Transitional shelter guidelines

This draft is being circulated to make sure that the contents are of use, reflect the consensus, and achieve buy in and dissemination. There are three ways that you can contribute to this project:

1. Offer feedback, comments and suggestions
We would welcome all feedback, comments and suggestions on the draft content presented in this consultation document. Feedback can be provided at the Transitional Shelter Guidelines working group meeting on **12th April 2011**. Further information on the working group meeting is provided in the introduction to this document.

Alternatively, if you are unable to attend this working group meeting, please email any feedback, comments or suggestions to **tsg@sheltercentre.org** by **Friday 15th April**.

2. Suggest useful reports and case studies
Do you or your organisation have any case studies or reports which you feel could inform the Guidelines?

3. Join the working group
Join the working group for this project, in order to be informed of progress and of future meetings and draft reviews.

Please return this document with your comments, before Friday 15th April, to Shelter Centre at:
tsg@sheltercentre.org

To join the working group, or to suggest reports or case studies, please email **tsg@sheltercentre.org**

This consultation document is available online as a Microsoft Word document at: **www.sheltercentre.org/Shelter+Guidelines**

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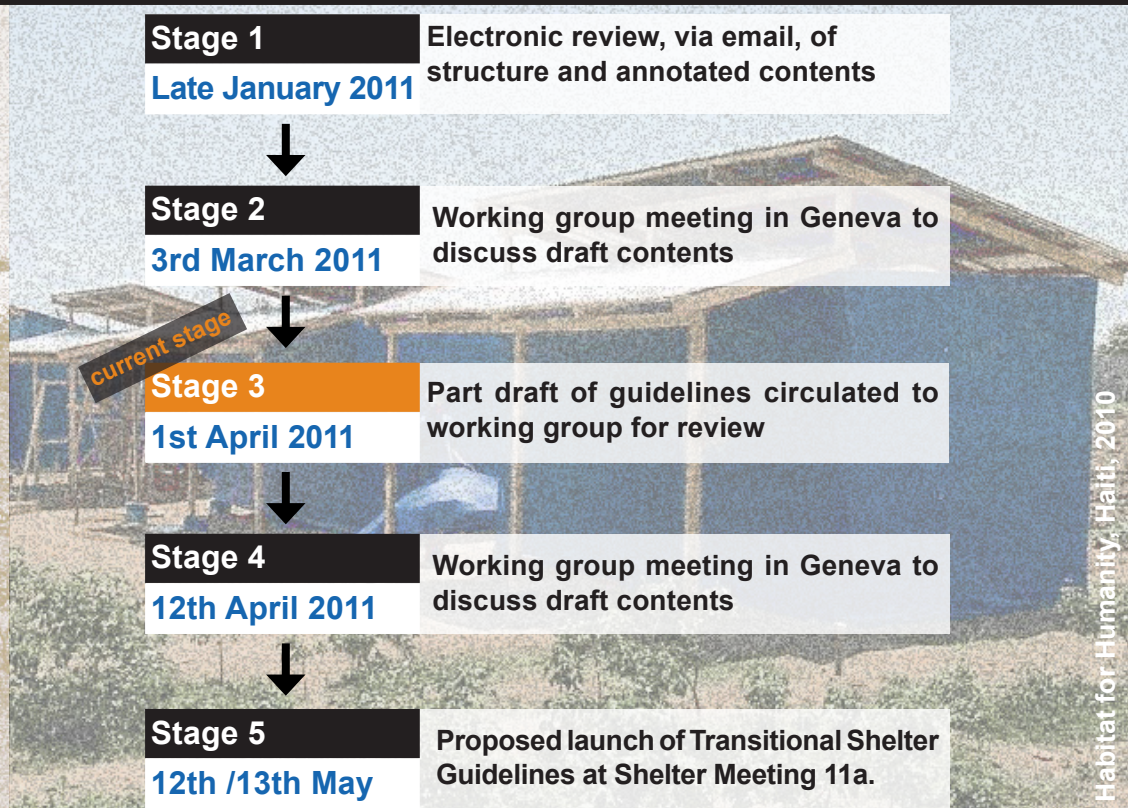
Consultation document April 2011

Transitional shelter guidelines



Habitat for Humanity, Haiti, 2010

This project involves the development of a set of practical guidelines that can be used in the field in order to facilitate the implementation of more effective transitional shelter programmes.

The project objectives are to:

- clearly define transitional shelter;
- assist the reader in determining whether it is an appropriate response method in a particular scenario; and
- offer assistance on best practise in implementing transitional shelter as part of a humanitarian response.

This draft is being circulated to make sure that the contents are of use, reflect the consensus, and achieve buy-in and dissemination. All Shelter Centre material is developed with reviews from working groups.

The document is available for download at:
www.sheltercentre.org/Shelter+Guidelines

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How to use this consultation document

This consultation document provides readers with the opportunity to offer feedback, comments and suggestions on the latest draft of the Transitional Shelter Guidelines.

The following questions will be considered during the Transitional Shelter Guidelines working group meeting on **12th May 2011**. Further information on the working group meeting is provided in further renew dates.

Alternatively, if you are unable to attend this working group meeting, please email your answers and any other feedback to **tsg@sheltercentre.org** by **Friday 15th April**.

Questions for the Transitional shelter principles

- **Do there appear to be any omissions or is there any undue emphasis in these principles?**
- **Is the wording of the principles sufficiently clear?**
- **We are working to ensure that these principles can be used in conjunction with the guiding principles for settlement and reconstruction after disaster, published by UN//OCHA in 'Shelter after disaster (2010)'. Are there any other principles or publications which these principles should be in line with?**

Questions for Chapter 1: What is transitional shelter and when is it appropriate?

This chapter is a part draft introduction to transitional shelter, offering a definition, and guidance on when and for whom transitional shelter may, or may not be appropriate.

- **Does the information in this chapter sufficiently explain the transitional shelter concept?**
- **Does the chapter make it sufficiently clear when and in what situations transitional shelter may or may not be appropriate?**

Questions for Chapter 2: Transitional shelter decision making tool

This chapter contains a draft of the 'transitional shelter decision making tool', intended to be of use to both generalist decision makers and technical specialists to ensure that the relevant questions are asked when planning and implementing transitional shelter programmes.

- **Does the tool sufficiently highlight key questions to be of use when planning and implementing a transitional shelter programme?**
- **Does the graphical representation make the information sufficiently clear and the tool easy to use?**

Questions for Chapter 3: Programme design

This chapter is a part draft, in note form, covering: coordination of a transitional shelter programme with the overall response strategy; the formation of a transitional shelter strategy; assessment; selection of assistance methods; and procurement and logistics issues.

- **Is the information included in the sections appropriate and accurate?**
- **Are there particular recommendations and suggestions about how to structure a programme/project team?**

Questions for Chapter 4: Site selection and planning

This chapter is a complete draft (with diagrams included for the first sub section) offering technical advice on site selection and planning for transitional shelter programmes.

- **Is the information included in the construction techniques and building materials sections appropriate and accurate?**
- **Do the example diagrams convey useful information clearly?**

Questions for Chapter 5: Shelter design

This chapter is a complete draft (with diagrams included for the first sub section of each section) offering technical advice on shelter design for transitional shelter programmes. Information is provided on construction methods, building materials, internal conditions, and designing to minimise risk.

- **Does the information included in the construction techniques and building materials sections seem appropriate and accurate?**
- **Are there any other examples of construction techniques, building materials, or design elements to minimise risk which should be included?**
- **Do the example diagrams convey useful information clearly?**

Questions for Chapter 6: Site management

This chapter is a part draft, in note form, covering site management, and site preparation issues.

- **Should any additional information be included in this chapter?**

The Transitional Shelter Guidelines project

The Transitional Shelter Guidelines project is coordinated by Shelter Centre, with funding from IOM. Additional funding has come from DFID.

The objective of this project is to produce a set of practical guidelines on transitional shelter for distribution in the field. These should:

- clearly define transitional shelter;
- assist the reader in determining whether transitional shelter is an appropriate response method in a particular scenario; and
- offer assistance on best practise in implementing transitional shelter as part of a humanitarian response.

Since the introduction of the transitional shelter approach by Shelter Centre in early 2005, in response to the Indian Ocean Tsunami of 2004, responses to disaster and conflicts worldwide have adopted this approach in support of the needs of millions of people affected by conflicts and disaster.

It is intended that the Transitional Shelter Guidelines will be published in May 2011.

Acknowledgements

This project has been made possible thanks to DFID and IOM.

Support and funding from DFID was received for the first initial drafting of these guidelines.

Subsequent funding and support from IOM has made the finalisation of this project possible, including support from IOM Pakistan for an evaluation mission for transitional shelters, undertaken in November 2010. This project would not have been possible without the continued funding and support of IOM, demonstrating once again their commitment to developing practical, technical guidance for the shelter, settlement and reconstruction sector.

Thanks are also due to the various organisations and individuals who have contributed or have indicated their willingness to contribute to the final Transitional shelter guidelines.

Transitional shelter guidelines

Explanation of text styles:

Questions and notes for reviewers are in orange

Draft content is in black

Notes for content are in italics

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Further review dates

Further review dates planned prior to publication in early May 2011. The three review stages are outlined below.

1st April: (current phase)

Transitional Shelter Guidelines consultation document, containing complete draft sections and detailed annotated contents, to be circulated to the working group for feedback, comments and suggestions.

12th April

Second working group meeting to be held at the Norwegian Refugee Council head office in Geneva, at 15h00 CET. A teleconference facility will be available for those unable to attend in person.

This meeting is intended as an opportunity to discuss and provide feedback on the draft contained in this consultation document. We hope that this meeting will be particularly of use for those who were unable to attend the previous working group meeting, which was arranged on short notice, taking advantage of the opportunity of key IOM staff being available to input.

12th /13th May

Proposed launch of Transitional Shelter Guidelines at Shelter Meeting 11a.

If you are not already a member of the working group, and would like to join, in order to be involved in the remainder of the review process, please send an email to: **tsg@sheltercentre.org**

This consultation document is available online at

www.sheltercentre.org/Shelter+Guidelines

Table of contents

Draft transitional shelter principles

The following ten draft guiding principles for transitional shelter are intended to be used consistently and in addition to the guiding principles for shelter, settlement and reconstruction after disaster published by UN/OCHA 'Shelter after disaster' (2010) and those published by the World Bank Global Facility for Disaster Risk Reduction (GFDRR) in 'Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disasters' (2010).

Questions for reviewers:

Qs ► **Do there appear to be any omissions or is there any undue emphasis in these principles?**

Qs ► **Is the wording of the principles sufficiently clear?**

Qs ► **We are working to ensure that these principles can be used in conjunction with the guiding principles for settlement and reconstruction after disaster, published by UN//OCHA in 'Shelter after disaster (2010)'. Are there any other principles or publications which these principles should be in line with?**

#1 Buy time

1. Transitional shelter programmes should allow sufficient time for sustainable reconstruction

Sustainable reconstruction following a major conflict or disaster can take a number of years to complete; longer than the usual life-span of plastic sheeting and tents. Aspects of responses such as community participation, risk mapping and the production of standards take time to initiate and complete, however, if rushed may result in inequality, poor sustainability and greater vulnerability. Transitional shelter is one approach to supporting shelter needs while sustainable reconstruction is taking place .

#2 Assessment

2. The appropriateness of a transitional shelter response should be comprehensively assessed for each situation and beneficiary group

Transitional shelter will not be an appropriate shelter response in all situations. A number of different approaches exist for providing shelter in post disaster or post conflict situations and comprehensive assessments should be undertaken to understand the potential strengths, weaknesses, opportunities and threats of all shelter responses prior to selecting the most appropriate.

#3 Community

3. The affected population should be partners in developing a transitional shelter strategy and leaders of local implementation

Invariably, the greatest effort in a response is made by those affected. They are also most aware of the most appropriate, sustainable and rapid routes to recovery. The greater the involvement of the community in implementation, the more efficient and cost effective the response will be.

#4 Strategy

4. Transitional shelter, when appropriate, should be used as part of a comprehensive, inter-sectoral strategy, developed in consultation with all stakeholders, including the government and affected population

Transitional shelter programmes should be used to support the appropriate groups within the affected population for a period of time, as part of a comprehensive inter-sector shelter strategy that considers CCCM, Early Recovery, Health, Protection and WASH issues, in addition to cross cutting issues, to support the entire population, both displaced and non-displaced, until durable shelter solutions are reached.

#5 Site planning

5. Site planning should be used to support communities as part of transitional shelter programmes

Beneficiaries of transitional shelter programmes should be located on land that is safe, legal and appropriate. This may be achieved through site planning involving the integration of hazard risk reduction, zoning and service integration. Site planning should consider the whole community and its needs, and is important for both displaced and non-displaced populations in urban and rural settings.

#6 Reconstruction

6. Shelters implemented as part of transitional shelter programmes should complement and contribute to reconstruction programmes

Transitional shelter programmes should be implemented at the same time as permanent reconstruction programmes. The shelters themselves should be designed to compliment and contribute to a reconstruction programme through the process of being upgraded, reused, recycled or resold.

#7 DRR

7. Transitional shelter programmes should reduce the vulnerability of the affected population

Transitional shelter programmes should reduce the vulnerability of the affected population and contribute to disaster risk reduction by using shelter design and construction, site selection and site preparation as a platform for communicating hazard resilient techniques and best practise and by building capacity within the affected population.

#8 Standards

8. Appropriate standards should be developed and agreed for the shelters for each beneficiary group within a transitional shelter programme

There is no standard transitional shelter design. Standards should be agreed upon, with participation from the affected population, which are appropriate for each beneficiary group. Standards should consider the implication of local hazards, climate, available labour and skills, available material, traditional building practises, cultural requirements and social and household activities.

#9 Process

9. Transitional shelter is an incremental process of sheltering which should start with the first distribution of relief items and continue until durable solutions have been achieved

The process of sheltering should start with the first distribution of relief items and offer opportunities for incremental upgrading, reusing, reselling or recycling by beneficiaries at their own pace until durable shelter solutions are achieved. Transitional shelter should not be viewed as an additional phase of a response.

#10 Maximise choice

10. Shelters implemented as part of transitional shelter programmes should maximise the choice of shelter options for the affected population throughout the transition to a durable shelter solution

The combination of shelter and settlement options utilised by each household on the path to a durable shelter solution, and the rate of recovery, will vary as a result of their different needs and resources. The design and construction of the shelters themselves should maximise the choice of shelter and settlement options for each household by allowing beneficiaries to upgrade, reuse, resell, recycle and relocate their shelters as required, and through the selection of assistance methods provided.

Transitional Shelter Guidelines consultation document

Explanation of graphics

The tips provide technical facts and information.

Case examples, lessons learned and good practice from the field practitioners and crisis situations worldwide.

»Section 5.1: Foundations

Refers to both the chapter number and section within the chapter

Transitional shelter displaced populations, 2005.

Refers to external resources, books, documents, publications, tools, and website resource that were used in the production of these guidelines.

Soil stabilised blocks

The CD-Rom will contain a digital copy of the Transitional Shelter Guidelines. It will also contain digital copies of key references and documents containing additional information on the topics covered. In addition, the CD will contain digital copies of the diagrams used in the guidelines, and templates that can be used for planning and reporting on transitional shelter programmes.

1. Introduction to the transitional shelter process

This chapter is a part draft introduction to transitional shelter, offering a definition, and guidance on when and for whom transitional shelter may, or may not be appropriate.

Questions for reviewers:

Qs ▶ **Does the information in this chapter sufficiently explain the transitional shelter concept?**

Qs ▶ **Does the chapter make it sufficiently clear when and in what situations transitional shelter may or may not be appropriate?**

The structure of the chapter is as follows:

1.1 What is transitional shelter and when is it appropriate?

Introduction

1. This section provides an introduction to the transitional shelter approach, including an overview of the purpose of transitional shelter, transitional shelter types and properties, and the use of transitional shelter to support both displaced and non-displaced populations.

Definition

2. Transitional shelter is an incremental process of sheltering which can be used to allow time for sustainable reconstruction following a conflict or natural disaster. The transitional shelter process begins with the first distribution of relief items, and results in a flexible covered living space for use until a durable shelter solution has been achieved. The shelters themselves should be relocatable and upgradable, reusable, resellable

and or recyclable to maximise choice of shelter and settlement options for the affected population throughout the transition to durable solutions, and to contribute to the reconstruction effort.

1.1.1 The purpose of transitional shelter

#1 Buy time

Transitional shelter programmes should allow time for sustainable reconstruction

Allowing time for sustainable reconstruction

3. It is a guiding principle of sheltering after disaster that the reconstruction and repair of permanent housing should be prioritised and commenced as soon as possible following a disaster. UN/OCHA 2010.

4. The transitional shelter approach acknowledges that for repair and reconstruction to be sustainable, sufficient time must be given to assessment and planning activities such as detailed risk mapping and the resolution of land rights issues. Emergency shelter and the six settlement options for displaced populations and the six reconstruction options for non-displaced populations may not always be sufficient for providing appropriate shelter over this period, which can commonly take between two and five years. Transitional shelter is one method of providing shelter over this period.

