

# **UNHCR Emergency Communal Shower**

**D700-2015a**

**Tools and Guidance for  
Refugee Settings**



**UNHCR**  
The UN Refugee Agency

**UNHCR Standardized WASH Designs**  
**Emergency Communal Shower Block (Wood + Plastic)**

**FOREWORD**

These emergency communal shower block designs form part of UNHCR’s series of Standardized WASH Design Guidelines for Refugee Settings which are the result of an extensive review process with WASH actors active in refugee settings. It is recognized that the Standardized WASH Designs will require continuous review and amendment in response to changes in engineering best-practice and feedback from the field. Therefore further review will be managed by a Technical Review Committee which will meet regularly to discuss issues related to the use of the design and an annual review will be reported back to the WASH community. More urgent amendments will be reported as, and when, required. Note that this latrine is based on a design shared by OXFAM GB.

**FOREWORD ..... 1**

**ENGINEERING DRAWINGS ..... 2**

**STEP-BY-STEP ASSEMBLY DRAWINGS ..... 7**

**BILL OF QUANTITIES ..... 17**

**VISUAL BILL OF QUANTITIES ..... 18**

**SPECIFICATIONS FOR WASH INFRASTRUCTURE IN REFUGEE SETTINGS ..... 19**

**400SCOPE..... 19**

**401SITE SELECTION ..... 19**

**402PREVENTION OF SURFACE OR GROUND WATER CONTAMINATION ..... 19**

**403GUIDELINES FOR PIT REINFORCEMENT ..... 19**

**404GUIDELINES FOR TOILET SLAB STRENGTH ..... 20**

**405GUIDELINES FOR TOILET SLAB ANCHORAGE ..... 20**

**406GUIDELINES FOR SANITARY SEALING..... 20**

**407GUIDELINES FOR THE USE OF PLASTIC SHEETING ..... 20**

**408GUIDELINES FOR WASH FACILITY DOORS ..... 21**

**409GUIDELINES FOR COMMUNAL PRIVACY WALLS ..... 21**

**410GUIDELINES FOR LIGHTING ..... 21**

**411GUIDELINES FOR VECTOR CONTROL MEASURES ..... 22**

**412GUIDELINES FOR RAIN AND STORMWATER PROTECTION ..... 22**

**413GUIDELINES FOR ADDITIONAL WASH BLOCK ACCESSORIES ..... 22**

**414COLLECTION OF ANAL CLEANSING AND SANITARY MATERIALS ..... 22**

**415MATERIAL SPECIFICATIONS OF COMMON CONSTRUCTION MATERIALS ..... 23**

**416HANDWASHING STATIONS DESIGN CONSIDERATIONS ..... 24**

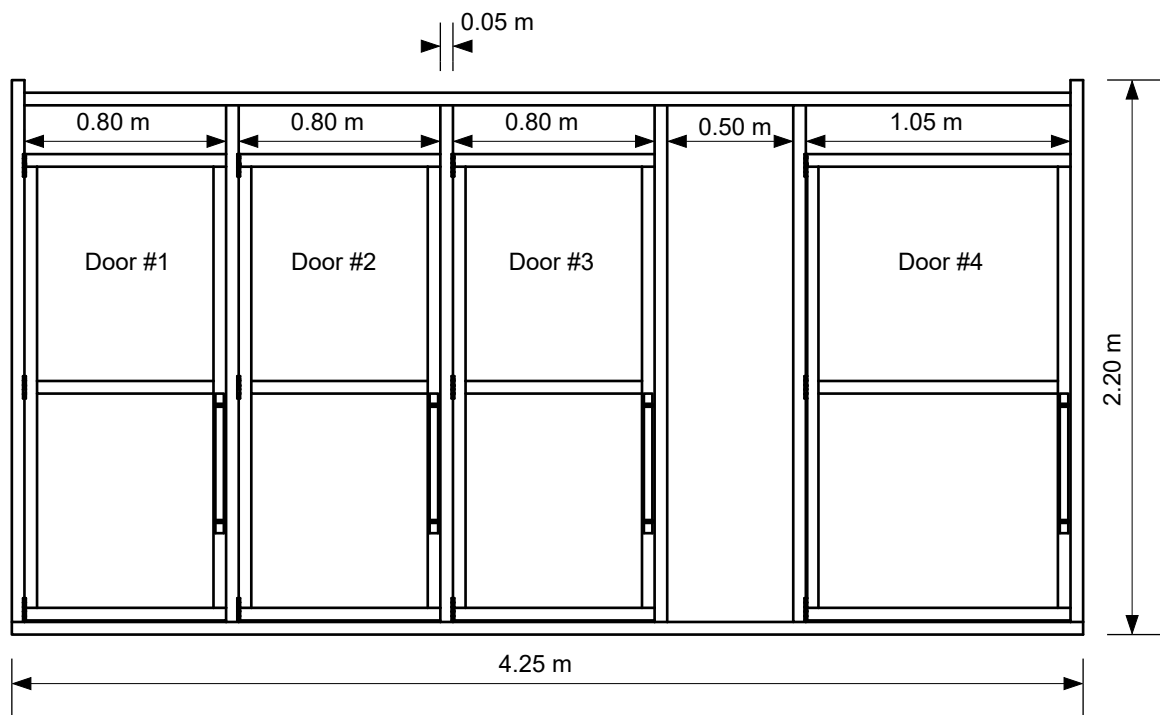
**417ENVIRONMENTAL CONSIDERATIONS FOR SOURCING WOOD ..... 24**

**418DECOMMISSIONING..... 24**

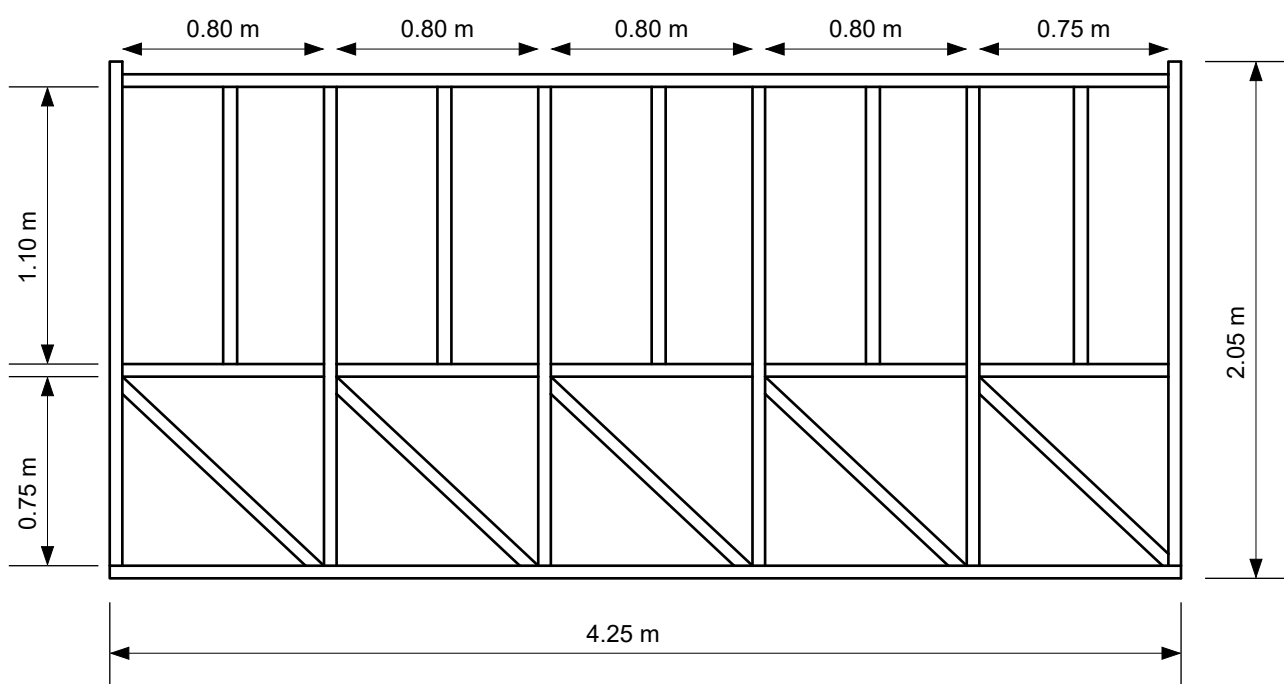
**419UNHCR STANDARD TOILET DESIGNS FOR REFUGEE SETTINGS ..... 24**

