should remain the last resort. Sites have to be pre-defined and prepared to absorb the excessive strain on services. If the camps are located far from transport and other services, livelihoods are difficult to maintain and dependency relationships are created that cripple self sufficiency and undermine the desire to reconstruct former dwellings.

<sup>12</sup> United Nations (2008:92-108) [field edition]

<sup>13</sup> At the time the study was conducted listings of pre-identified locations could not be made available for security purposes due to the recent xenophobic attacks. It could however be said that all community halls are reserved for this purpose but that schools are not. Public property such as churches, gymnasiums and sport stadiums reserve the right to open their doors at their discretion.

<sup>14</sup> United Nations (2008:98)

Photo by Dennis Farrell

### Central Methodist

Figure 14 Collective Centres : Farrell (2008:16of24]). The image is an example of what happens when collective centres such as community halls and churches are used for longer than its capacity allows for.



Photo by Daniel Born

### Kruger Park Flats

Figure 13 Fire at Kruger Park flats : Born (2008:[1of1]). Urban Self-settlement: It is unclear how many residents very legally occupying the building but severe negligence by the owner of the property allowed the building to deteriorate into such a state that it became unsafe to occupy.



During the July eviction of residents of the Kruger Park flats a fire was allegedly started by angry residents. The disaster took the lives of 6 people tried to escape the fire by jumping from their balconies to escape the fire. No alternative living accommodation option were made available to the former residents.

### New Europa House

Figure 12 Housing development in Hillbrow : Madulamoho Housing Association (2007:2). They offer a variety of residential units ranging from emergency accommodation [available for 72 hours], transitional accommodation [available for 18 months], communal units and bachelor units for longer term rental. This is a good example of safe and financially viable urban resettlement.



Photo by Philani

### Planned Camp

Figure 15 A temporary refugee camp created for the victims of xenophobia - Johannesburg (2009) : Philani (2009:[1of1]) Planned Camps: Klerksoord Shelter Camp went from being a planned camp much like in the image of a temporary shelter camps in Johannesburg, to a version of a self settlement.



Photo by Halden Krog

### Klerksoord Camp

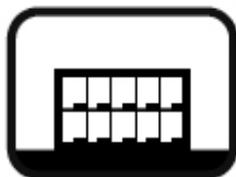
Figure 11 Woman searching for anything to salvage : Krog (2009:[16of17]) Residents were forcefully removed after they refused to be relocated after government officially closed the camp and withdrew all support.



HOST FAMILIES



COLLECTIVE CENTERS



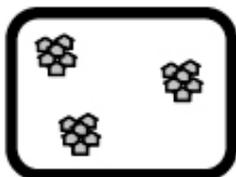
RURAL SELF-SETTLEMENT



URBAN SELF-SETTLEMENT



SELF-SETTLED CAMPS



PLANNED CAMPS

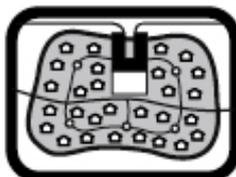


Figure 16 Six transitional reconstruction options : United Nations (2008:110)

## 4.4 COMPARATIVE STUDY

One of the objectives of the National Disaster Management Framework is to conduct research into the shortcomings not yet addressed by legislation. A comparative study was undertaken to collate [where possible] South African Building Regulations with International Shelter Standards to establish how shelter differs from building. The data was also compared to current practice [the light-weight emergency tent] and two precedent studies of cardboard shelters that are currently available commercially.

The resulting differential would assist in establishing a possible South African derivative. This will be used both to establish the program and as a reference in the following chapters, in order to explore and justify why standards were adopted or found irrelevant.

### SOUTH AFRICAN NATIONAL BUILDING REGULATIONS

#### A 23 TEMPORARY BUILDINGS

Local authorities may grant provisional approval for the erection of a temporary building subject to the fulfilment of the following sub regulations and provisions:

2. a.) statement of proposed duration
- b.) site plan
- c.) layout drawings showing general size, form, materials and use.

3. may be provisionally approved to be determined at later

4. if public has access to such building applications should have a certificate signed by a professional engineer or other approved competent person to indicate if structural system is satisfactory.