Factors which may delay permanent repair and reconstruction

5. In addition to assessment and planning activities, a number of unavoidable factors may delay sustainable repair or reconstruction. These include:

- unresolved hazards;
- unresolved land tenancy issues;
- adverse climatic or weather conditions; and
- the priority of or livelihood priorities which prevent them from wishing to focus time and resources on reconstruction.

#6 Reconstruction

Shelters implemented as part of transitional shelter programmes should complement and contribute to reconstruction programmes.

Complement and contribute to reconstruction repair and reconstruction

6. Shelters implemented as part of transitional shelter programmes should be designed to physically complement and contribute to the permanent reconstruction programme. This may be achieved through the shelter designs allowing the beneficiaries to upgrade, reuse, resell or recycle the shelters to contribute to permanent reconstruction efforts.

#7 DRR

Transitional shelter programmes should reduce the vulnerability of the affected population.

Reduce vulnerability

7. Transitional shelter programmes should be used to reduce vulnerability in the affected population by disseminating disaster risk reduction techniques, and building local capacity.

#9 Process

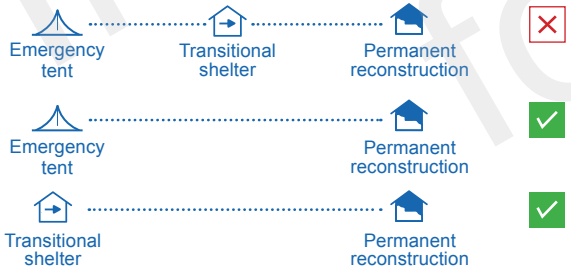
Transitional shelter is an incremental process of sheltering which should start with the first distribution of relief items and continue until durable solutions have been reached.

An incremental process of sheltering

8. Transitional shelter is an incremental process which begins in the first days of the emergency, with the first distribution of relief items. Initial distributions may include items such as plastic sheeting or stockpiled transitional shelter kits or packages. These items can be combined with further distributions, or with items procured or salvaged by beneficiaries, to allow for the incremental construction of shelters by beneficiaries at their own rate.

Diagram XX **Cumulative distribution of NFIs contributing to a transitional shelter programme**

Diagram XX **Transitional shelter as a two-phase, not a three-phase process**



#10 Maximise choice

Shelters implemented as part of transitional shelter programmes should maximise choice of shelter options for the affected population throughout the transition to a durable shelter solution.

Maximise choice

9. Transitional shelter programmes should maximise the choice of shelter and settlement options utilised by each household on the path to a durable shelter solution. The shelter and settlement options selected will vary as a result of the different needs and resources of each household. The design and construction of the shelters themselves should maximise the options available to each household by allowing beneficiaries to upgrade, reuse, resell, recycle and relocate their shelters as required, and through the selection of assistance methods provided.

Response methods over time

10. The most appropriate shelter or settlement option for each household may change over time. For example, a displaced family may stay with a host family for a while but may then wish to return to their place of origin once it is safe to do so. Therefore, the most appropriate response method for this family may initially be to provide host family support but then after relocating, transitional shelter support may be most appropriate.

1.1.2 Transitional shelter types

The four transitional shelter types

11. Shelters constructed as part of a transitional shelter programme should be designed to ensure that they are at least one, if not all four of the following: upgradable, reusable, recyclable or resellable. Definitions of these properties are provided below.

Upgradable

12. While being inhabited, transitional shelter is improved over time either to become a permanent shelter solution, or to improve temporary living conditions. This can be achieved through extension or by replacing original materials for more durable alternatives.

Case Study XX

▶ *Example case study for upgradable transitional shelter*

Reusable

13. Once reconstruction is complete, the transitional shelter may be used for an alternative function, for example as an external kitchen, barn or a shop.

▶ *Example case study for reusable transitional shelter*

Resellable

14. Once reconstruction is complete, the components of the shelter may be used as a resource to sell.

Case Study XX

15. *Example case study for resellable transitional shelter*

Recyclable

16. The transitional shelter components may be gradually dismantled during the reconstruction process and the materials recycled for use in the construction of a durable shelter solution.

Case Study XX

17. *Example case study for recyclable transitional shelter*

1.1.3 Transitional shelter design

Design appropriate to each beneficiary group

18. There is no standard transitional shelter design, though designs may be adapted from those used in previous projects. Appropriate designs should be agreed on for each project and beneficiary group.

#3 Community

The affected population should be partners in developing a transitional shelter strategy and leaders of local implementation

Common qualities

19. Transitional shelters should be designed using simple techniques and rapid construction methods appropriate to the environment and community with which they are being implemented. Transitional shelter projects should utilise local and traditional materials and construction methods which are familiar to the beneficiaries where possible.

#10 Maximise choice

Shelters implemented as part of transitional shelter programmes should maximise choice of shelter options for the affected population throughout the transition to a durable shelter solution.

Shelter standards

20. Transitional shelters should be designed and constructed to structural and performance standard which are agreed on for each beneficiary group.

A note on stockpilable transitional shelter

21. Stockpiled transitional shelter kits or packages allow for the first stage of a transitional shelter response to be quickly distributed. Stockpiled transitional shelters may be appropriate for use in instances where the local markets and economy cannot provide sufficient materials or where the speed of response is vital. Stockpilable transitional shelter kits and packages generally represent the first phase of the transitional shelter process, which can subsequently be upgraded, using locally procured materials.

A note on prefabricated shelter

22. Shelters which are totally prefabricated and transported to site as completed units cannot be considered to be transitional shelters. The use of prefabricated shelters is rarely successful and should be avoided.

23. The prefabrication of some transitional shelter elements may sometimes be considered appropriate where there is a shortage of the necessary local skills or where fast implementation is vital. In these cases, prefabrication should take place as locally as possible. Shelters which utilise prefabricated elements should still be suitable for upgrade, reuse, reselling or recycling by beneficiaries using locally procured materials.

1.1.4 Transitional shelter for displaced and non-displaced populations

Settlement options

24. Transitional shelter can support displaced populations as part of a transitional settlement programme or can support non-displaced populations as part of a transitional reconstruction programme.

25. The settlement options for displaced and non-displaced populations can be categorised into six transitional settlement options and six transitional reconstruction options which outline the context in which the affected family are settled following disaster 🕮 UN/OCHA 2010.

Transitional shelter for displaced populations

26. For displaced populations, transitional shelter can be used to span both the period of displacement and the processes of upgrading or reconstruction needed to achieve a durable solution after relocation has taken place.

27. The transitional shelter can be located on a temporary site until it is safe for the beneficiary to return to their place of origin. Once it is safe to do so, the transitional shelter can be relocated closer to the beneficiary's place of origin.

28. Figure XX below details the six transitional settlement options for displaced populations, and provides examples of how transitional shelter may be used as an appropriate response method within each option.

Diagram XX
The six transitional settlement options for displaced populations

Option 1: **Host families**

Definition: local families shelter the displaced population within their household or on their property.

Example: a displaced family could erect a transitional shelter on the land owned by a host family.

Option 2: **Urban self-settlement**

Definition: urban unclaimed properties or land unaffected by the disaster are used informally by displaced populations.

Example: a displaced family could erect a transitional shelter in an urban settlement occupying unclaimed land.

Option 3: **Rural self-settlement**

Definition: displaced populations create a settlement on collectively owned rural land.

Example: displaced families could erect a transitional shelter on rural land that is owned collectively.

Option 4: **Collective centres**

Definition: existing, large structures such as transit facilities can serve as collective shelters.

Example: collective centres are usually located in pre-existing structures and therefore transitional shelters cannot usually be used within this option. However, for example transitional shelters can be built in the grounds of a sports stadium.

Option 5: **Self-settled camps**

Definition: independent of support from government or other organisations, camps are formed by the displaced population.

Example: a group of displaced families could erect a transitional shelter in a camp independent of assistance from local government or the aid community.

Option 6: **Planned camps**

Definition: government or aid organisations plan camps including infrastructure to house displaced populations.

Example: a displaced family could erect a transitional shelter on a purpose built site where a full services infrastructure is provided.

Transitional shelter for non-displaced populations

29. For non-displaced populations, transitional shelter can be located on the beneficiary's land and used throughout the period of upgrading of reconstruction needed to achieve a durable solution.

30. Figure XX below details the six transitional reconstruction options for non-displaced populations, and provides examples of how transitional shelter may be used as an appropriate response method within each option.

Transitional Shelter Guidelines consultation document

Diagram XX
The six transitional reconstruction options for non-displaced populations

Option 1: **Occupancy with no legal status**

Definition: the occupant informally lives on property without explicit permission of the owner.

Example: a family who occupied land or property without the explicit permission of the owner is provided with a transitional shelter on the same site while they seek tenure and while reconstruction takes place.

Option 2: **House tenant**

Definition: the occupant rents housing and land from the owner in a formal or informal arrangement.

Example: a family who rented a house and the land it occupies are provided with a transitional shelter on the same site, to provide them with shelter during the period of reconstruction of the house.

Option 3: **Apartment tenant**

Definition: the apartment is rented by the occupant formally or informally.

Example: a family who rented an apartment are provided with a transitional shelter on the site of the apartment block, to provide shelter during the period of reconstruction.

Option 4: **Land tenant**

Definition: the occupant rents land but owns the house.

Example: a family who rented an apartment are provided with a transitional shelter on the site of the apartment block, to provide shelter during the period of reconstruction.

Option 5: **Apartment owner-occupier**

Definition: the occupant owns their apartment, a self-contained housing unit that occupies only part of a building, formally or informally.

Example: a family who owned an apartment are provided with a transitional shelter on the site of the apartment block, to provide shelter during the period of reconstruction.

Option 6: **House owner-occupier**

Definition: the occupant owns or partially owns the house and land. This includes a mortgage or a loan and includes formal and informal ownership agreements.

Example: a family who owned a house and the land are provided with a transitional shelter on the same site, to provide shelter during the period of reconstruction.

1.2 When is transitional shelter not appropriate?

1.2.1 When is transitional shelter not appropriate?

Notes for content:

- ***When sustainable repair and reconstruction can be commenced rapidly***
  - *Local hazards have been resolved*
  - *Land tenancy issues have been resolved*
  - *Climatic and weather conditions allow for repair and reconstruction to be completed in good time*
  - *Beneficiaries are able to offer time and resources to reconstruction*
- ***Risk of transitional shelter delaying permanent solutions when used inappropriately***
  - *Time issues*
  - *Financial issues*
  - *Resources issues*

1.2.2 Alternative shelter approaches

Notes for content:

- ***The first stage of permanent reconstruction***
  - *One room shelter/core housing*
  - *Field experience: one room shelter response to the 2010 flood in Pakistan*
- ***Temporary solutions***
  - *Emergency tents*
  - *Semi-permanent shelter*

Transitional Shelter Guidelines consultation document

1.3 TS SWOT analysis

31. SWOT analysis can be used to better understand the use of transitional shelter and to outline the benefits, draw backs, and potential opportunities and threats presented by implementing a transitional shelter programme.

S Transitional shelter strengths

32. The implementation of a transitional shelter programme:

- spans the entire transition period, from disaster until a durable solution is achieved;
- provides cost effective shelter, as it costs a similar amount as tented accommodation but is far more durable;
- provides a more secure, healthy living environment, with greater privacy and dignity;
- involves beneficiaries in decision making processes, allowing diversity in the type and design of transitional shelters. This allows the programme to support a family most effectively depending on their circumstances;
- allows shelter to be provided before land rights issues are resolved by negotiating the use of land on a temporary basis;
- supports local procurement of construction materials, enabling the financial resources for assistance to enter into and circulate within the local economy;
- allows diversity of the materials used in transitional shelter construction, reducing the risk of resource exhaustion;
- uses skills and materials which are culturally familiar to provide shelter which can be upgraded, used for an alternative function or dismantled for materials to be recycled or sold; and
- introduces and incorporates hazard-resistant construction principles and techniques that may inform reconstruction through the provision of supervision and technical expertise.

W Transitional shelter weaknesses

33. The implementation of a transitional shelter programme:

- may take more time than acquiring tents, which are sometimes more readily available;
- requires significant human resources to acquire materials needed for transitional shelter construction; and
- may initially be more expensive than the use of tents but as transitional shelters are more durable it is a more cost effective response method.

O Transitional shelter opportunities

34. The implementation of a transitional shelter programme:

- provides support during the resolution of land rights or tenure of the household;
- reuses materials salvaged from damaged or destroyed housing units. Reuse of salvaged materials may also present livelihood opportunities;
- allows the transitional shelter to be relocated from a transitional settlement site to a transitional reconstruction site;
- prevents the duplication of funding by using elements of the emergency response materials;
- creates opportunities for the innovative reuse of transitional shelter after reconstruction, e.g. as a shop or an external kitchen;
- accelerates economic recovery by helping local business to cope with market disruptions; and
- develops awareness of appropriate planning and building codes and standards with the affected population that support significant differences in individual transitional shelters, depending on factors such as family size, location, culture and availability of materials.

T Transitional shelter threats

35. The implementation of a transitional shelter programme:

- could result in no support being offered beyond transitional shelter, either because other methods of assistance are prioritised for resources, or because of a lack of resources. This can result in transitional shelter substituting permanent shelter without upgrading or reconstruction taking place;
- could result in poor or unsafe siting and construction if implemented with insufficient technical capacity or experience;
- could push up prices of materials or result in sub-standard shelter if the demand for key materials is greater than supply;
- could result in materials being allocated towards building shelters that normally have other purposes. This can affect livelihoods and the sustainability of local resources; and could result in transitional settlement sites becoming future ghettos if they are not managed and decommissioned properly.

2. Decision making tool

This chapter contains a draft of the 'transitional shelter decision making tool', intended to be of use to both generalist decision makers and technical specialists to ensure that the relevant questions are asked when planning and implementing transitional shelter programmes.

Questions for reviewers:

Qs ► **Does the tool sufficiently highlight key questions to be of use when planning and implementing a transitional shelter programmes?**

Qs ► **Does the graphical representation make the information sufficiently clear and the tool easy to use?**

The tool is divided into three steps which represent key decisions:

Decision A	**Would a transitional shelter approach be appropriate?** The questions asked in this step are based on the ten transitional shelter principles, also being produced for the Transitional Shelter Guidelines.
Decision B	**What properties do the shelters need to have?** This step aims to assist programme managers in producing specifications for shelters used in transitional shelter programmes.
Decision C	**Which labour, materials, support methods and quality control methods should be used?** The structure of this step is based on the 'assistance methods' used in Shelter After Disaster (UN/OCHA 2010)

The questions and considerations in this section are designed to assist programme managers and technical specialists in asking the relevant questions when deciding whether a transitional shelter programme may be an appropriate shelter response. In situations where the cluster approach is in use, guidance from the cluster should be considered in conjunction with this tool.

- The questions asked in this step are based on the ten transitional shelter principles. »Section XX: Transitional shelter principles.

A1 Is it possible to commence sustainable reconstruction rapidly?

Consider:
- land rights
- unresolved hazards
- climatic issues
- displaced beneficiaries
- alternative priorities of target population; e.g. seasonal harvesting
- site clearance/infrastructure rehabilitation

If all of these conditions are satisfied . . . move on to **STEP B: Define the appropriate type of T-Shelter**

A2 Have the unique requirements of each community within the affected population been considered?

- Consider natural hazards, climate, safety and security, livelihoods, social and household activity needs for each household or beneficiary group.
- Review alternative shelter options. »Section XX

A3 Is it possible to involve the affected population throughout the planning and implementation of the transitional shelter programme?

Consider:
- program strategy;
- site selection and preparation;
- transitional shelter design;
- materials selection;
- construction techniques. »Section XX

A4 Would a transitional shelter programme contribute to an inter-sectoral strategy?

- How will the transitional shelter programme fit into cluster, sector or government shelter strategies?

Consider integration of:
- WASH, CCCM, health, early recovery, etc. issues »Section XX and
- cross cutting issues.

A5 Would the site selection and planning of the shelter programme support the recovery of the target communities?

Consider:
- keeping communities together;
- livelihood recovery;
- access to community facilities, hospitals and schools; and
- exposure to natural hazards, climatic conditions, and safety and security issues.

A6 Would the shelters complement and contribute to the permanent reconstruction programme?

Would beneficiaries be able to:
- **upgrade** their shelter to a permanent construction;
- **reuse** their shelter for an alternative purpose;
- **resell** their shelter, or its components to help fund permanent reconstruction or to recover livelihoods;
- **recycle** materials from their shelter?

A7 Would a transitional shelter programme reduce the vulnerability of the target population?

Consider:
- integration of DDR methods;
- construction and best practices;
- capacity building.

Does the implementing agency have:
- capacity to ensure shelters are of an acceptable quality?
- skills at its disposal to undertake capacity building with the target population?

A8 Can the transitional shelter process begin with the first distribution of relief items and be developed incrementally until durable solutions are reached?

- Can the relief items be integrated into the transitional shelter design?
- Does the shelter design allow for incremental upgrading at a rate decided by each beneficiary?

A9 Can appropriate standards be developed for the shelters of each beneficiary group?

Consider availability of:
- skills, labour, materials and agency capacity to ensure that shelters are constructed to the established standards.
- Consider elements such as hazards, climate, safety and security, etc., »Decision B for each beneficiary group.

A10 Would a transitional shelter programme maximise choice of shelter and settlement options for the affected population throughout the transition to a permanent solution?