**USEFUL REFERENCES..... 26**

## Front Panel



## Rear Panel



### NOTES

1. All communal WASH infrastructure to be located at least 30m from water sources and households.
2. Distances to be increased when excavating infiltration pits in fissured rock.
3. The base of all shower infiltration pits must be at least 1.5m higher than maximum annual groundwater table.
4. To facilitate bucket showering the emergency shower block must be located within 50m of a water point.
5. Site to be adequately cleared and levelled before starting construction.

**D-700**

### TITLE

**Emergency Shower Block**  
General Layout

### PROJECT

Project Name, Country

### DRAWN BY

B. Harvey - 11/10/15

### APPROVED BY

M. Burt - 15/11/15

### SCALE

1:30

### UNITS

metres

### SHEET

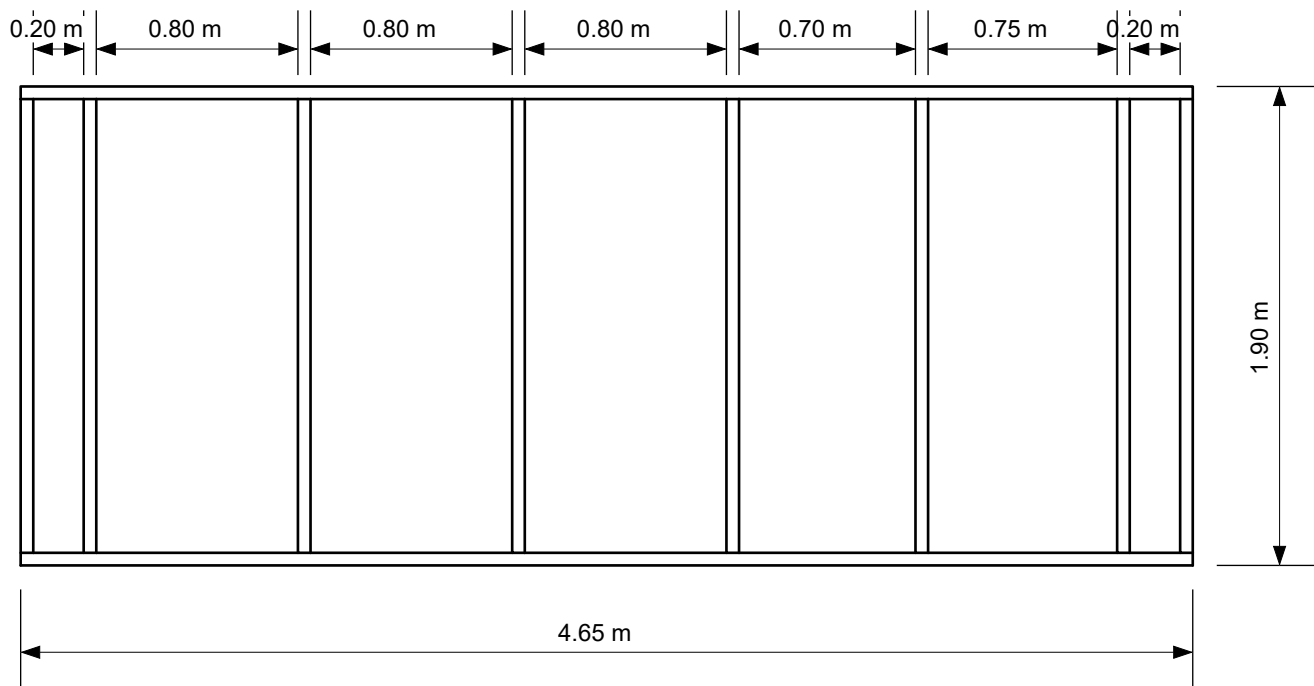
1 of 4

### DATE PUBLISHED

15/11/15

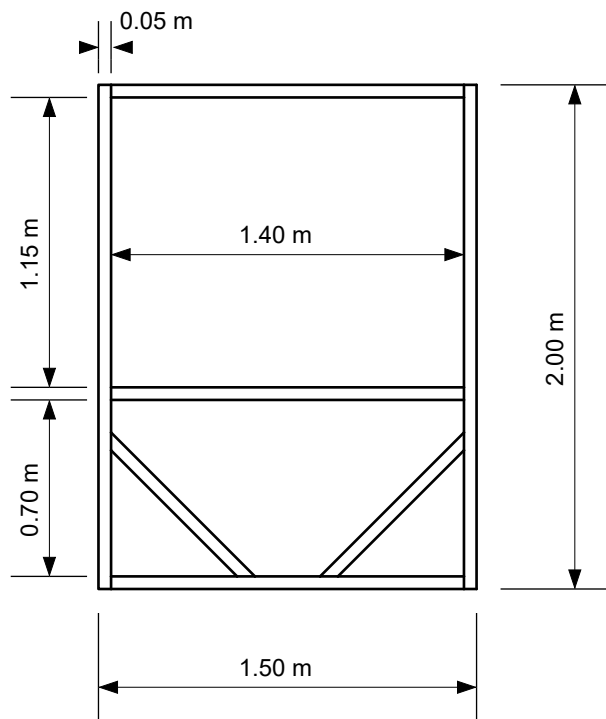


## Roof Panel



During a 1st phase emergency response the roof panel may be left off the design provided that it is added within 3 months.

## Side Panels



### NOTES

1. Individual panels to be prepared in a dedicated mass production facility and transported to the assembly location.
2. Panels timbers to be joined either using galvanized screws or at least two (2) galvanized skewed nails at each connection location.
3. Panel-to-panel connections to be made using M10 bolts for ease of disassembly or movement to new locations.