**N/A**

#### CLASS OF OCCUPANCY OR BUILDING

H3 - Domestic Residence: two or more dwelling units on a single site

H4 - Dwelling House: a single dwelling unit on its own site

**N/A**

**N/A**

**N/A**

### INTERNATIONAL SHELTER STANDARDS

The Preliminary Draft for Shelter Standards\* - January 2008, is the most current international standards proposed by the Shelter Standards Consortium for the provision of transitional family shelter. The consortium aims to provide donor governments and implementing humanitarian organizations with a set of accepted standards to facilitate and coordinate international relief efforts.

The Preliminary draft is currently open for comment by the manufacturing community.

\* Shelter Centre (2008)

#### 4.1.1 COST

#### 4.1.2 TOTAL WEIGHT + PACKAGE SIZE

Complete shelter package mass  
 Complete shelter package volume  
 Longest dimension of packed shelter

NOTES:

- The total shelter shall be in one package which contains smaller packages broken down into parcels of weights suitable for transport by two people



#### 4.1.3 STORAGE

Shelf life:  
 STORAGE: 120 x 80 cm Euro pallet: PACKED:  
 STACKED:

#### 4.1.4 MARKING

Shelters shall have space to mark:



NOTES:

- Markings to indicate if shelter is mosquito proof
- Exterior material shall make allowance to print the humanitarian organisation/donor logo on the outer fly and door of the shelter

#### 4.1.5 AVAILABILITY

NOTES:

- The shelter shall be easy to obtain from different manufacturers under competitive bidding
- The shelter shall be capable of being produced fast enough to respond suitably to a humanitarian crisis

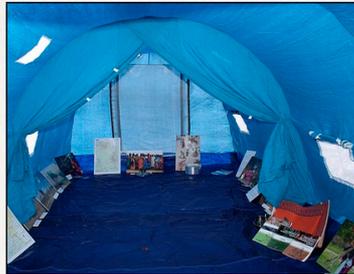


Figure 17 Light Weight Emergency tent  
: Architecture for Humanity (2006:62)



Figure 18 6sqm Meter Shelter : Global Village Shelters Lc. (n.d.)



Figure 19 Octagonal shelter : Sago Mokuzai (2009)

		<b>UN LIGHT WEIGHT Emergency Tent</b>	<b>GLOBAL VILLAGE 6sqm SHELTER</b>	<b>OCTAGONAL SHELTER</b>
	The following members of the consortium have agreed with the preliminary standards;  CARE International Oxfam GB, [DFID], [SDC/HA] [IFRC], [UNHCR], [JICA], [UN/OCHA], [MSF-B] Nederlands Red Cross.	LOCATION: Universal application for warm/ tropical climates DATE: 2005 USER: Refugees / displaced persons DISASTER: Political and temporary shelter in the case of natural disasters MANUFACTURER: Made all over the world but not South Africa.  DESCRIPTION:  tents to house refugees	LOCATION: Grenada DATE: 1995-2005 USER: Displaced residents of Grenada DISASTER: Hurricane DESIGN FIRM: Ferrara Design, Inc. MANUFACTURER: Global Village Shelters LLC  DESCRIPTION:  More than a 100 different experimental forms were designed before finding the right method for this design.	LOCATION: Japan DATE: 2008 USER: Displaced residents of Grenada DISASTER: Earthquakes DESIGN FIRM: Sago Mokuzai MANUFACTURER: Sago Mokuzai
		<b>\$ 80</b>	<b>\$ 500</b>	<b>\$ 1350 (150 000 yen)</b>
	40 - 80 kgs 0.3 m <sup>3</sup> - 0.5m <sup>3</sup> > 2 000 mm	<b>41.5 kgs</b>	<b>77 kgs</b>	<b>82 kgs</b>  1660 mm
	5 years fit at least 4 YES	<b>1 part</b>	3 parts	2 parts
	1. which particular design it is 2. size of usable area 3. how many people it can accommodate 4. means of transport 5. time + conditions of storage 6. name/trademark of manufacturer 7. date of manufacture  Instruction Language: English, French, and other appropriate language			
		YES NO: STOCKPILED	NO YES	NO YES