Consider:
- the six settlement options for displaced and six reconstruction options for non-displaced populations; »Section XX
- the compatibility of the shelter design with the identified options.

This step aims to assist programme managers and technical specialists in producing specifications for shelters used in transitional shelter programmes.

This step may be re-visited a number of times throughout a transitional shelter programme to produce updated specifications as shelters are upgraded over the course of the transitional shelter programme.

In situations where the cluster approach is in use, guidance from the cluster should be considered in conjunction with this tool, however shelter designs and specifications should be produced to meet the unique requirements of each beneficiary group.

- B1 Suitable for relocation?
- B2 Lifespan
- B3 Suitable for: upgrade; reuse; reselling; and or recycling?
- B4 Cost
- B5 Adherence to existing standards
- B6 Hazard resistance/resilience
- B7 Climatic appropriateness
- B8 Safety and security
- B9 Temperature
- B10 Ventilation
- B11 Internal area (height/floor space)
- B12 Privacy
- B13 Vector control

Transitional shelter specification example form ⊙ dowload from CD

Specifications	Standard
Key properties	
Suitable for relocation? (completely/selected elements; over what distance?)	
Lifespan (accounting for possible upgrades?)	
Suitable for: upgrade; reuse; reselling; and or recycling? (material selection; design; construction methods)	
Cost (materials cost; total cost)	
Adherence to existing standards (local standards; humanitarian standards; standards produced for the transitional shelter programme)	
Cultural appropriateness (material selection; design; construction methods)	
Minimising risk	
Hazard resistance/resilience »Section XX: Natural hazards (site selection/ preparation; shelter design/construction)	
Climatic appropriateness »Section XX: Climatic design (site selection/ preparation; shelter design/construction)	
Safety and security »Section XX: Safety and security (site selection/ preparation; shelter design/construction)	
Internal conditions	
Temperature »Section XX: Internal climatic conditions (site selection/preparation; shelter design/construction)	
Ventilation »Section XX: Internal climatic conditions (site selection/preparation; shelter design/construction)	
Internal area (height/floor space) »Section XX: Socio-cultural issues (site selection/ preparation; shelter design/construction)	
Privacy »Section XX: Socio-cultural issues (site selection/ preparation; shelter design/construction)	
Vector control »*Section 4.6.2: Health issues* (site selection/ preparation; shelter design/construction)	

Decision C: What assistance methods should be used?

This step aims to assist programme managers in selecting appropriate labour, materials, support methods and quality control methods for transitional shelter programmes. The questions asked in this step are based on the 'assistance methods' used in Shelter After Disaster (UN/OCHA 2010).

The step is further divided into three sections:
C1. Selection of materials methods
C2. Selection of labour methods
C3. Selection of support methods
C4. Selection of quality control methods

consider all the options in each section

C1 Selection of materials methods

C1.1 Are appropriate materials readily available in local markets?

- Is there enough availability of required building materials on local markets, for Transitional shelters to be appropriately built using local materials only?
- [MARKET SUPPORT] Is there potential to support existing markets and local suppliers to ensure they will provide sufficient materials for the programme?

✓ If yes, go to C2
✗ If no, go to C1.2

C1.2 Should transitional shelters be built using imported building materials?

- Are sufficient building materials available in national markets ?
- Is the existing infrastructure sufficient to allow transport of non-local (national and international) materials on site?

✓ If yes, go to C2
✗ If no, go to C1.3

C1.3 Should transitional shelters be built using prefabricated parts?

- Would a prefabrication of some Transitional shelter parts in local workshops simplify the quality control process?
- Would a prefabrication of some Transitional shelter parts in local workshops allow for quicker construction process?
- Would a prefabrication of some Transitional shelter parts in local workshops allow optimising the available technical capacity?

✓ If yes, go to C2
✗ If no, reconsider options

C2 Selection of labour methods

C2.1 Self-help: can transitional shelters be built by the beneficiaries themselves?

Consider:
- availability of sufficient and appropriate construction skills;
- alternative priorities of target population ; e.g. seasonal harvesting

Consider the provision of support methods:
» Section C17: supervision and tech expertise.
» Section C18 capacity building.

✓ If yes, go to C3
✗ If no, go to C2.2

C2.2 Community labour: can transitional shelter be built through community mobilisation?

Consider:
- the cohesion of the affected community. Will they be willing to undertake building activities together?
- the location and distribution of the target population;
- availability of labour;
- availability of sufficient and appropriate construction skills;
- alternative priorities of target population ; e.g. seasonal harvesting

Consider the provision of support methods:
» Section C17: supervision and tech expertise.
» Section C18 capacity building.

✓ If yes, go to C3
✗ If no, go to C2.3

C2.3 Direct labour: can transitional shelter be built by hiring local labour?

Consider:
- the cohesion of the affected community. Will they be willing to undertake building activities together?
- the location and distribution of the target population;
- availability of labour;
- availability of sufficient and appropriate construction skills;
- alternative priorities of target population ; e.g. seasonal harvesting

Consider the provision of support methods:
» Section C17: supervision and tech expertise.
» Section C18 capacity building.

✓ If yes, go to C3
✗ If no, go to C2.4

C2.4 Contract labour: should transitional shelter be built using contractors?

Consider:
- availability of labour;
- availability of sufficient and appropriate construction skills;
- alternative priorities of target population ; e.g. seasonal harvesting

Consider the provision of support methods:
» Section C17: supervision and tech expertise.
» Section C18 capacity building.

✓ If yes, go to C3
✗ If no, reconsider options

C3.1 Cash

Should transitional shelters be implemented direct distribution of cash to beneficiaries?

- Is distribution of cash to beneficiaries ensured by reliable banking facilities in the times and stages of payment required for the duration of the program?
- Is distribution of cash a safe option which won't expose both beneficiaries and disbursing staff to security risks?
- Are sufficient materials and tools available in local/national markets to avoid inflation of prices if a cash distribution programme is implemented?

C3.2 Vouchers

Should transitional shelters be implemented using vouchers?

- Are sufficient building materials available in national markets?
- Is the existing infrastructure sufficient to allow transport of non-local (national and international) materials on site?

C3.3 Loans

Should transitional shelters be implemented using loans?

- Is collection of materials and tools feasible with later repayment?
- Is the repayment of a loan likely to represent an unaffordable financial burden for the beneficiaries (e.g. unaffordable down payment; severe/unclear/unfair government regulations of lenders)?
- Is the repayment of soft loans likely to increase beneficiaries vulnerability (e.g. by requiring his land or property as a guarantee)?

C3.4 Market support

Can the existing markets and local suppliers be supported to help them to provide sufficient materials for the programme?

C3.5 Local information centres

Would the establishment of local information centres be beneficial to offer advice to the affected population on what assistance is available, and what opportunities for consultation and participation exist?

C3.6 Advocacy, legal and administrative

Would the provision of access to advocacy, legal or administrative assistance for beneficiaries, free of charge or at a reduced cost, be beneficial to the project?

C3.7 Return and transit items

Would the provision transport and/or return and transit support packages support to the affected population, who may wish to return to their original location or relocate their transitional shelter be beneficial to the project? (e.g. transport fares and vouchers, tools, materials etc).

C3.8 Infrastructure and settlement planning

Would the inclusion of infrastructure and settlement planning as part of the transitional shelter programme be beneficial?

C3.9 Environmental and resource management

Is it necessary to manage the use of natural resources to avoid causing environmental damage, or the depletion of natural resources?

quality assurance methods

C4.1 Supervision and technical expertise

Can sufficient and adequate supervision and technical expertise be provided to ensure that shelters are constructed to appropriate standards?

- Is there sufficient local technical capacity for checking the quality of construction and provide technical advice as required?
- Does the implementing agency have enough technical surge capacity/technical staff capacity to provide adequate support and advice to beneficiaries in building their transitional shelters?

C4.2 Capacity building

Would it be beneficial to invest in technical capacity building among the affected population?

3. Programme design

This chapter is a part draft, in note form, covering: coordination of a transitional shelter programme with the overall response strategy; the formation of a transitional shelter strategy; assessment; selection of assistance methods; and procurement and logistics issues.

Questions for reviewers:

Qs ▸ **Is the information included in the sections appropriate and accurate?**

Qs ▸ **Are there particular recommendations and suggestions about how to structure a programme/ project team?**

The structure of the chapter is as follows:

3.1 Transitional shelter as part of a coordinated response

3.1.1 Coordination framework

Notes for content:

- ***Objectives of coordination***
- ***Overview of humanitarian reform***
  - *IASC, the eleven clusters/sectors, the four cross cutting issues*
  - *Why these guidelines use the term 'sector' rather than 'cluster'*
- ***How does the shelter sector coordinate with the overall response?***
  - *The core sectors that support shelter – WASH, CCCM, Protection, Early recovery.*
  - *Composition of the shelter coordination team*
  - *Regional hubs and regional/district level coordination*

3.1.2 Roles and responsibilities

Notes for content:

- *Government*
- *Affected population*
- *Coordinating agency*
- *Implementing agencies*
- *National stakeholders*
- *National and local authorities*
- *National NGOs*
- *Local civil societies*
- *Donors*
- *International Financial Institutions*
- *National and international private sector stakeholders*

3.1.3 Coordination activities

Notes for content:

- ***What activities does the coordination body undertake?***
- ***What coordination tools may be used?***
  - *Strategic Advisory Group (SAG)*

- *Technical Working Groups (TWiGs)*
- *Information Management Group (IM)*
- *Public meetings*

3.1.4 Information management

Notes for content:

- ***Information needs for responding stakeholders***
- *Need for consistent communication*
- *Information needed: land use surveys, building damage assessments, info on risks from ongoing and new hazards, etc.* »*Section xx: Assessment*
- ***Information for the affected population***
- *E.g. Public information campaigns and outreach programmes: information packs, posters, leaflets, committees, workshops and trainings*
- ***Encourage community participation for regular beneficiary feedback***

3.2 Programme strategy

3.2.1 What is a programme strategy?

Notes for content:

- ***The purpose of a programme strategy***
- *Plan and present the course of action to be taken to address the needs of a specific group*
- *Used by project managers to ensure that their projects fit into the sector strategy and overall humanitarian response*
- *Baseline for monitoring budget and programme during construction*
- *Managing expectations regarding quality and timeliness of delivery*
- *Strategy will be a live document – updated as more detailed information becomes available*
- ***The contents of a programme plan***
- *Objectives*
- *Programme scope - considering issues of location and spread of project activities*
- *Activities*
- *Integration with other sectors*
- *Time management - Include consideration of: time needed for recruitment, etc, public holidays, prioritisation*

of livelihood activities, seasonal weather variations, difficulties with infrastructure, lead in periods for material

- *Detailed cost plan*
- *Quality management*
- *Assessment of risks*

3.2.2 Forming a programme strategy based on a document template

Notes for content:

- ***Needs analysis, objectives, indicators, sectoral monitoring plan, roles and responsibilities***
- ***Needs analysis***
- *Importance of basing programme plans on detailed assessments – update plans as more detailed information becomes available*
- *What should be assessed for transitional shelter programmes* »*Section xx: Assessment*
- *Assessment tools*
- ***Formation of programme objectives***
- *Objectives to consider: overall strategic objectives of government and sector; donor requirements; other sectors; agency/organisation mandate; needs of the targeted beneficiary groups*
- *Consider TSG key principles while forming objectives for TS programme*
- ***Indicators***
- *Scenario planning*
- *Identifying key indicators for transitional shelter programmes*
- *Scenario examples: Natural hazards or problematic weather conditions occur unexpectedly; changing seasons make some periods of time unsuitable for construction, or mean beneficiaries have other priorities for certain times of the year*
- *Use of key indicators to monitor the resolution of issues which prevent reconstruction/repair. E.g., land rights issues, unresolved hazards*
- *Importance of risk assessment* »*Section xx: Planning tools*
- ***Monitoring plan***
- *Importance of monitoring – ensure that programme remains relevant to the needs of the affected population*
- *Importance of monitoring - allow managers to identify*

problems in good time + make appropriate adjustments so as to minimise delays and avoid incurring additional costs

– *Formation of key monitoring indicators* »*Section xx: Logical framework*

3.2.3 Community consultation

Notes for content:

– *Transitional shelter principle 3, Community: Importance of involving the affected community when forming a strategy*
– *Methods of involving community*

3.2.4 Integrated programming

Notes for content:

- ***Water and Sanitation***
- ***CCCM***
- ***Emergency relief distribution and NFIs***
- ***Disaster risk reduction and risk management***
- ***Livelihoods***
  – *The five capitals: natural, social, human, manufactured, financial*
- ***Infrastructure***
  – *Site access, focal point buildings for meetings/ administration, etc*
- ***Cross cutting issues***
  – *Gender*
  – *HIV/AIDS*
  – *Environment*

3.2.5 Common problems and considerations for project managers

Table xx **Transitional shelter project management –potential problems and solutions**

Potential problem	Solutions/mitigating activities
Planning Stage	
Donors and funding	
Risk of donor-driven rather than demand-driven responses.	Communicate with donors regularly and in detail to provide technical evidence as to why a particular project type would be appropriate.
Some donors may be used to supplying funds in three 'phases': emergency, early recovery and reconstruction. This may not be applicable to a transitional shelter programme.	Consider targeting different donors for different stages of the project – 'emergency relief' donors for the initial stages and 'reconstruction' donors for the later stages. Ensure that the transitional shelter concept is fully explained to donors so that the reasons behind funding requests are understood.
Donor requirements may not appear feasible as more detailed information becomes available. For example, a funding plan may specify that money be spent by certain dates, which are later revealed to be unreasonable due to harvest times or adverse climatic conditions.	Communicate with donors regularly and in detail to provide up to date information on progress and constraints.
Very limited funding.	Decide between providing an equal, low, level of assistance to all of the affected population, or identifying only the most vulnerable households for direct assistance and indirectly assisting the wider population through the dissemination of DRR and best practise site selection and preparation, and design and construction.
Setting up	
Agency registration in-country can be time consuming.	Meet with the relevant authorities as soon as possible on arrival in-country, and chase up progress as necessary. The UN is registered in all countries. Consider co-opting them to help if necessary.
Setting up national bank accounts to enable the transfer of money into the country can take time and delay project start up.	
The process of locating, securing, and finalising contracts for a new office can cause delays in project start up.	Consider transferring staff from other agency offices who are already familiar with the way the agency operates (e.g. the regional office/ central hub).

Potential problem	Solutions/mitigating activities
Planning Stage	
Personnel	
Accurate estimation of personnel requirements can be difficult in the early stages when information is limited or incomplete.	Use planning tools such as logical frameworks and Scope of Works to make initial assumptions of personnel requirements and modify estimates as more information becomes available.
High competition for local staff with appropriate skills and experience, for example, those with skills in: construction management, financial management or community mobilisation.	Fair and transparent recruitment process is important for attracting good staff. International recruitment may be appropriate, especially in the early stages. Selection of national/local staff may increase and replace international staff over time. Ensure that particular skills are genuinely required. For example, it may be appropriate to hire site managers and builders to carry out quality control checks in the place of engineers, as long as they are appropriately supervised.
Local partners	
Rapid identification of credible local implementing partners can be difficult.	Check potential implementing partners thoroughly. Checks may include: review of financial records; validation of stated number of staff members and their qualifications; site visits to other projects undertaken by the agency. Be aware of the capacity of local partners, and the MoUs that they hold with other organisations. It should be ensured that implementing partners are selected on the basis of a transparent bidding procedure.
Strategic planning	
Circumstances of the beneficiaries change before construction has been completed. For example, beneficiaries may want or need to relocate earlier than anticipated.	Contingency planning should be built into programme and project plans so that a pre-defined strategy can be put into action in the case of a change of circumstances. For the example where beneficiaries may wish to relocate sooner than anticipated, it should be possible for them to take shelter materials with them to their new location.
The identification of critical path activities can be difficult in projects which are new in type or scale to the implementing agency.	A pilot programme may help to identify key activities.

Potential problem	Solutions/mitigating activities
Planning Stage	
Strategic planning	
Natural hazards or problematic weather conditions delay construction.	Predictable weather patterns should be factored into the schedule of operations. Contingency planning should consider the effects of adverse climatic and weather conditions on project progress. Risk assessments should be undertaken to identify potential natural hazards and adverse weather conditions, and contingency plans should be defined at the planning stage.
Site selection/preparation and shelter design/construction	
Mitigating risks completely requires highly engineered structures with associated higher costs.	It may be appropriate to design shelters to be hazard resilient, rather than completely hazard proof. At a minimum, transitional shelters should remain structurally sound for long enough for the inhabitants to evacuate the shelter without risk of injury or death due elements of the shelter falling or collapsing.
Appropriate standards should be formed rapidly so that they can be used to inform shelter design.	Consider using Decision 2 in the transitional shelter decision making tool as an aide memoir to cover all points. »Chapter 2. Identify any existing local or national building standards which may need to be included.
Holistic response	
Water and sanitation, social, health and education facilities are not included in programme plans due to lack of budget or expertise.	Coordinate with other agencies and sectors whos mandates more directly cover these issues.
Implementation	
Donors and funding	
Inflation, changing exchange rates, and fluctuating materials costs can make accurate cost estimates difficult.	Contingency planning should be built into donor proposals, to ensure that programmes can be adapted to actual inflation and exchange rates. Plans may include the inclusion of additional or fewer beneficiaries, or alterations to shelter designs.
Financial tracking in a large scale project over a wide geographical area can be difficult.	Use standard templates for recording transactions. Consider splitting financial tracking responsibilities into smaller areas to make accurate tracking more feasible.
Time consuming reporting and accountability frameworks cause delays in decision making.	Use simple standard templates for reporting.