**D-700**

### TITLE

**Emergency Shower Block**  
General Layout

### PROJECT

Project Name, Country

### DRAWN BY

B. Harvey - 11/10/15

### APPROVED BY

M. Burt - 15/11/15

### SCALE

1:30

### UNITS

metres

### SHEET

2 of 4

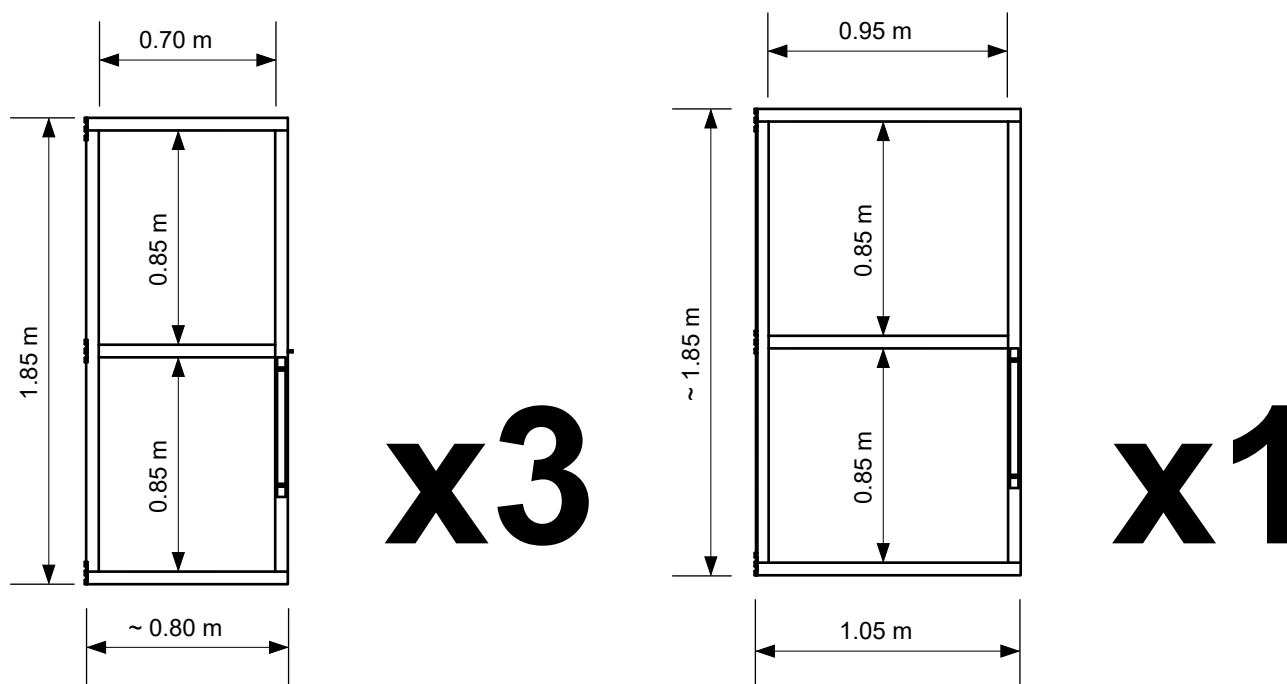
### DATE PUBLISHED

15/11/15



**UNHCR**  
The UN Refugee Agency

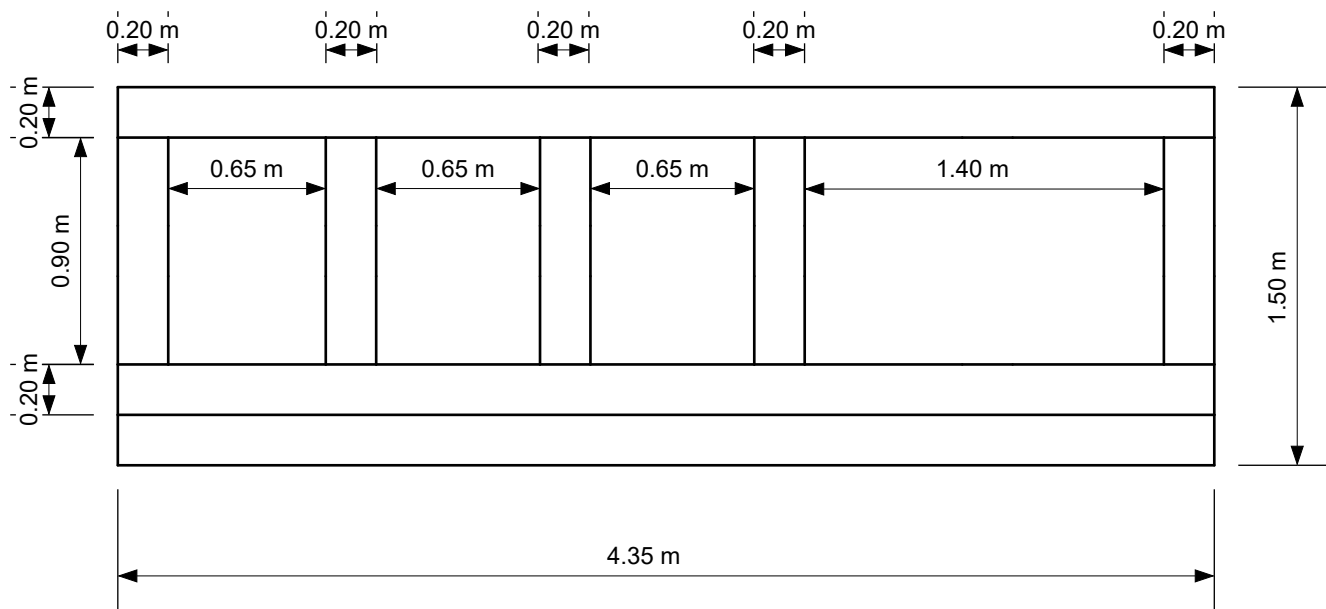
## Doors Detail



### NOTES

1. All doors hung straight and level.
2. All doors equipped with three (3) hinges at least 50cm long. All screw holes filled with screws. Nails not permitted.
3. Maximum gap between door and frame 3mm. Maximum gap between door and floor 10mm.
4. All doors to be equipped with a long child friendly handle of at least 50cm length on both the inside and outside door faces.
5. All doors to be equipped with a child friendly and secure locking mechanism.