	<p><b>PHYSICAL REQUIREMENTS</b> <b>4.1.6 INTEGRITY</b></p> <p><i>The erected shelter wind speed with all doors and windows closed</i> <i>snow load</i> <i>cover minimum water column</i> <i>ground sheet minimum water column</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li><i>The structure shall have sufficient redundancy so that if the covering or one fixing fails, the shelter will remain upright</i></li> <li><i>In warm, humid climates: reasonable roof slope for rain water drainage</i></li> <li><i>Provision to trench the sod cloths into the ground to increase the stability of the shelter</i></li> </ul>
<p><b>4.1.7 DURABILITY</b></p> <p><i>From moment of deployment structure shall last for:</i> <i>covering and liner shall last for a minimum of:</i> <i>The shelter shall withstand temperatures between:</i> <i>minimum resistance to natural sunlight.:</i> <i>the breaking strength and the resistance to penetration by rain:</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li><i>Inner fabrics shall have a minimum breaking strength of 30 daN for warp and weft when tested in accordance with ISO 13934-1 or ISO 1421</i></li> </ul>	
<p><b>4.1.8 USABLE AREA</b></p> <p><i>The shelter shall be large enough for a family of five and have between 3.5m<sup>2</sup> and 4.5m<sup>2</sup> of covered living area.</i> <i>The standing height:</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li><i>The design shall allow for the introduction of fuel burning stoves, including a fireproof and waterproof flue manifold</i></li> <li><i>It shall be possible to insulate the floor, walls and roof of the shelter</i></li> <li><i>Provision will be made for semi-enclosed and shaded cooking areas and provision for fixed minimum ventilation of the interior, to reduce cases of Acute Respiratory Infections (ARIs)</i></li> <li><i>Storage pockets shall be integrated into the inner liner of the shelter</i></li> <li><i>There shall be no guy ropes, or other trip hazards around the shelter</i></li> </ul>	

**DESIGN POPULATION**

Hotel [H1] and Domestic Residence [H3]- 2 persons per bedroom  
Dormitory [H2] - 1 person per 5 sqm

**ROOM AREA**

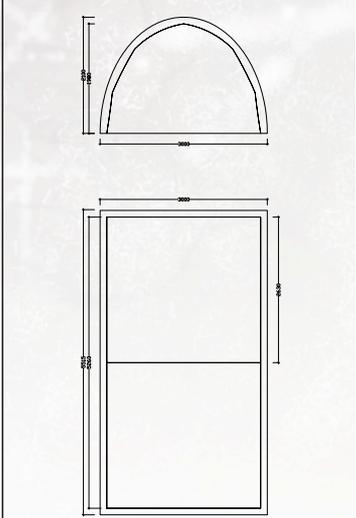
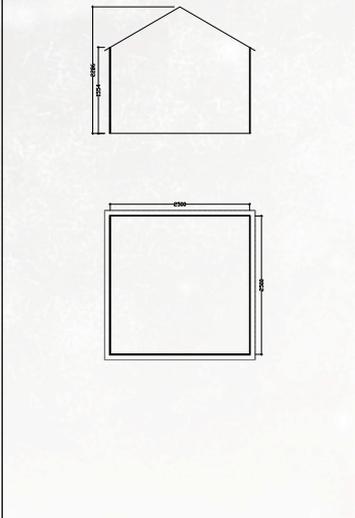
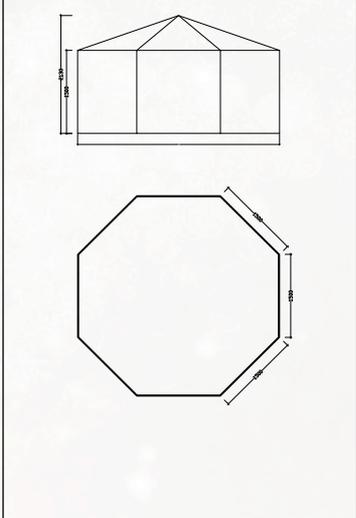
Any habitable room other than a kitchen, scullery or laundry shall consist of a minimum 6sqm with no linear dimension less than 2m. Excluding the area covered by a built in cupboard/cabinet.