Potential problem	Solutions/mitigating activities
Implementation	
Personnel	
High turnover of staff makes accountability difficult, and can put stress on longer term staff	ToRs for positions with high turnover rates should be well defined, including details of all roles and responsibilities, to ensure that the position is well understood by incoming staff. Ensure that records are well kept, ideally on standard templates. Where possible, allow a handover period between incoming and outgoing staff. Ensure that new team members are given full orientation and induction to the job
Local partners	
Local partners are new to working with humanitarian agencies or on this type of shelter project.	Communicate regularly and clearly with implementing partners to ensure that they fully understand what is required of them and the consequences of not completing work on time or to quality are known. Monitoring and reporting systems should also be clearly communicated. Capacity building and training sessions for local partners may be appropriate. Ensure that budget is allocated for capacity building, monitoring and quality control of implementing partners.
Monitoring local partners, and ensuring the work of local partners is of sufficient quality can take a lot of time and resources.	Use a clearly defined system to monitor the work of the implementing partners, for example, organise field teams to regularly report back to the hub. Consider undertaking random spot checks. Identify the most crucial site selection/ preparation and building design/construction indicators to reduce time required for quality control checks. Ensure that local partners have appropriate tools, materials, knowledge of construction techniques, and skills prior to commencing work.
Procurement	
Damaged infrastructure makes transport of materials and personnel to site difficult.	Procure materials locally where possible to reduce transportation requirements. Where materials need to be transported to site, materisls should be selected and packs designed such that they can be transported by hand, or by other suitable transport. Coordinate with the government and with other sectors where major repair work is required.

Potential problem	Solutions/mitigating activities
Implementation	
Procurement	
Materials arrive on site damaged or not as advertised/requested.	Check materials as early as possible, ideally at ports or airports where they have been sourced internationally, to avoid unnecessary transport costs if they are damaged or not as requested. »Section xx: Procurement. Take care when specifying materials. »Section xx: Procurement
Beneficiaries	
Beneficiaries unwilling to accept advice on new designs or building techniques.	Priorities the use of local and traditional building techniques where possible. Implement a strong social mobilisation programme, ideally hiring staff from within the affected communities.
Handover	
Beneficiaries	
Beneficiaries have unrealistic expectations about the shelters or project timescale. Beneficiaries unhappy with design or build quality.	Implement a coordinated strategy for communication with the affected community. »Section XX: Information Management Establish a grievance redress system and humanitarian helpline to assist beneficiaries in dealing with land/human rights issues and make sure that realistic expectations are met. Implement a strong social mobilisation programme, ideally hiring staff from within the affected communities.

3.2.6 Programme and project team structures, roles and responsibilities

Notes for content:

- ***Structure of the shelter programme team***
  - *Programme manager*
  - *Technical coordinator*
  - *Field coordinator*
  - *Social mobilisers*
  - *Construction supervisors*
- ***Relation between the shelter programme team and the shelter coordination team***
- ***Logistics team***
- ***Procurement team***
- ***Assessment team*** *»Section xx: Assessment*
- ***Example organograms***

3.2.7 Planning tools

Notes for content:

- *Critical path analysis*
- *Scenario planning*
- *Logical frameworks*

3.3 Assessment

Notes for content:

- *Assessment types: who, what, when, where;*
- *Need for a standard methodology of information gathering*
- *Composition of the assessment team*

3.3.1 Stages of assessment

Notes for content:

- ***Preliminary assessment***
- *Overview, purpose, timeframe, quality of information, information required at this stage for a transitional shelter project*
- ***Rapid assessment***
- *Overview, purpose, timeframe, quality of information, information required at this stage for a transitional shelter project*
- ***Joint / detailed assessment***
- *Overview, purpose, timeframe, quality of information, information required at this stage for a transitional shelter project*
- ***Monitoring and evaluation***
- *Overview, purpose, timeframe, quality of information, information required at this stage for a transitional shelter project*

3.3.2 What information is required?

Notes for content:

- *Who, what, where (mapping of affected population)*
- *Beneficiary assessment, monitoring and review*
- *Damage assessment (buildings, infrastructure, etc.)*
- *Environmental assessment*
- *Assessment of traditional building materials, techniques and designs*

- *Hazards and risks assessment*
- *Capacity assessment (capacity to participate in transitional shelter construction)*
- *Livelihood assessment*
- *Availability of skills(skilled and non-skilled labour), tools, building materials*
- *Market assessment and market access (EMMA)*
- *Reporting back the results of assessments to beneficiary communities*

3.4 Beneficiary identification

Notes for content:

- ***Potential role of the shelter cluster in providing beneficiary selection criteria***
- ***Balancing level of assistance and equity of response***
- *Option of indirectly assisting the affected population beyond the project beneficiaries through the dissemination of good practise and DRR techniques*
- ***Beneficiary selection process***
- *First action: formation of a selection committee*
- *Second action: agreement on selection criteria*
- *Third action: agreement on a selection strategy*
- *Fourth action: selection of beneficiaries*
- *Fifth action: formation of a complaints procedure*
- *Sixth action: reporting selection back to communities*
- ***Considerations for displaced beneficiaries***
- *Identification of beneficiaries in dispersed settlements*
- *Difficulty in distinguishing combatants from 'civil' population*
- ***Considerations for non-displaced beneficiaries***
- *Identification of beneficiaries with no legal status*
- ***Monitoring and review to inform the beneficiary selection process***

3.5 Labour and contracting

3.5.1 Labour methods

Notes for content:

- ▶ ***Self-help labour***
- – *When it is appropriate*
- – *Possible challenges*
- – *Considerations for transitional shelter projects*
- ▶ ***Community labour***
- – *When it is appropriate*
- – *Possible challenges*
- – *Considerations for transitional shelter projects*
- ▶ ***Direct labour***
- – *When it is appropriate*
- – *Possible challenges*
- – *Considerations for transitional shelter projects*
- ▶ ***Contract labour***
- – *When it is appropriate*
- – *Possible challenges*
- – *Considerations for transitional shelter projects*
- ▶ ***Private sector engagement***
- – *Benefits of engaging local private sector*
- – *When to engage international private sector*
- ▶ ***Contracting***
- – *Tendering methods*
- – *Mutual accountability and transparency in bidding procedures*
- – *Appointment of contractors*
- – *Contract documents*
- – *Bid forms*

3.6 Support methods

3.6.1 Cash

Notes for content:

- – *When cash is appropriate*
- – *Possible challenges (e.g. inflation)*
- – *Release of cash disbursements*
- – *Considerations for transitional shelter projects*

3.6.2 Vouchers

Notes for content:

- – *Vouchers as alternative to cash*
- – *Possible challenges*
- – *Selection of local suppliers for voucher schemes*
- – *Considerations for transitional shelter projects*

3.6.3 Insurance, loans and guarantees

Notes for content:

- – *Loan access in lack of credit access*
- – *Possible challenges (e.g. potential rise of social insecurity)*
- – *Considerations for transitional shelter projects*

3.6.4 Market interventions

Notes for content:

- – *Interruptions and disruptions in local supplies*
- – *Use of a market mapping and analysis tool*
- – *Involvement of the construction industry*
- – *Considerations for transitional shelter projects*

3.6.5 Local information centres

Notes for content:

- – *When to establish local information centres*
- – *What information may be offered to the affected population*
- – *Considerations for transitional shelter projects*

3.6.6 Advocacy, legal and administrative

Notes for content:

- – *Assistance in land and property rights*
- – *Integration of international standards into the national legislation*
- – *Considerations for transitional shelter projects (e.g. assistance with resolution of land rights)*

3.6.7 Return and transit items

Notes for content:

- *Return and transit packages for those who wish to return or relocate*
- *What items may be necessary to distribute*
- *Considerations for transitional shelter projects (e.g. what level of assistance will be required to relocate the transitional shelter?)*

3.6.8 Infrastructure and settlement planning

Notes for content:

- *Ensure safety and accessibility of essential settlement services*
- *Integrate infrastructure with programme planning*
- *Considerations for transitional shelter projects*

3.6.9 Environmental and resource management

Notes for content:

- *Impact of the disaster on health and availability of natural resources*
- *Restoring damage to the environment and minimise the environmental impact of transitional shelters.*
- *Considerations for transitional shelter projects*

3.7 Quality control

3.7.1 Supervision and technical expertise

Notes for content:

- *Technical support for appropriate standards and inclusion of DRR measures.*
- *Roles which may require technical expertise/ types of expertise required* »*Section xx: Strategy - monitoring plan*

3.7.2 Capacity building

Notes for content:

- *Capacity building for local partners*
- *Capacity building for beneficiaries*
- *Capacity building activities*

3.8 Procurement and logistics

3.8.1 Procurement and logistics

Notes for content:

- *Importance of correctly specifying materials*
- *Technical specifications*
- *Performance specifications*

3.8.2 Sourcing materials

Notes for content:

- *Existing regulations*
- *Rapid procurement*
- *Local sourcing*
- *National and international sourcing*
- *Stockpiles*

3.8.3 Assessing the market and market access

Notes for content:

- ***Basic considerations when sourcing materials***
- *Ethical concerns*
- *Environmental concerns*
- *Economic issues*
- *Developmental factors*
- ***Market assessment tools***
- ***Market support*** »*Section xx: Assistance methods*

3.8.4 Supply chain

Notes for content:

- ***Purchasing***
- ***Transport***
- *Assessment of available transport and infrastructure for transport of materials to site*
- ***Storage***
- *Warehousing options*
- ***Distribution and distribution systems***

3.8.5 Quality control

Notes for content:

- *Who controls quality at each step?*
- *Training on materials standards and quality checking*

3.9 Sign over to beneficiaries

Notes for content:

- *Continuation of technical advice/assistance after sign over*
- *Importance of communication of potential for upgrade, reuse, reselling and recycling of shelters to contribute to permanent reconstruction*
- *Formal receipts and official acknowledgement*

Transitional Shelter Guidelines consultation document

4. Site planning

This chapter is a complete draft (with diagrams included for the first sub section) offering technical advice on site selection and planning for transitional shelter programmes.

Questions for reviewers:

- **Is the information included in the construction techniques and building materials sections appropriate and accurate?**
- **Do the example diagrams convey useful information clearly?**

The structure of the chapter is as follows:

4.1 Site selection

Notes for content:

- *Criteria for site selection*
- *Site selection teams*

4.1.1 Site safety

Notes for content:

- *Topography and soil type requirements for disaster risk reduction*
- *Key recommendations for flood-prone sites*
- *Key recommendations for landslide-prone sites*
- *Key recommendations for earthquake-prone sites*
- *Key recommendations for storm-prone sites*
- *Safety buffer zones in volcanic and tsunami-prone areas*

- *Key recommendations in conflict affected areas*
- *Vector control*
- *Toxic threats*

4.1.2 Site legality

Notes for content:

- *Consideration of existing housing laws*
- *Time frame for land agreements for transitional use*
- *Land tenure and land provision*
- *Delays in land allocation*
- *Land tenure and land allocation issues*

4.1.3 Site appropriateness

Notes for content:

- *Choice of culturally sensitive/appropriate sites*
- *Consideration of local livelihoods and social connections*
- *Minimum space requirements for household activities*
- *Sufficient space for reconstruction activities*
- *Site accessibility*

4.2 Site planning and preparation

4.2.1 Site planning

Notes for content:

- ***The importance of good site planning***
- ***Conducting needs and resource assessments before planning***
- ***Topographical information to include in a site plan***
- ***Development of a physical plan (inc. WATSAN, infrastructure, etc.)***
- ***Consideration of cross-cutting issues in planning***
- *Gender*
- *Age*
- *Environment*
- *HIV/AIDS*
- ***Development of a community layout***
- *Avoid using a rigid grid design*

- *Use of a semi-open form to facilitate interaction with other communities*
- *Use of a decentralised layout for a community-based approach: U-shapes and H-shaped rather than squared shapes*

- ***Key planning standards and indicators for layout and household services***
- ***Key planning standards and indicators for communal services and infrastructure***
- ***Considerations for water supply systems***
- ***Considerations for fire prevention***
  - *Firebreaks*
  - *Minimum distances between shelters* » Section xx: Design to minimise risks- Fire prevention measures
- ***Considerations about main roads and pathways***
- ***Consider land requirements for household activities***
  - *Consider extra space for livestock, small-scale cultivations, and household open-air activities*
- ***Consider land/space requirements for construction activities***
  - *Consider extra space needed for warehouses and workshops*

4.2.2 Site preparation

Notes for content:

- ***Building site layout***
- ***Site clearance***
- ***Ground works, levelling and marking out***
  - *Preserve existing vegetation and top-soil*
  - *Construct banks to control surface runoff*
  - *Drainage lines*

Transitional Shelter Guidelines consultation document

5. Shelter design

This chapter is a complete draft (with diagrams included for the first sub section of each section) offering technical advice on shelter design for transitional shelter programmes. Information is provided on construction methods, building materials, internal conditions, and designing to minimise risk.

Questions for reviewers:

Qs ▸ **Does the information included in the construction techniques and building materials sections seem appropriate and accurate?**

Qs ▸ **Are there any other examples of construction techniques, building materials, or design elements to minimise risk which should be included?**

Qs ▸ **Do the example diagrams convey useful information clearly?**

The structure of the chapter is as follows:

5.1 Construction methods

Guidance

36. This section provides basic guidance on common construction techniques suitable for transitional shelter projects. Information is divided into sections on foundations, floors, walls, openings and roofs.

37. The examples provided in this section are not a comprehensive list, nor are they suitable for every situation.

They are intended as a basic primer to help the humanitarian worker in the field. Ideally, structures should be designed by a qualified professional. Further information about any of the construction methods described in this section and more can be found on the CD. ⊙ Construction methods

Key points for selecting construction methods

38. The following key points should be considered while selecting construction methods.

#3 Community

- **Involving the affected community:** construction methods and techniques should be selected in consultation with the affected population. The affected population will begin to recover and to construct shelters immediately following the disaster and these efforts should be supported through the choice of construction methods. »Section xx: Assessment.

#8 Standards

- **Structural performance standards:** construction methods should be selected to ensure that the shelters can meet performance standards which have been agreed to meet the needs of each beneficiary group.

#9 Process

- **Use of emergency relief items:** where possible, the construction techniques selected should make use of the emergency relief items distributed.

#10 Maximise choice

- **Maximising choice:** construction techniques should be selected to ensure that the shelters can be upgraded, reused, resold or recycled, or relocated, to contribute to the transition to a permanent solution.

5.1.1 Foundations

Function

39. The function of foundations is to transfer the load of the building to the ground. Improper foundations may compromise the integrity of the structure as shown in diagram XX.

Diagram XX **Types of damage that may occur with improper foundations**

Foundations for transitional shelters

40. Anchor, pad or strip foundations, discussed in the following sections, are likely to be the most appropriate types for use with transitional shelters. Larger more permanent structures may use alternative foundation types such as raft or pile foundations.

Foundation selection

41. The type of foundation used should be chosen based on

ground conditions, type of structure and risk of hazards. For complicated structures or difficult soil conditions, a suitably qualified engineer should be consulted.

Tip!

Foundations on rented or borrowed land

It is important to ensure that the rules and laws related to constructing foundations are well understood before construction starts on rented or borrowed land. Lease agreements may specify that only 'non permanent' or lightweight foundations be used.

Selecting foundations

42. The following key points should be considered when selecting and constructing foundations.

- Foundations should not be built on organic soils as this can cause them to sink. Organic soils are generally black and smell musty.
- Clay soils shrink and swell with changes in moisture content. Care should be taken to prevent this movement from damaging the structure.
- Adequate drainage should be provided to prevent water from undercutting the foundations.
- Foundations should distribute loads from the building evenly into the ground. Failure to ensure this may result in some parts of the structure sinking, causing cracks.
- Foundations should not be constructed from materials which will degrade in damp conditions over time, such as stabilised soil bricks.

Tip!

How deep should the foundations be?

In general, the worse the ground conditions the deeper the foundations need to be. It may be best to ask the owners of nearby houses which are in good shape how deep their foundations are to get a rule of thumb but average depths are between 50 and 100cm.

Anchor foundations

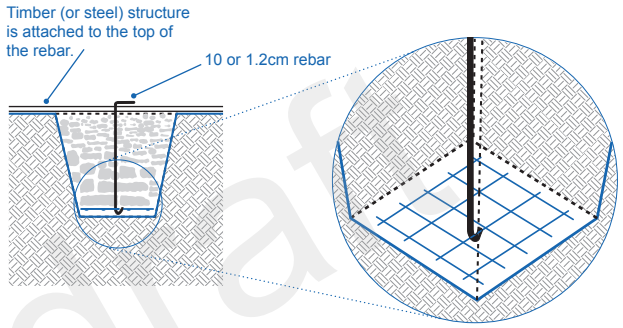
Function

43. Anchor foundations are simple to construct but should be used only with very light structures such as those made of a lightweight frame and plastic sheeting. This type of foundation offers very little additional support to spread the load of the structure in the ground so should only be used on firm soils containing little organic material.

44. Anchor foundations are primarily of use to 'anchor' light structures to the ground to prevent them from being blown away in high winds.

45. Diagrams XX and XX show debris anchor foundations and wooden anchor foundations respectively.

Diagram XX
Debris anchor foundation details



Step 1: dig holes - the size and number will depend on the design of the shelter

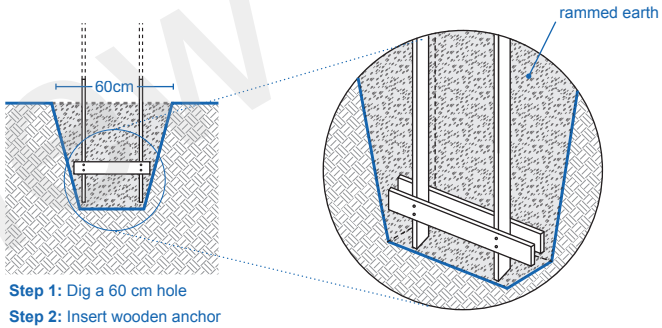
Step 2: place square of weld-mesh at bottom of each foundation. Min 1cm weld mesh

Step 3: create a hook in 1 or 1.2cm re-bar and attach to mesh

Step 4: backfill with compacted rubble

Diagram XX
Wooden anchor foundation details

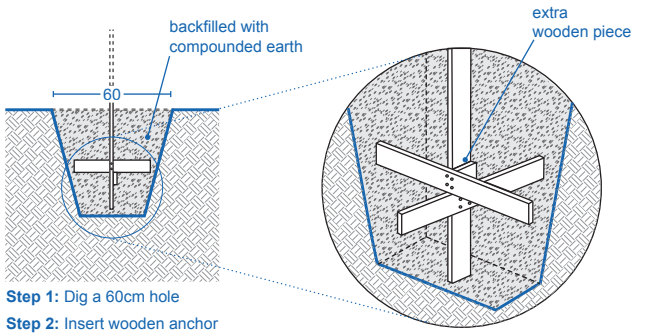
Type A



Step 1: Dig a 60 cm hole

Step 2: Insert wooden anchor

Step 3: Fill with concrete or rammed earth



Step 1: Dig a 60cm hole

Step 2: Insert wooden anchor

Step 3: Fill with concrete or rammed earth

Pad foundations

Function

46. Pad foundations are designed to support a high load over a limited area such as at the base of a column. They consist of a series of individual foundations, one for each column of a structure.

47. This type of foundation is fairly simple to construct and can be upgraded for use in a permanent structure if the household does not need to relocate.

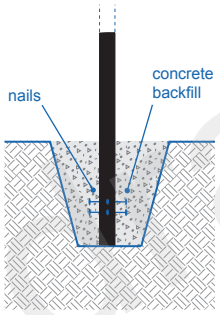
Avoid movement of pads

48. It is important to ensure that the 'pads' are not allowed to move relative to one another as this can lead to structural damage in the shelter. The relative movement of 'pads' can be avoided by only using this foundation type on firm ground and below the frost line on solid subsoil. Damage caused by water erosion should also be prevented.

49. Diagrams XX and XX show wooden post foundation options, and a plate and pad foundation respectively.

Diagram XX
Wooden post foundation details

Type A

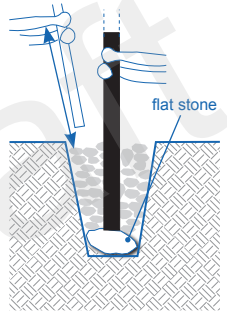


Step 1: dig a 60cm hole

Step 2: insert 2 nails for each side of the post with the heads protruding 3-4cm

Step 3: fill the hole with concrete

Type B

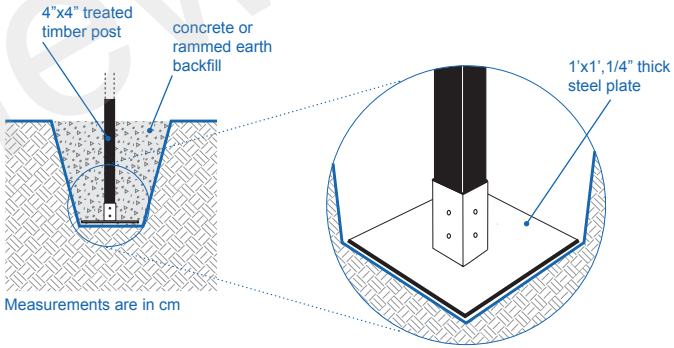


Step 1: dig a narrow 60cm hole

Step 2: insert the post resting on a large flat stone

Step 3: use a metal bar to firmly wedge rocks into the hole

Diagram XX
Plate and pad foundation details



Step 1: dig a 60cm hole

Step 2: secure metal plate to the post with bolts

Step 3: place plate and post into the hole and backfill with concrete or rammed earth

Strip foundations

Function

50. Strip foundations can support the length of a load bearing wall or a line of columns. They consist of two strips of foundation, each supporting a series of columns or a load

bearing wall.

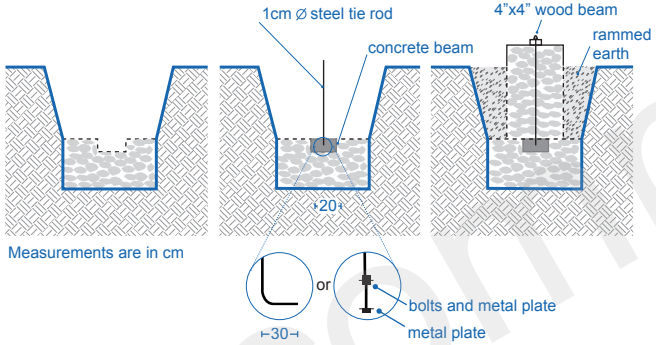
Properties

51. Strip and pad foundations can be constructed from stone or rubble. Stone foundations use mortar between the stones so are likely to last longer than rubble foundations, be more suitable for upgrading to a permanent structure, and will be stronger, making them more suitable for use in hazardous environments. The cement required for mortar is likely to be expensive, however, and the foundation is more complex to build.

52. Rubble foundations are cheaper, can use up rubble that would otherwise be discarded. There is also potential for the gaps between the rubble to improve site drainage. Rubble foundations cannot support as much weight as a stone foundation, however, especially on softer ground.

53. Diagrams XX and XX show strip foundations constructed from stone and rubble respectively. ERRA/UN-Habitat ,2006

Diagram XX
Stone foundation details and construction method

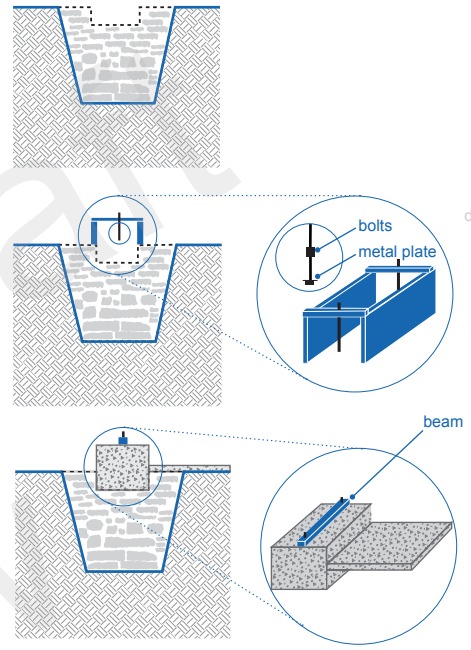


Step 1: dig a 60cm wide trench where the walls are to be constructed. Build up a stone or masonry footing with a channel for a concrete beam.

Step 2: put the tie rods into position and pour the concrete beam. Consider reinforcement for the concrete in difficult ground conditions.

Step 3: build up the foundation to 30cm above the ground and lay a ground beam. Attach the beam to the tie rods with washers and bolts. Backfill the trench with rammed earth.

Diagram XX
Rubble fill foundation details and construction method



Step 1: dig a 60cm deep trench under where the walls will go. The trench should be wider than the walls. Fill the trench with clean, compacted rubble or stones of 3cm diameter with a 10cm depression to pour the grade beam into.

Step 2: assemble formwork to 30cm above the ground and as wide as the wall. Tie bars should be attached to the formwork reinforcement with wire. The bottom of the tie bar should be at least 25mm away from the rubble.

Step 3: pour the concrete and when it hardens, disassemble the formwork, detaching it from the tie bars. The tie bars can then be incorporated into the new wall.

Tip!

Special requirements for deep trenches

Generally, heavier structures require deeper trenches but should a trench be dug below waist height or dug in loose soil, formwork is required to prevent collapse and injury. Materials, equipment and excavated soil should not be stored near the trench.

Connecting foundations to the rest of structure

Ensure transfer of loads to the foundations

54. It is usually sufficient to use simple methods of connecting the foundation to the rest of the structure for transitional shelters, however it is important to ensure that the connection method transfers loads evenly to the foundations.

Connection methods for light structures

55. The simplest method of attaching the foundations to the structure is to sink columns or frame elements directly into the foundations with no additional structure. This may be suitable for light structures on firm ground in the absence of hazards, however movements such as those caused by the shrinking and swelling of clay soil or wind loads are likely to severely affect the shelter by moving parts of the structure, pulling it apart.

Stronger connections

56. A stronger connection can be formed by using a ground beam to add stiffness to the structure, limiting the movement of shelter elements relative to each other.

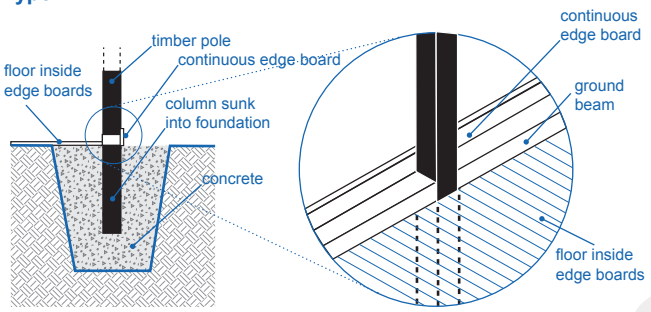
57. A ground beam can either be continuous and connected directly to the foundations, with columns resting on top of it, or split into segments between columns which are sunk directly into the foundations. These two options are shown in diagram XX.

58. Diagram XX also shows the use of an edge board which can be used to prevent vectors entering the shelter, and to confine a floor.

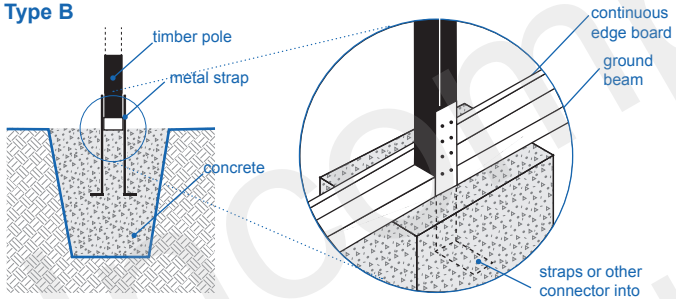
Diagram XX **Rubble fill foundation details and construction method**

Use of ground beams for spreading loads

Type A



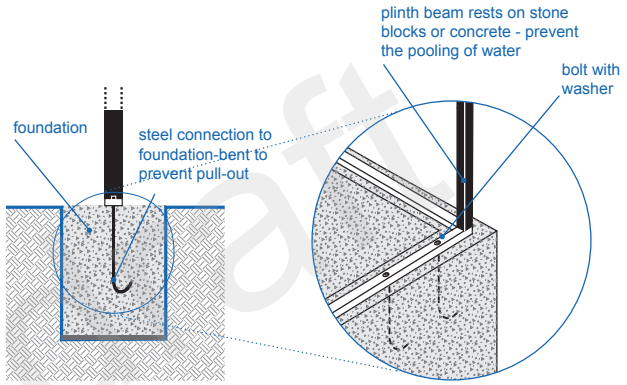
Type B



Measurments are in cm

59. When using strip foundations or a stone base, a continuous ground beam (called a plinth beam) should be used to evenly spread the load of the structure onto the foundations. This is shown in diagram XX (adapted from ERRA/UN-Habitat, 2006).

Diagram XX **Plinth beam details**



5.1.2 Walls

Function

60. Walls can be classified as load bearing or non-load bearing. For load bearing walls, the whole structure is used to transfer the weight of the building onto the foundations. With non-load bearing walls, the weight of the structure is transferred to the foundations through a frame or a series of load bearing columns to which the wall itself is attached.

61. Both load bearing and non load bearing walls provide protection from the elements, safety and security, and privacy for the building occupants.

Walls for transitional shelters

62. In most situations, the walls of transitional shelters should:

- be quick to construct;
- use minimal and inexpensive materials;
- be structurally suitable for supporting any materials which may be added or replaced to upgrade the shelter;
- be lightweight; and
- be suitable for reuse, reselling or recycling.

63. In most cases, non load bearing walls are the most appropriate for transitional shelters. These are discussed in the following section. Brief notes are also provided on load bearing walls, which should be considered where there is the possibility of beneficiaries upgrading lighter structures.

Non-load bearing walls

64. Non load bearing walls are generally lightweight and easy and fast to construct, however may lack thermal mass, leading to shelters which quickly become too hot or too cold if no measures are taken to prevent this.

65. It is important to be aware that non load bearing walls still have a weight and foundations must account for this in order to protect the building from sinking.

Materials used for non-load bearing walls

66. Non-load bearing walls are commonly constructed from plastic sheeting, woven sticks or matting, wood, bamboo, blockwork, CGI sheeting or other lightweight materials, attached to the load bearing columns.

Protection from vectors

67. The materials commonly used for non load bearing walls can leave shelters at risk of infiltration by vectors. The use of brick or blockwork to protect the lower part of the wall from vermin, water and dust should be considered. »Section xx: Vector control.

Bracing in non-load bearing walls

68. Structural elements may need to be included in non-load bearing walls in order to protect against horizontal forces such as wind or earthquake loads. These elements may be in the form of bracing with diagonal timbers, metal strap or 10mm thick structural plywood panels UN/OCHA, IFRC, CARE, 2009.

69. Diagram XX below shows the use of bracing to strengthen non load bearing walls.

Diagram XX **Structure and bracing in non load bearing walls**

Load bearing walls

70. Heavy construction is rarely used for transitional shelters, however the possibility of beneficiaries upgrading a lighter transitional shelter should be considered. Brief basic rules for load bearing walls are provided below. More information on some types of load bearing wall construction can be found on the CD Walls.

Materials employed for load bearing walls

71. Load bearing walls are commonly constructed from heavy stone, block, brick or rammed earth. The whole wall is used to transfer loads to the ground.

72. The following key points should be considered when constructing load bearing walls.

- In most cases, a wall thickness of approximately 45cm-60cm should be appropriate.
- As a general rule, walls should not be higher than 3 meters without substantial structural support.
- Care must be taken to ensure that no part of the wall experiences twisting, tension or bending forces as these can cause connections at corners to fail.
- Through stones or perpendicular bricks should be used at regular intervals to tie the structure together.
- Lintels and sills should be used at openings as described in »Section xx: Openings.
- Walls which are longer than approximately 4 meters are likely to require additional structural support in the form of a perpendicular wall or buttress.
- Disaster risk reduction elements »Section xx: Design to minimise risk, should be designed into the structure as they can be difficult to retrofit.

Upgrading light structures

73. Many transitional shelters will not be built with heavy construction but there may be the possibility of the beneficiaries upgrading a lighter shelter after construction.

5.1.3 Roof

Function

74. The main functions of a roof are to protect walls, floors and occupants from the elements, and to moderate the temperature inside the shelter.

Roofs for transitional shelters

75. In most situations, the roofs of transitional shelters should:

- be quick to construct;
- be lightweight; and
- be suitable for reuse, reselling or recycling.

76. Flat, single pitched and double pitched roofs, discussed in the following sections, are in most cases the most appropriate types of roof for use with transitional shelters.

Roof selection

77. The type of roof used should be chosen based on climate, culture and the prevalence of natural hazards. In areas where natural hazards present risks, or when building larger structures, a suitably qualified engineer should be consulted.

Diagram XX
Common names for roof components

Use of an overhanging roof

78. Roofs should have an overhang which is sufficient to prevent water from falling or splashing on to the walls and foundations. An overhang of approximately 25cm is often sufficient, however prevailing winds or high walls can mean that a longer overhang is required. Diagram XX below shows the use of an overhanging roof to protect a shelter from water damage.

Diagram XX
Use of an overhanging roof

Loads on a roof

79. Roofs should be designed to carry their own weight and also variable loads such as snow, covering material (including material used in potential upgrades), wind and, where necessary, people conducting maintenance.

Design of pitched roofs

80. Roof pitch is important. Excessively steep roofs may blow in due to the high wind loading, while low pitched roofs are more exposed to wind suction and may be blown away. This is shown in diagram XX.

Diagram XX
Wind effect on roof structures

Double pitched roofs

Properties

81. Double pitched roofs are typically built at angles of 25-45°. Double pitched roofs can be built with a separate flat ceiling to control temperature fluctuations inside the shelter.