**ROOM HEIGHT**

bedroom: 2.4m for a floor area of 6sqm with a clear head height of 1.8m at any point more than .75m from the edge of the floor space.  
other habitable rooms: 2.4m over 70% of floor area with not less than 2.1m over the remaining area

**FLOOR AREA**

The floor area of any temporary dwelling house shall not be less than 15sqm or 30sqm in the case of any permanent building.

	<p>18m/s in any direction 1,500 N/m<sup>2</sup> 1500mm 1500mm</p>	<p>36 MONTHS 18 MONTHS -30 °C to +55 °C ISO 4892-2 &gt;30% below the minimum value applicable to the shelter</p>	<p>covered space shall be a minimum of 1.8m over at least 60% of the covered floor area</p>			<p><b>18 MONTHS</b></p>	<p><b>16.5 sqm</b> 4-5 persons</p> <p>required to have a standing height of at least 1.8m over 33% of covered area.</p> <p>120 mm diameter chimney outlet [apron] only floor</p> <p>canopy: 1000mm x 1500mm <b>NO</b> ropes necessary</p> 			<p><b>18 MONTHS</b></p>	<p><b>6.25 sqm</b> 2-3 persons</p> <p>option available <b>YES</b> no canopy no ropes</p> 			<p><b>6 MONTHS</b></p>	<p><b>10.83 sqm</b> 5 persons [Culturally accepted]</p> <p><b>NO</b> <b>YES</b> no canopy ropes but no trip hazard</p> 
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	<p><b>4.1.9 VENTILATION</b></p> <p><i>Minimum ventilation shall be achieved through maximum air changes per hour</i>  <i>minimum air changes per hour</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li>• Ceiling to provide an adjustable air gap for insulation and ventilation</li> <li>• All doors and openings shall be adjustable to control light, heat gain or loss</li> <li>• In hot, dry climates the shelter should have a double skinned roof with ventilation between the layers to reduce radiant heat gain. The distance between the layers should be a minimum of 100mm</li> <li>• In warm, humid climates the shelter design shall maximise air flow.</li> <li>• In cold climates, air flow through the shelter shall be kept to a minimum, while also providing adequate ventilation for space heaters, or cooking stoves.</li> <li>• In cold climates, the shelter shall have internal compartments in order to minimise heat loss through infiltration.</li> </ul>	
	<p><b>4.1.10 FIRE SAFETY</b></p> <p><i>Fire Rating:</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li>• The shelter shall have two opposite doors to facilitate escape in the event of fire</li> <li>• It shall be possible to exit the shelter within 30 seconds when all doors are fully closed</li> <li>• The shelter shall not ignite when tested in accordance with ISO 6940 and exposed to a test flame for 10 seconds, in the new condition and also after artificial weathering in accordance with ISO 4892-2</li> </ul>	
	<p><b>4.1.11 VECTOR CONTROL</b></p> <p><i>All doors and openings shall be protected against insects such as:</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li>• The shelter shall have a 10cm vertical edge around the base of entry points in order to impede the entry of insects</li> <li>• The shelter must be mosquito proofed in an area long and broad enough for the intended occupancy to sleep in</li> <li>• There shall be fixings for additional or replacement mosquito nets to be hung</li> </ul>	
N/A	<p><b>4.1.12 ENVIRONMENTAL TOXICITY:</b></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li>• Shelters shall not involve materials that are toxic to humans, even when cut or modified for later re-use</li> <li>• The environmental impact resulting from the manufacturing or disposal of shelters shall be minimised</li> <li>• Shelters shall not involve materials that are toxic, by burning or burying, and shall not pollute the ground water table or enter the food chain</li> </ul>	
N/A	<p><b>4.1.13 COLOUR:</b></p> <p><i>Refrain from using:</i></p> <p>NOTES:</p> <ul style="list-style-type: none"> <li>• Not all colours have the same meaning to all people, care must be taken to ensure the colours used in shelters are culturally appropriate.</li> <li>• Cultural and political sensitivities shall be taken into account, for example in the use of colours used in national or factional flags.</li> </ul>	