Use of trusses in double pitched roofs

82. Most single family transitional shelters are likely to be small enough to make multiple rows of trusses unnecessary. Instead, purlins may span the whole length of the roof to support the covering. Diagram XX, below, shows details of a standard double pitched roof.

Diagram XX
Double pitch roof details

83. Diagram XX shows design techniques which can be used to protect against common failure modes in a double pitched roof.

Diagram XX
Roof failure and solutions

Single pitched roofs

Properties of single pitched roofs

84. Single pitched roofs can be simpler to construct than double pitched roofs, though the total height can make construction difficult. The angle of the pitch should be no less than 30° to prevent uplift from the wind from damaging the structure or pulling the roof away from the walls.

Flat roofs

Properties of flat roofs

85. Flat roofs are the simplest roof type, however they are the most at risk of damage from uplift caused by strong winds and are therefore not suitable for use in high wind or areas at

risk of storm.

86. Flat roofs should be built on a slight gradient of at least 3cm per meter in order to avoid the formation of pools of water which can infiltrate the roof or become breeding grounds for mosquitoes.

Connecting the roof to the rest of the structure

Roof fixing

87. A wall plate should be used to attach the rafters and, if necessary, the purlins to rest of the structure. This is shown in diagram XX. It is important for all connections to be strapped to prevent wind lifting roof from walls.

Diagram XX
Roof fixings

5.1.4 Openings

Function

88. Doors and windows are necessary for access, light and ventilation but care must be taken to ensure they do not compromise the structural integrity of the shelter.

89. Openings in load bearing, and in non-load bearing walls are discussed in the following section.

Key recommendations for designing openings

90. The key points below can be applied to openings in both load bearing and non load bearing walls.

- Openings should be positioned away from corners as this weakens the structure. This is especially important in areas at risk of earthquakes. »Section xx: Design to minimise risk.
- Lintels, when used, should be set at a uniform height on the exterior walls in order to distribute loads evenly throughout the building.
- Excessively large openings should be avoided. As a general rule, any opening more than a meter wide will probably require additional reinforcement.
- Doorways should allow access to children, disabled people and the elderly. As a general rule, doorways should be at least 900mm wide with low handles that are easily grasped. Access ramps for wheelchairs should be

considered.

- Vector control methods should be included where necessary such as mosquito nets on windows and a 10cm vertical edge to prevent crawling vectors entering »Section xx: Vector control.

Diagram XX
Max dimensions of walls and openings

Openings for transitional shelters

91. Windows and doors can be valuable and may be suitable for reuse in permanent reconstruction. Shelters should be designed with this in mind.

Openings in non-load bearing walls

92. Lightweight construction often includes cross bracing and other reinforcement. Openings should be placed so that they do not compromise these features.

Openings in load bearing walls

93. Lintels and sills should be used to reinforce openings in stone and masonry walls. Openings should not compromise DRR features in the building such as seismic bands »Section xx: Design to minimise risk.

5.1.5 Floors

Function

94. A well constructed floor can improve the thermal performance of a shelter and improve the usability of a shelter by making it easier to clean. Solid floors can also provide thermal mass.

Floors for transitional shelters

95. Floors may not be a first priority in transitional shelter construction; the option of adding a floor to a completed transitional shelter as an upgrade may be considered.

96. The construction and use of solid and suspended floors are outlined in the sections below.

Solid floors

Properties of solid floors

97. Solid floors consist of a subfloor and a finish such as rammed earth or concrete. The top of the floor should be at least 15cm above ground level to prevent water infiltration and a waterproof barrier may be required to prevent rising moisture from the ground from affecting the floor.

98. Subfloors may be constructed using the following steps.

1. Lay a gravel drainage layer, 2.5-30cm thick, depending on site conditions.
2. Lay a vapour barrier as described in the tip box below.
3. Pour a 5cm layer of a wet mix of clay, sand and gravel and compact. Repeat up to a final height of 100mm and make sure the final layer is hard, level and clean.

Tip!

Vapour barrier

A vapour barrier may be necessary to prevent moisture from the ground from making the floor damp. There are two common types of vapour barrier:

- plastic sheeting (1000g polythene) resting on 25mm of sand with 25mm of sand on top. The sand protects the plastic from damage from sharp stones; or
- a 100mm layer of clay and earth, bitumen and earth or lime stabilised sandy soil.

Rammed earth floors

99. Rammed earth floors have a smooth leather-like appearance and do not require costly materials. They are, however, labour and time-intensive.

Use of test floors

100. Before building a rammed earth floor it may be useful to make a number of small (approximately 1m x 1m) test floors to train the builders in proper technique and to ensure that there is no cracking which can be caused by the use of an unsuitable mix.

Construction steps

101. A rammed earth floor may be constructed using the following steps.

1. Lay a subfloor (as outlined above).
2. Prepare an earth mixture which contains a ratio of 6 sand: 2 clay: 1 chopped straw (approximately 1.3cm length). Use a soil test »Section xx: Stabilised earth to help determine this and make sure there is no organic content.
3. Apply the earth mixture wet in a 25mm layer and compact. Let it dry.
4. Apply four coats of sealant such as hot boiled linseed oil. The first coat should be pure oil and successive coats should be diluted with thinner until the final coat at ¼ oil.

Concrete floor

102. Concrete floors are simple, quick and durable but require large quantities of expensive cement.

Reinforcements to reduce cracking

103. The quality of concrete floors can be improved by adding wire mesh as reinforcement and to reduce cracking, and by laying moist canvas, sawdust or straw on the curing concrete to keep the concrete damp, providing it with sufficient moisture to cure.

Construction steps

104. A rammed earth floor may be constructed using the following steps.

1. Lay subfloor (as outlined above).
2. Lay any reinforcement and pour a 50mm slab of concrete.
3. Finish with a sand/cement screed, concrete sealer or thick paint.

Suspended floors

105. Suspended floors are elevated above ground level and usually consist of timber floor joists covered with wood boards, plywood or matting.

Elevation of the floor to reduce heat loss

106. Suspended floors can be used to reduce heat loss through the ground or raise the house above potential flood waters. They are, however, relatively expensive and complex to construct. Diagrams XX and XX show block and joist, and hanging joist type suspended floors respectively.

Diagram XX
Block and joist floor

Diagram XX
Hanging joist floor

5.2 Building materials

Guidance

107. This section provides basic information on common materials that may be suitable for use in transitional shelter construction. Information is divided into sections on timber and manufactured wood, bamboo, plastic sheeting, mortars and renders, concrete and reinforcement, rammed earth, thatching and corrugated metal sheets.

Further information

108. The information in this section is intended as a basic primer to help the humanitarian worker in the field. Further information on using the materials discussed in this section can be found on the CD Building materials.

5.2.1 Timber and manufactured wood

Uses

109. Timber may be used in sawn sections (planks and beams) or as poles to form structural elements of a shelter such as load bearing columns and foundation elements »Section xx: Foundations; Section xx: Non load bearing walls. Poles are less wasteful than sawn timber because they use the whole tree and are stronger than the equivalent cut timber but their round sections make them more difficult to connect.

110. Manufactured wood such as plywood or chipboard can make good wall or floor coverings and can provide lateral reinforcement if connected properly. Ensure however that these materials remain dry as water can badly damage them.

111. Care must be taken to ensure that timber is responsibly procured as illegally or irresponsibly procured timber can be harmful to the environment and can result in criminal prosecution. »Section xx: Environmental considerations; ERRA/UN-Habitat, 2006.

Protection from water and pests

112. Wood will degrade when exposed to water or to pests such as termites. Degradation is more likely in cases where the timber is placed directly in the ground, however treatment or metal flashing can help to prevent this. UN/OCHA, IFRC, CARE, 2009.

Tip!

Wood treatment
Organic materials such as wood or bamboo will degrade over time, especially in damp conditions. A cheap way of preserving such materials is to soak the elements overnight in a mix (2:1) of waste engine oil and diesel or a 5% solution of borax.

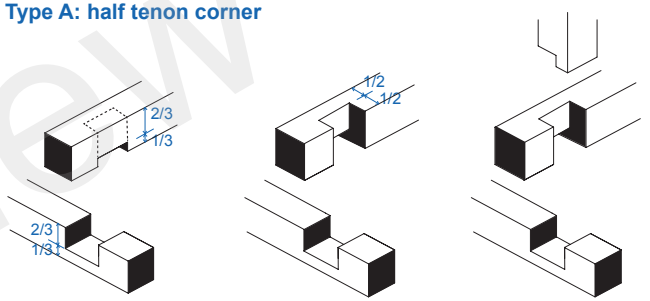
Connection types

113. Nails used to connect elements should be hammered in at differing angles and large nails will require pre drilling to prevent splitting of the wood. At least two nails should be used per joint and metal plates or straps can be used to strengthen joints. Bolts will require regular tightening and should be used with washers to prevent them from sinking into the timber.

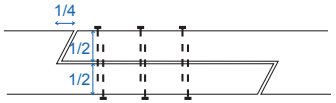
114. Diagrams XX and XX below show common connection types for cut timber and timber poles respectively.

Diagram XX
Block and joist floor

Type A: half tenon corner



Type B: lap joint



At least two nails should be used per joint and metal plates or straps can be used to strengthen joints.

adapted from ERRA, UN-Habitat, 2006

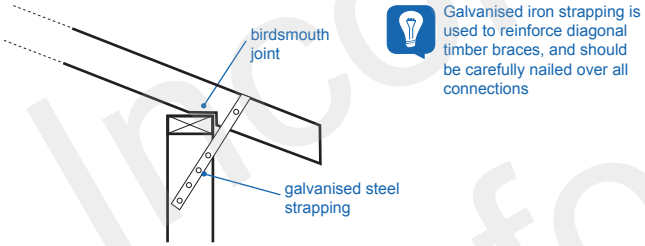
Diagram XX
Cut timber connection types

Diagram XX
Timber pole connection types

Use of metal straps to reinforce connection

115. Tension connections or any connection in hurricane prone areas should be reinforced with straps. Diagram XX shows good practise hurricane strapping. Flinn, B., Unknown

Diagram XX
Timber pole connection types



adapted from ERRA, UN-Habitat, 2006

Tip!

Example specification for metal strapping
Material: galvanised steel
Thickness: 0.9 mm
Width: 20 mm
Maximum hole diameter: 6.5 mm holes at regular intervals.
Note: holes decrease the cross sectional area, so the smaller the holes the better. Hurricane strapping with no holes is strongest. Haiti Shelter Cluster, 2010.

5.2.2 Bamboo

Uses

116. Bamboo can be used in structural members but also in many other forms such as tiles, matting and reinforcement. Bamboo is, relatively strong, and cheap. It is also very fast growing which often means that it is simpler to manage the environmental impact of using bamboo.

Protection from fungus and other forms of degradation

117. Care must be taken to mitigate fungus and other forms of degradation. This is especially true where bamboo is in contact with soil. There are a number of ways to treat bamboo to increase resistance to water. »Section xx: Wood treatment tip box; UN/OCHA, IFRC, CARE, 2009.

Connection types

118. Bamboo connections must ensure that the bamboo is not split or crushed. Nails are especially damaging to bamboo. Diagram XX shows a number of common bamboo connection types.

Diagram XX
Bamboo connection types

5.2.3 Plastic sheet

Uses

119. Plastic sheeting is cheap, lightweight, and commonly included in stockpiles making it widely available post emergency. It is commonly included in initial distributions of NFIs and can be later incorporated into transitional shelter. Further, detailed, information on plastic sheeting can be found in the plastic sheeting guidelines on the CD. IFRC, OXFAM, 2007.

Protection

120. Plastic sheet has a relatively short lifespan of six months to two years. Lifespan can be extended by protecting the sheet from the sun, and from damage, with other materials such as thatch.

Connection types

121. Fixings and connections should be spaced no further than 30cm from each other in order to prevent tearing. The sheet should be kept taut to avoid flapping and pooling of water, however it should be remembered that changes in temperature can cause the sheeting to expand and contract.

122. Diagram XX shows common connection types for plastic sheeting.

Diagram XX
Plastic sheeting connection details

5.2.4 Bricks, blocks and stone

Uses

123. Bricks, blocks and stone can all be used in the foundations and walls of a transitional shelter.

124. It is possible to make your own stabilised soil blocks which can be cheaper than acquiring commercial materials. Soil Stabilised Blocks

Tip!

Testing for quality

One way to check the quality of a brick, block or stone is to use a ring test. To perform a ring test, knock two blocks or bricks together, and listen for a sharp ringing noise. If there is not a sharp ring, the blocks may not be of sufficient quality.

Practical Action, Unknown.

Protection

125. Render can be used to extend the lifespan of mud brick walls. For mud walls, mud-straw mid renders or cement-lime renders are most suitable. Renders used on mud walls should not be cement based as the render will trap water then fall off mud walls »Section xx: Mortars-Mud; Section xx: Mortars-Cement.

Connections

126. Bricks, blocks and stone should generally be laid in alternating courses, with through stones, or perpendicular stones, to tie the wall together. Mortar is used in a 10mm or thicker layer between the bricks, blocks or stones.

127. Diagram XX shows a block or stone wall with through connections.

Diagram XX
Through connections in block or stone walls

5.2.5 Mortars and renders

128. Mortar binds stones bricks and blocks together and can be made of cement, lime or mud.

- **Cement renders and mortars:** are very strong and easy to use but can be expensive and crack with movement.
- **Mud renders and mortars:** degrade quickly when in contact with water and therefore should be protected, and are not suitable for use in foundations. Mud renders and mortars are potentially the cheapest form of mortar.
- **Lime renders and mortars:** can be cheaper and more forgiving of movement and damp in a structure than cement but takes time to harden.

Cement

129. Table XX shows standard ratios for cement renders and mortars

	cement	sand	lime
Standard cement mortar	1	3-4	0
Cement mortar with lime	1	4	1
Cement render	1	3	

Adding water

130. Sufficient water should be added to make the cement workable, while staying as dry as is practical. Water should be clean and free of organic material. Salt water can be used, however it reduces the final strength of the cement and is unsuitable for use with steel reinforcement.

Safety

131. Cement should be mixed on a clean surface such as wooden boards or concrete.

1. Pour cement onto a pile of sand and mix well.
2. Make a hole in the middle of the mixture to form a ring.

3. Pour water into the centre of the ring.
4. Heap dry mix from the outside edge of the ring into the water, until all the water has mixed with the dry materials. Thorough mixing is essential for good cement.

Process

132. Cement is an irritant and prolonged exposure to skin should be avoided. If cement comes in contact with eyes, it should be immediately washed out with lots of water. Appropriate clothing should be worn to avoid repeated or prolonged exposure to the skin.

Mud

Standard mixes

133. Mud mortars and renders typically have a clay content of 10-15 percent Practical Action, 1999 and can be improved with the addition of straw, hair, pine needles or other fibrous material. Another potential additive is cow dung at a ratio of one part dung to five parts earth by weight. Mud mortar, plasters and renders.

Stabilised mud

134. Mud can be stabilised by adding cement, typically in a 20:10:2 sand, clay soil, cement ratio. Stabilised mud must be kept damp and protected from harsh sun for a few days in order to aid the curing process.

Tip!

Sand

The quality of the sand is extremely important in construction

- Sand should be clean and free of organic material. Wash it if necessary
- Sand should be as sharp and angular as possible to better grip the cement
- Sand should consist of a variety of grain sizes that will

5.2.6 Concrete and reinforcement

Properties of concrete

135. Concrete is widely used due to its strength, versatility and ease of use. It can be expensive however and its use will generally be kept to a minimum in transitional shelter projects. Concrete is good in compression but poor in tension. Steel reinforcement can be used to compensate for this.

General rules for concrete mix

136. Concrete is mixed by making up a cement as described in the mortar section and then adding damp, clean aggregate, with enough later in it to make the mixture workable. » Section xx: Mortars-Cement.

137. Table XX shows commonly used concrete mix ratios

Standard mix	1	3	6
Economy mix for mass concrete such as foundations	1	4	8

Testing concrete

138. A slump test can be used to test a concrete mix. This involved filling a specially sized cone with the concrete mix and analysing the 'slump' of the concrete once the cone is removed. This is shown in diagram XX.

Diagram XX
The slump test

Pouring and compacting concrete

139. Concrete is poured either into a temporary mould such as wooden formwork with a coating of light oil to prevent sticking, or in the case of foundations, into a hole in the ground. The concrete should then be compacted to remove any trapped air and voids, which can reduce strength and durability. Compacting can be started with a shovel and then be finished with a flat wooden board. A vibrator can also be used.

Curing concrete

140. Concrete should typically be allowed 24 hours to cure before it is walked on, and can take 28 days to achieve a high structural strength. In the first three to seven days, concrete should be kept damp by covering it in plastic sheet or wet burlap, kept out of strong sun and kept from freezing with insulation or heaters.

When and where to use reinforcement

141. Reinforcement can be added to concrete to improve tensile and bending strength. This reinforcement should be covered with at least 2.5cm of concrete to protect it from water and other weather.

Diagram XX
Where to use reinforcement

5.2.7 Rammed earth

Uses

142. Rammed earth can be used in walls and foundations but the methods remain the same. The earth should have a sand content of 50-60% and a clay content of 10-20%and can be optionally stabilised with 5-8% cement. If there is more clay in the soil then the higher amount of cement is required 🕮 Practical Action, Unknown.

143. Damp soil is typically poured in layers 10-25cm think and then compressed to approximately half its thickness with a tamping tool as shown in the diagram XX below.

Diagram XX
Rammer for compressing earth

144. Formwork is required for the creation of rammed earth walls. This formwork is typically 35cm wide and securely reinforced to prevent bulging. When the wall is at its full height the formwork is removed.

Protection

145. Render is required to protect rammed earth walls but this should not be cement based as water can become trapped between the permeable mud and impermeable cement layers. Trapped water can cause the render to fall off the wall. Mud or cement/lime render would be suitable » Section xx: Mortars-mud; Section xx: Mortars-Cement.

5.2.8 Thatching

Uses

146. Thatching is commonly used on shelter roofs, or as lightweight and inexpensive walling, flooring and doors when woven into screens. Local knowledge is important for both procurement and use.

Thatch as roofing material

147. Thatch can be used either as a covering for plastic sheeting or CGI sheeting, or as a roofing material by itself.

148. When used as a covering for plastic or CGI sheeting, the thatch insulates the roof, preventing heat loss in cold climates and heat gain in warm climates. It also acts as sound insulation, as rain hitting plastic or metal roofs can be quite loud.

149. When used on its own as a roofing material, thatch is commonly laid in bundles up to 30cm thick. The roof should be at a pitch of 40-50° to prevent water soaking into the thatch. Thatch can be surprisingly heavy, with 10m2 of thatch weighing approximately 300kg. It is therefore important that this weight be factored in when designing the walls and foundations.

5.2.9 Corrugated metal sheets

Uses

150. Corrugated Iron (CGI) sheets are easy to use and often widely available, either locally or by import. The sheets are usually suitable for reuse and should be used in a way that facilitates this. The key drawback of CGI sheeting is the poor thermal performance, which can mean that shelters rapidly heating up to very high temperatures in the sun and rapidly cooling at night if not properly insulated. Care must be taken to mitigate this.

Connections

151. CGI sheets can be fixed to purlins. Table XX provides date on how to space purlins when using with CGI sheet 9adapted from 🕮 Oxfam, 2005.

Table XX
Spacing of purlins when using CGI

Thickness of CGI sheets	Maximum spacing of purlins
0.63mm – 24 guage	1.60m
0.80mm – 22 guage	1.80m
1.00mm – 20 guage	2.00m
1.25mm – 18 guage	2.40m
1.60mm – 16 guage	2.80m

152. Wind ties can be made from flat iron of approximately 4x0.6cm, fixed just above at the eaves ends of the sheets in continuous lengths and bolted down every 1.2m. 🕮 Oxfam, 2005.

Protecting the ridge of the roof

153. The ridge of the roof should be covered with a ridge section of plain 20-gauge Galvanised Iron sheet, with a minimum of 22.5cm overlap on either side of the ridge over the

sheet. Oxfam, 2005.

Forming holes in CGI

154. Holes should be drilled, as opposed to punctured, in the ridges of the corrugation.

Fixing CGI sheeting

155. CGI sheets can be secured to wood framing by screws or jagged nails 65–75mm long, at intervals not exceeding 30cm on every purlin. Oxfam, 2005.

156. Diagram XX shows good practise methods of fixing CGI sheeting.

Diagram XX
Fixing CGI sheeting

Diagram XX
CGI sheeting details

5.3 Internal conditions

Introduction

157. This section provides an overview of internal conditions criteria which should be considered when designing a shelter. Criteria are divided into internal climatic conditions and socio cultural conditions.

158. Shelter design should be tailored to local climatic conditions to ensure that acceptable internal conditions can be achieved. Ideal internal conditions will vary depending on a number of factors such as the conditions commonly provided by local traditional buildings, and the household and livelihood activities which will be undertaken in the shelters.

5.3.1 Internal climatic conditions

Temperature

Daily and yearly variations

159. The effect of both daily and yearly temperature variation on the internal conditions should be considered. Sometimes the difference between day and night time temperatures may be as much as 20-30 degrees centigrade, while temperatures may vary by 40 degrees between winter and summer » Section xx: Climatic design.

Factors affecting humidity

160. The temperature in a shelter will be affected by:

- the outside temperature;
- the level of insulation;
- the thermal mass of the shelter materials;
- the amount of ventilation;
- the number of people, and heat emitting items in the shelter; and
- the use of stoves and heaters in the shelter.

Humidity

Factors affecting humidity

161. Humidity is the amount of water vapour in the air. Sources of humidity inside a shelter include:

- water brought into the shelter, for example as rain or snow on wet clothes;
- people in the shelter, emitting moisture through breathing; and
- the use of heaters and stoves in the shelter, producing water vapour as a product of combustion.

162. The humidity in a shelter will also be affected by the outside humidity and the level of ventilation and 'breathability' of construction materials.

Condensation

163. Warmer air is able to hold more moisture than cold air. As humid air cools, for example, when it comes into contact with the colder walls and windows of the inside of a shelter, water vapour can be caused to condense from the air and form condensation on the shelter materials. Condensation should be avoided where possible as it can lead to mould and the degradation of materials such as plywood and thatch.

164. Shelters in cold, and hot wet, environments are the most at risk of condensation forming. Design advice for avoiding condensation is provided in »Section xx: Climatic design.

Factors affecting humidity

165. In cold climates, high humidity levels increase cooling as moisture on skin and clothes leads to evaporation which removes heat. In hot climates, high humidity can make people

feel hotter as sweat is less able to evaporate from the skin, reducing the cooling effect.

Ventilation

Factors affecting ventilation

166. The level of ventilation will affect the temperature, humidity and air quality, in addition to the comfort level, where the movement of air is noticeable.

Effect on temperature

167. Wind increases cooling by causing warm air to be removed from the body. It follows that ventilation should generally be maximised in warm climates and minimised in cold climates. Design advice for achieving suitable levels of ventilation is provided in »Section xx: Climatic design.

Minimum acceptable levels

168. It is important that a minimum level of ventilation should be achieved at all times, to ensure sufficient air exchange. The Transitional Shelter Standards suggest the inclusion of an un-blockable hole of area 0.01m2 in shelters which may otherwise lack ventilation. If shelters are completely sealed, the inhabitants may be at risk of asphyxiation, carbon monoxide poisoning and respiratory diseases caused by smoke 🕮 Shelter Centre, 2010.

169. Acceptable levels of ventilation are likely to occur naturally in many locally constructed transitional shelters, as air can enter through cracks and joints.

5.3.2 Socio-cultural issues

Internal volume and floor area for livelihood activities

170. The necessary internal volume and covered area of a shelter will depend on a number of factors such as:

- household and livelihood activities to be undertaken in the shelter;
- number of people to inhabit each shelter; and
- average size of shelters used before the disaster.

171. It is likely that shelters will need to be larger in more hostile environments where it is necessary to undertake livelihood and household activities inside.

172. SPHERE guidelines suggest a minimum covered area of 3.5m2 per person. The Transitional Shelter Standards, which provide guidance focussed on stockpilable, airliftable shelters, suggest a minimum covered area of 17,5 m2 for a standard shelter, with a minimum standing height of 1800mm over at least 60% of the covered floor area. 🕮 The Sphere project, 2005.

Light for household activities

173. Factors affecting lighting requirements in a shelter may include:

- external climatic and security conditions;
- the type of livelihood activities to be undertaken in the shelter; and
- the natural light levels.

174. Internal lighting requirements will vary depending on the activities to be undertaken in the shelter. Areas in which household or livelihood activities are to be undertaken may require relatively light levels, depending the activity.

175. Shelters may be designed such that natural light can enter the shelter through windows and open doors or through translucent materials, for example where plastic sheeting or loosely woven grass matting is used for walls.

Privacy issues

176. It should be possible to divide the internal space to provide privacy between people of different ages and sexes. This may be achieved through the provision of movable screens or hanging sheets, or by the inclusion of permanent walls in the design.

177. The shelter should prevent those outside from being able to tell whether the shelter is occupied. This means that it must be possible to cover doors and windows, and that it should be possible to light the shelter at night without creating silhouettes on the walls which are visible from outside the shelter.

5.4 Design to minimise risk

5.4.1 Natural hazard proofing

Introduction

178. This section provides basic guidance on techniques which may be used to make transitional shelters more resilient to natural hazards. Information is divided into sections on earthquakes, storms, floods, landslides, volcanoes and fires.

Hazard proofing verses hazard resilience

179. Ideally, all transitional shelters would be hazard proof, however in some cases the complete hazard proofing of shelters may be considered too expensive or time consuming or to require skills which are not readily available. In these cases, it may be appropriate to design transitional shelters to be hazard resilient, rather than completely hazard proof. At a minimum, transitional shelters should remain structurally sound for long enough for the inhabitants to evacuate the shelter without risk of injury or death due elements of the shelter falling or collapsing.

180. Transitional shelter programmes should reduce the vulnerability of the affected population.

Potential for disseminating DRR techniques

Where possible, transitional shelter design should be used as a platform for communicating disaster risk reduction design and construction techniques. Transitional shelters which are

hazard resistant or hazard resilient may benefit members of the affected population other than the beneficiaries if they are accepted as examples of good building practise.

Further information

181. The examples provided in this section are not a comprehensive list, nor are they suitable for every situation. They are intended as a basic primer to help the humanitarian worker in the field. Ideally, structures should be designed by a qualified professional. Further information about any of the hazard proofing methods described in this section and more can be found on the CD. Design to minimise risk.

Earthquake-resilience measures

Foundations

182. Foundations should be deep, carefully constructed and well connected to the rest of the structure. »Section xx: Foundations.

Avoid heavy roofs

183. Heavy roofs should be avoided as they can cause injury if they collapse. Heavy loads on rooftops should also be avoided, for example multiple layers of mud or soil for insulation over a flat roof, and equipment such as water tanks.

184. Light roofs such as CGI sheeting over a timber frame, are less likely to cause injury on collapse.

Position openings away from corners

185. Doors and windows should be positioned away from corners, and large openings (over approximately 1 meter wide) should be avoided.

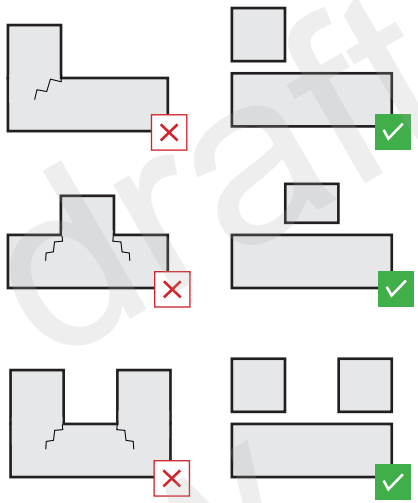
Reinforce walls

186. Thin, high or long walls should be reinforced with buttresses at regular intervals » Section xx: Load bearing walls.

Upgrades and extensions

187. Simple plans are recommended for future upgrading and extension. Asymmetrical, L-shaped, H-shaped or T-shaped designs are more vulnerable to cracking in the corners. These concepts are shown in diagram XX (adapted from UNEP, 2007).

Diagram XX **Simple plans for seismic proof shelters**



adapted from Corsellis, T. And Vitale A., 2005

Ring beams

188. Ring beams (made from timber or concrete) should be placed at floor level, at the lintels, and below the eaves to help to bind the structure together. The first band should be placed one foot above ground level.

Diagonal bracing

189. Diagonal bracing in non load bearing walls will help to resist horizontal earthquake loads, however the bracing must be well connected to the main structure in order to be effective. »Section xx: Non load bearing walls.

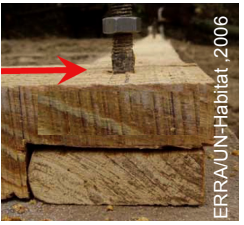
Connections

190. All connections should be reinforced. This can be done by using straps or plates. Information on connection types for each material, including the use of reinforcements, is provided in the mateirlas sections. »Section xx: Materials.

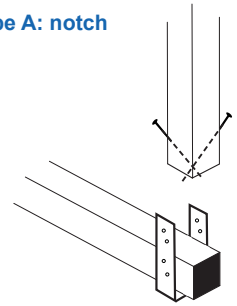
191. Timber beams and ring beam connections should be secured with a notch of 1 inch in the corners or with a long lap

joint. »Section xx: Timber and manufactured.

Diagram XX
Simple plans for seismic proof shelters

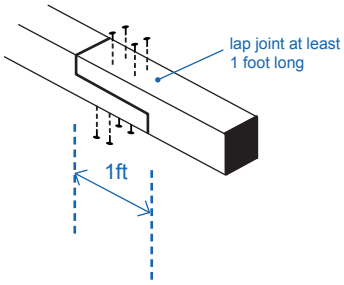


Type A: notch



Timber beams and ring beams connections should be secured with a notch of 1 inch in the corners.

Type B: long lap joint



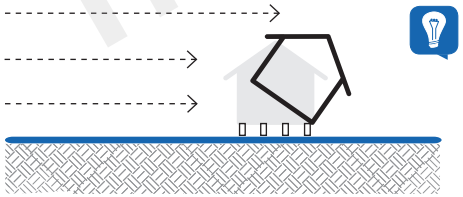
Or with a long lap joint - use a minimum of two nails for proper wood-to wood joints and pre-drill all the timber before nailing to avoid splitting.

adapted from ERRA, UN-Habitat, 2006

Storm-resilience measures

192. Foundations should be sufficient to ensure that shelters are able to withstand uplift forces in strong winds. Shelters which are not properly attached to their foundations may overturn, as explained in the diagram xx below (adapted from Oxfam, 2005) »Section xx: Foundations.

Diagram XX
of anchor foundations to prevent wind uplift



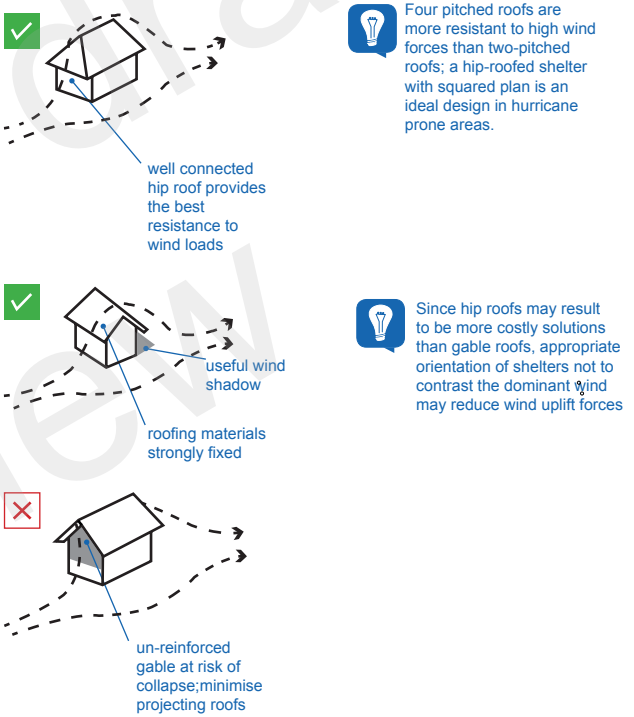
Foundations should be appropriately dimensioned to make shleters withstand uplift forces in strong winds.

adapted from Corsellis, T. And Vitale A., 2005

193. Roofs should be appropriately pitched, well strapped down and appropriately oriented in order to reduce the chance

of them detaching from the rest of the structure in strong winds. Roof pitches in cyclone prone areas should be between 30°-45° for double pitched roofs and between 12°-14° for single pitched roofs. In areas at severe risk of storms, hipped roofs may be considered, however in most cases, hipped roofs are likely to be too expensive and complicated for use in transitional shelters. »Section xx: Roofs. Considerations on roof shape and orientation are provided in the diagram xx below (adapted from Oxfam, 2005).

Diagram XX
Considerations on roof shape and orientation



Four pitched roofs are more resistant to high wind forces than two-pitched roofs; a hip-roofed shelter with squared plan is an ideal design in hurricane prone areas.

Since hip roofs may result to be more costly solutions than gable roofs, appropriate orientation of shelters not to contrast the dominant wind may reduce wind uplift forces

adapted from Corsellis, T. And Vitale A., 2005

Reduce overhangs to limit uplift

194. Excessive roof overhangs should be avoided in areas at risk of storm as a large overhang can allow the wind to leaver the roof from the rest of the structure. A maximum recommended extension of the overhang in cyclone prone areas is 15cm.

Openings

195. Openings positioned close to the ridge of a roof to help to balance internal and external pressures and to facilitate natural ventilation.

196. Shutters should considered to provide protection for glazed windows.

Site layout and vegetation

197. Shelters arranged in clusters or zigzag patterns dissipate the wind forces better than when arranged in rows, where the tunnel effect is amplified. Vegetation provides an ideal buffer against wind.

Hurricane bracing

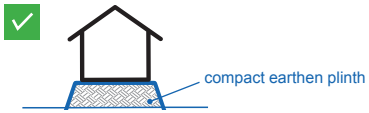
198. Hurricane strapping and extra bracing is important in high winds, and is particularly important at the roof-wall connections to resist uplift forces. »Section xx: Timber and manufactured wood.