			
<p>unobstructed aperture with a total area 0.01m<sup>2</sup> &gt; 7 &lt; 14</p>	<p><b>YES</b></p> <p>120mm gap between skins</p> <p><b>YES</b> <b>N/A</b></p> <p><b>N/A</b></p>		
<p>ISO 6940 and ISO 4892-2</p>	<p>CPAI - 84 1955 fabrics used in tents are rarely made fireproof as such coatings are expensive - they are however made fire retardant.</p> <p>2 doors</p>	<p>1 door</p>	<p>1 door</p>
<p>mosquitos, rats, flies, pests: snakes, scorpions + termites</p>	<p>fabric stabilized against decomposition</p> <p>WHO standards</p>		
			<p>NON TOXIC</p> <p>LOW EMBODIED ENERGY</p> <p>BIODEGRADE</p>
<p>Military or camouflage colours (green and beige, and white in winter)</p>	<p>UN BLUE + WHITE</p>	<p>WHITE</p>	<p>RAW CARDBOARD</p>

N/A

**4.1.14 PRIVACY:**

NOTES:



- It shall be possible to sub-divide the internal volume in order to increase visual privacy, whilst maintaining cross ventilation
- A fully closed shelter shall allow sufficient light to enter without compromising privacy
- At night, it shall be possible to use artificial lighting within the shelter without compromising privacy

N/A

**4.1.15 BUILDABILITY:**

NOTES:



- It shall be possible for two untrained adults to assemble the shelter without expert supervision
- The shelter shall be distributed complete, ready to put up, with all components included and all appropriate tools
- Each shelter shall be accompanied by instructions for use with explanatory sketches or drawings, suitable for multi-cultural/multi-lingual use in a variety of climatic and physical contexts, including different topographies/ ground conditions.
- In particular, these instructions shall ensure that erection and maintenance are well understood by an untrained adult. Shelters shall also be accompanied with instructions for the safe disposal of the components

N/A

**4.1.16 ADAPTABILITY + REPAIR:**

NOTES:

- It shall be possible to connect the shelter to another of the same type to increase the covered area
- The design shall facilitate the local adaptation of wall and roofing materials, such as mud brick side walls, local matting, or thatch
- The frame shall be strong enough to take the weight of sheet roofing and of hanging family objects from it
- The number of different types of components shall be kept to a minimum
- The total number of components shall be kept to a minimum
- Components shall be interchangeable where possible
- Components shall be available globally, or appropriate materials, tools and skills should be available for their local manufacture and repair
- Insulating materials shall be incorporated into the shelter when temperatures fall below a comfortable level
- The design shall maximise the number of components and materials that can be maintained and repaired with nonspecialist skills and equipment
- The shelter shall include a repair kit, with appropriate tools, spare components and material
- The design shall maximise the number of component materials that are suitable for later re-use, upgrading, modification or reconstruction on return
- Use of zippers and fixing methods such as proprietary clips and Velcro shall be minimised for use in functions that must be used frequently, such as doors and windows

N/A

**4.1.17 SECURITY**

Lockable Unit



				
		I X INTERNAL PARTITION	<b>NO</b>	<b>NO</b>
		<b>YES</b> <b>YES</b> <b>YES</b>  <b>YES</b>	2 PEOPLE: 20MINS <b>YES</b> <b>YES</b>  <b>YES</b>	4 PEOPLE: 2 HRS <b>YES</b> <b>YES</b>  <b>YES</b>
		<b>NO</b> <b>NO</b> ROOF NO OBJECTS YES <b>YES</b> <b>YES</b> <b>N/A</b>  <b>YES</b>	<b>NO</b> <b>YES</b> UNDETERMINED  <b>YES</b>	<b>NO</b> <b>YES</b> UNDETERMINED  <b>NO</b>
		<b>NO</b>	<b>YES</b>	<b>NO</b>