Flood-resilience measures

Foundations and plinths

199. Elevated foundations, or plinths, may be used to raise the living area above the level of potential flood water. Plinths may consist of simple platforms made of a mix of compacted sand, clay and cement or RCC and bricks; the plinth level should correspond to the maximum flood level, as shown in diagram XX.

Diagram XX **protection from persistent water: elevated plinth**



Foundations should be appropriately dimensioned to make shleters withstand uplift forces in strong winds.

adapted from Practical Action, 1999

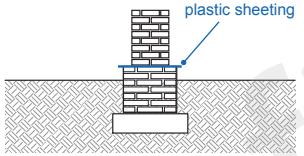
Flood proofing walls

200. As an alternative to raising the whole structure, a flood proof wall may be constructed to the height of the predicted water level. Flood proof walls may be constructed from fired brick, with cement mortar, and should ideally be plastered (see below). Above the predicted water level other, non flood resistant, materials may be used however a moisture proof barrier may need to be inserted between water proof and non waterproof layers, to prevent moisture seep.

201. Diagram XX shows the use of a fired brick plinth to protect the lower part of a wall from water.

Diagram XX

Reinforced fired brick plinth for mud/



Fired brick wall plinth (50cm) then mud bricks over the sill level. Insertion of plastic sheeting between plinth and wall to prevent rise of moisture

Flood proof plastering

202. The plastering of external walls is recommended to increase lifespan of walls. Where funds are insufficient to plaster the whole wall, plaster can be applied from ground level to the predicted water level in order to protect the most vunerable part of the wall »Section xx: Plasters and mortars.

Protection for plastering

203. Wall panels (e.g. bamboo mats or timber/plywood panels) and mud plastering may be protected from water/rain up to the sill level, by using water-proof materials such as plastic sheeting or clay tiles.

Roof overhangs

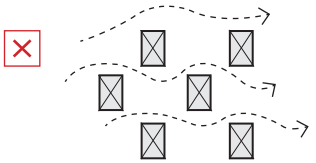
204. Extended roof overhangs can protect walls and foundations from direct exposure to heavy rains. Care should be taken in areas of strong wind however, as long overhangs can trap wind, which can damage a roof. »Section xx: Roofs.

Tsunami-resilience measures

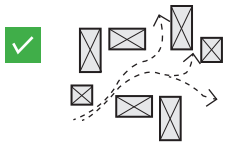
Site plan

The layout of a site will affect the impact of a tsunami. Shelters arranged in rows can amplify the disruptive effect of tidal waves by causing a wind and water tunnel effect. The positioning of shelters in spread out or clustered patterns may help to reduce damage. This is shown in diagram XX (adapted from UNEP, 2007).

Diagram XX **Tsunami prone areas: settlement layout**



Shelters arranged in rows might amplify the disruptive effect of tidal waves by amplifying the wind and water tunnel effect.



A spread out and/or clustered pattern is more protective.

adapted from Corsellis, T. And Vitale A., 2005

Elevated shelters and suspended floors

205. In absence of naturally elevated grounds, consider elevating shelters above ground with pile foundations, and/or suspended floors to make structures more likely to resist the water pressure of a tidal wave »Section xx: Flood resilience methods.

Orientation of openings

206. Major openings should be placed on the sides facing the sea to allow water to flow through the shelter without applying high pressure on walls.

Vegetation

207. Trees and bushes can be used to slow tidal waves. Mangroves, swamps and other vegetation which provides a natural barrier to coastal areas should be protected.

Design for multiple hazards

208. Locations which are at risk of tsunami are likely also to be prone to earthquakes and floods. Multi-hazard design is therefore advisable. »Section xx: Earthquake resilience measures; Section xx: Flood resilience methods.

Landslide-resilience measures

Site selection

209. Careful site selection is required to avoid hazardous areas such as deforested areas, steep slopes, coastal cliffs, and river bends. »Section xx: Site selections - Site safety.

Proper drainage

210. Landslides are likely to occur where the soil is full of water. Good drainage in the area around the shelter can help to mitigate this.

Multi-hazard proofing

211. Landslides may occur as a consequence of other major hazards such as earthquakes, storms and flooding, therefore multi-hazard resistance features should be considered.

Volcano-resilience measures

Technical expertise

Professionals such as geologists and volcanologists may need to be consulted when building in volcanic areas. Consultation with local geological authorities is also recommended. »Section xx: Site selection.

Openings and escape routes

212. Openings, especially doors, should be placed on the side away from the volcano so that they can be used as escape routes. Large openings on the side facing the volcano should be avoided, to protect the inhabitants from blasts and ballistics such as rocks and fragments of petrified lava.

Roof

213. Roofs may need to be designed to withstand the load of heavy layers of saturated ash.

Multi hazard proofing

214. Volcanic eruptions can cause other hazards such as earthquakes, landslides, fire, floods and tsunamis. Multi hazard proofing should therefore be considered. »Section xx: Design to minimise risk.

Fire prevention measures

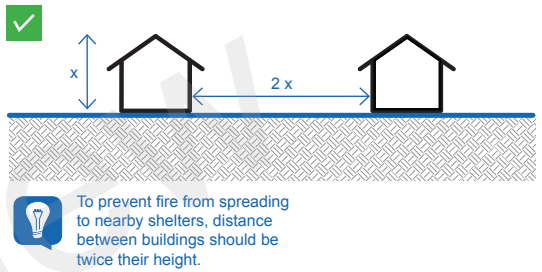
Fire prevention

Fire prevention is particularly needed in dry areas, where forest fires are more common, and in shelters where stoves or heaters are likely to be used.

Fire safety distance in transitional settlements

215. To prevent fire from spreading to nearby shelters, distance between buildings should be twice their height.

Diagram XX **Fire safety distance in transitional settlements**



adapted from adapted from Corsellis, T. And Vitale A., 2005

Elevated shelters and suspended floors

If shelters are built with highly inflammable materials such as thatch straw and timber the distance should be increased to 3 to 4 times the height of any structure UNHCR, 2007.

Escape routes and fire breaks

216. »Section xx: Site planning and preparation

Position of openings for stoves and heaters

217. Where stoves or heaters are likely to be used in the shelters, provision should be made for a fireproof and waterproof flue opening. In many cases, it may be beneficial to position the flue opening in the side of the shelter to prevent water getting into the shelter, however this will depend largely on the stove, heater and flue designs to be used.

218. Special attention must be paid to fire- and heat-proofing the floor and walls under and around stoves and heaters.

219. Where possible, the shelter design should include more than one exit route, in case one exit becomes blocked. Where locks are installed, care should be taken to ensure that the doors are easy to unlock from the inside.

5.4.2 Climatic design

Cold climates

Climate and calorie use

220. People use more energy in cold conditions and therefore burn more calories. At temperatures below 20oC, an additional 100 kilocalories per day are required per 5 degrees reduction in temperature. 🕮 Oxfam, 2005.

Provision of stoves and heaters

221. Provision of stoves and heaters should be considered. The use of warm rooms where it is not necessary to heat the whole shelter can help to reduce fuel use. Fire safety measures should be carefully considered when these items are used »Section xx: Fire prevention methods.

222. When using stoves or heaters in shelters, care should be taken to ensure that the air quality in the shelter remains safe for the inhabitants. Some guidance on this issue is provided in »Section xx: Health issues.

Insulation

223. Insulation of walls, roofs and floors is important for maintaining suitable temperatures, and to reduce the demand of fuel for stoves. Plastic sheeting is often used to insulate walls and roofs (as an intermediate layer) and to stop draughts in windows. It can also be employed to sub-divide the indoor space and create thermal buffer zones.

Tip!

Low cost insulation for transitional shelter

This tip box will contain examples of methods of insulating shelters used in transitional shelter programmes, and of common materials.

Compact form

224. A compact form is functional to reduce heat loss in cold climates. Circular plans are ideal, however for transitional shelters, appropriately insulated shapes with a maximum length:width ratio of 3:1 may be more feasible.

Minimal but safe levels of ventilation

225. Ventilation should be minimised as air entering the shelter from outside will cool the internal space. A degree of ventilation should be ensured at all times to ensure sufficient air exchange for the inhabitants. This is particularly important in cold climates where stoves and heaters are commonly used as shelters which are completely sealed can put inhabitants at risk of asphyxiation, carbon monoxide poisoning and respiratory diseases.

Snow loads on roofs

226. Design roof structures with adequate resistance to sustain potential snow loading.

Diagram XX
Cold climate building principles

Hot dry climates

Thermal mass

227. Thermal mass may be included in a shelter design to control daily temperature variations. Materials with high thermal mass can absorb heat from the sun or from a heater, and release it slowly over time, effectively regulating the shelter temperature. Materials with high thermal masses are unlikely to be easily transportable and are therefore likely only to be used in transitional shelter designs where temperature variations are extreme, or where they are used traditionally.

Protection from roof over-heating

228. CGI sheeting is a common building material used for pitched roofing of transitional shelters; due to its poor thermal capacity, it should be matched with an insulating layer placed on the internal face. Use of local techniques such as thatch, loose straw or straw mixed with mud, timber panels or other fibre board may be suitable »Section xx: Flood resilience methods; Section xx: Roofing.

229. Thatched insulation may also be placed between the CGI sheeting and an internal lining sheet.

Eave ventilation

230. It is advisable to have a 15cm gap between the wall cladding and the roof to allow cross-ventilation and enable the release of hot air.

231. When covering roofs with plastic sheeting, double skinned roofs with ventilated cavity provide the most efficient solution for insulation and ventilation.

Minimise solar gains with use of vegetation

232. Vegetation may be used to minimise heat gain of walls during the warmer hours of the day. Vegetation also creates a more comfortable microclimate by keeping the temperature cooler through natural processes of evaporative cooling.

Diagram XX
Hot dry climate building principles

Warm humid climates

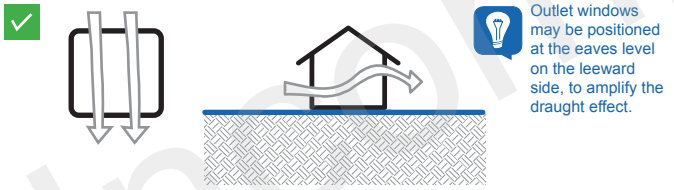
Transpiring materials for walling to facilitate moisture removal

233. The employment of light wall structures made of natural and/or transpiring materials (such as bamboo mats and/or wood panels) is recommended to facilitate heat and moisture removal from inside the shelter. In flood-prone areas these materials may be matched with a flood-proof solution, such as an elevated plinth or a fired brick wall up to sill level to avoid direct contact with standing water »Section xx: Flood resilience methods.

Compact form

234. In order to maximise air flow, outlet windows may be positioned higher than inlet windows. Air will be warmed inside the shelter, causing it to rise to reach the higher openings to leave the shelter.

Diagram XX
Warm humid climates: positioning of openings for ventilation



adapted from UNEP, 2007

Roof gradients

Roofs should have a sufficient gradient for rainwater drainage. As rules of thumb, the minimum angle for thatched roofs should be 40°, and for CGI sheeting roofs, the minimum angle should be 20°.

Roof overhang

235. Large roof overhangs may provide shading to walls and protection from heavy rains. At the same time, ensure that any roof overhang is not so large as to increase the hazard from strong winds, especially in tropical areas and those generally prone to storms. »Section xx: Storms resilience methods.

Measures to prevent condensation

236. Shelters in hot, wet climates are at risk of condensation forming. »Section xx: Humidity. Possible methods of reducing condensation are listed below:

- provide a covered external area for wet clothes and shoes to dry;
- increase ventilation;
- consider raised floors to better protect from rising of moisture and direct contact with damp grounds »Section xx: Floors;
- prevent water from splashing back onto the walls of the building, for example by increasing roof overhangs;
- use pitched roofs with appropriate slope gradient (minimum 0.5%) to allow water runoff and drainage.

5.4.3 Health issues

Measures to prevent condensation

237. The term ‘vector’ is used to describe any organism which can carry disease from one place to another. Two main categories of vector need to be considered when designing transitional shelters:

- insects, including mosquitoes, black flies, fleas, ticks, and sand flies; and
- small animals, including rats, birds, monkeys, and bats.

As a minimum, shelters should be mosquito proofed over an area large enough for the inhabitants to sleep in. This may be achieved through the provision of treated mosquito nets. Alternatively, mosquito netting or fine wire mesh may be placed over window and door frames to protect the whole shelter.

Measures to prevent condensation

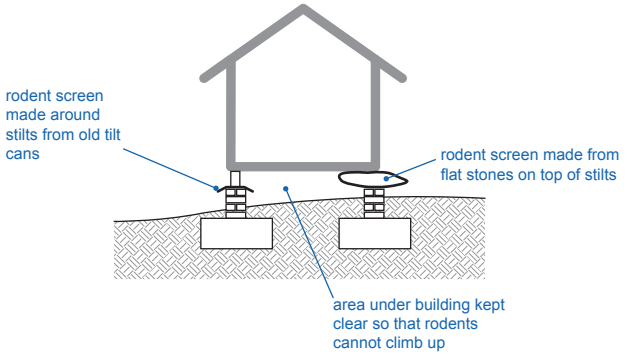
238. The shelter should impede the entry of crawling insects. This may be making sure that there is a vertical edge of 10cm between the ground and any entry points. Shelter Centre, 2010.

239. The shelter should impede the entry of small animals. This can be achieved by filling all holes greater than 6mm in diameter: the smallest size that a young mouse can climb through. Holes should be blocked using strong material such as concrete or metal plates as rats are able to chew through rope and chicken wire. Oxfam, 2005.

240. Where raised floors are to be used, it can be possible to rodent-proof buildings by including rodent ‘screens’ in the

building stilts as presented in the diagram xx below.

Diagram XX
Rodent proof measures



adapted from adapted from Corsellis, T. And Vitale A., 2005

Elevated shelters and suspended floors

241. In locations where primates are common, it should be remembered that these animals have been known to open doors and undo some fasteners such as zips.

Air quality for cooking, heating

242. Indoor smoke inhalation is a major cause of death. Reducing exposure to smoke from stoves or heaters should be a major consideration when designing transitional shelters.

243. Shelter design can reduce the risk of smoke inhalation by:

- removing or reducing the need for heaters by better utilising natural sources of heat, such as solar energy, in combination with improved insulation and efficient use of thermal mass. »Section xx: Fire prevention methods;
- providing sufficient ventilation to remove the smoke produced; and, or
- designing the shelter such that the stove can be placed in an external covered space.

244. Choice of stove or heater and fuel type can greatly affect the amount of smoke produced and therefore the risk of smoke inhalation. Oxfam, 2005.

Toxic environments

245. Some materials, such as some types of asbestos, some paints, and formaldehyde, should be avoided because they are toxic. Asbestos poses the greatest risk to health when it is friable, fragmenting into small pieces due to wear or degradation.

Lead-based paints and glazes

246. Paints are generally solvent-based and contain toxic and pollutant chemical components (Volatile Organic Compounds, VOC). These components evaporate slowly into the indoor environment even for months after the application, especially in conditions of high temperature and humidity, with harmful effects on human health (nausea, irritation of eyes and difficulty

of respiration; in case of protracted exposures also heart and lung diseases, or cancer).

5.4.4 Safety and security issues

Household security

247. A very basic level of security can be achieved by ensuring that shelters are designed such that those outside cannot tell whether or not the shelter is occupied. »Section xx: Privacy.

248. It may be necessary to provide locks for doors and windows, or to design shelters such that locks can be added, however the full design should be considered for security, for example, locks on windows and doors may be ineffective on shelters with plastic sheeting or fabric walls, as these can be easy cut through to force entry.

6. Construction management

This chapter is a part draft, in note form, covering site management, and site preparation issues.

Questions for reviewers:

- **Should any additional information be included in this chapter?**

The structure of the chapter is as follows:

6.1 Health and safety measures

6.2 Hazards on construction sites

6.3 Site preparation

Notes for content:

- ***Building site layout***
- ***Site clearance***
- ***Ground works, levelling and marking out***
  - *Preserve existing vegetation and top-soil*
  - *Construct banks to control surface runoff*
  - *Drainage lines*

6.4 Security risks

- ***Theft of tools, equipment and materials***
- ***Corruption***
- ***Preventive measures***

Appendices

TS standards

Information on the Transitional shelter standards, currently being developed by Shelter Centre. The aim of the Transitional shelter standards project is to develop common standards and indicators, consistent with the Transitional shelter guidelines, for both locally produced and stockpiled, airliftable transitional shelters, developed and agreed upon by a multi-agency Project Consortium.

The most recent draft of the Transitional shelter standards is available here:

http://sheltercentre.org/library/transitional-shelter-standards-10b.

Evaluation tool

Information on the Transitional shelter evaluation tool, currently being produced by Shelter Centre. The evaluation tool is designed for use in the evaluation of completed transitional shelter projects. The tool is intended for general use in all operation types and by all implementing agencies. It is intended that the evaluation tool offer a general template for the evaluation of transitional shelter projects, allowing for easy comparison of similar operations, and the production of standard case studies.

Case studies

This section will contain a number of case studies of transitional shelter projects which will be referenced as examples throughout the guidelines. Case studies will follow a standard template including sections on impact, shelter design and quality, and project implementation.

Resources

Acronyms

Annotated bibliography

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Key references

Internet resources