## Floor Support Structure



### NOTES

1. Ensure floor structure is perfectly square and level.
2. All wood faces in direct contact with ground to be treated with used engine oil.
3. Final floor surface to be at least 5cm - 10cm above ground level to prevent water ingress.
4. Outer surroundings of platform to be sealed from water ingress using tamped clay or 30cm of concrete sanitary seal.

**D-700**

#### TITLE

**Emergency Shower Block**  
General Layout

#### PROJECT

Project Name, Country

#### DRAWN BY

B. Harvey - 11/10/15

#### APPROVED BY

M. Burt - 15/11/15

#### SCALE

1:30

#### UNITS

metres

#### SHEET

3 of 4

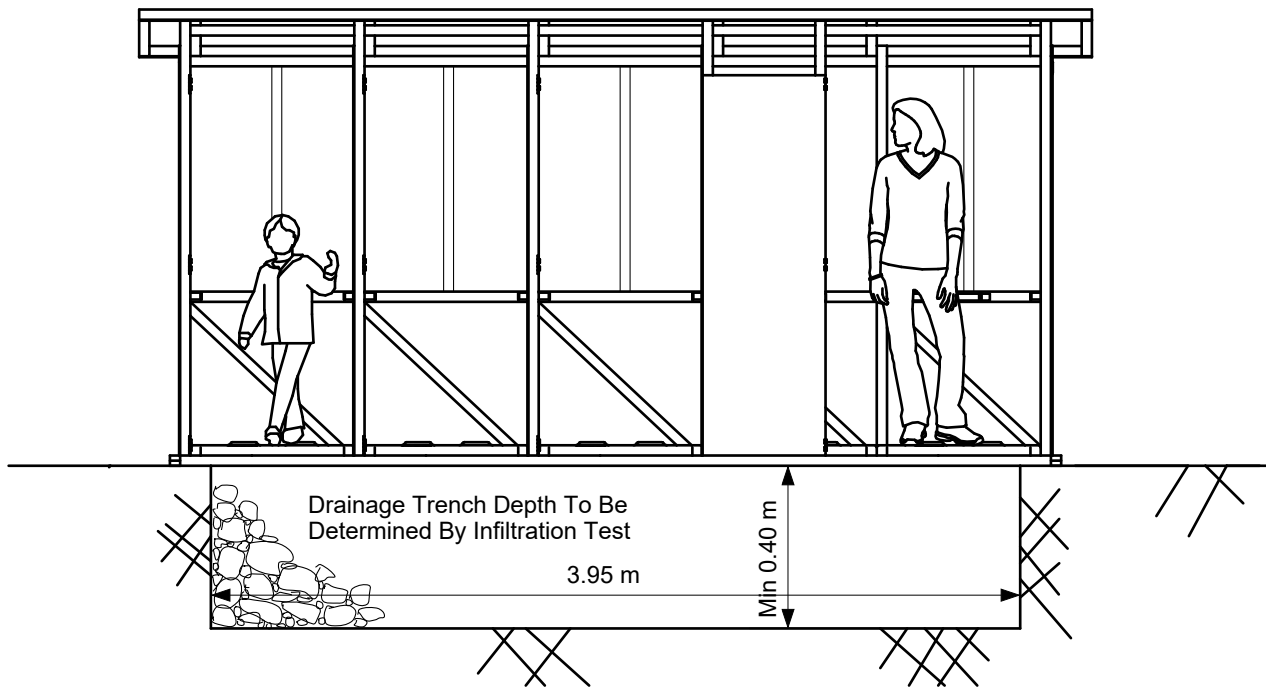
#### DATE PUBLISHED

15/11/15



**UNHCR**  
The UN Refugee Agency

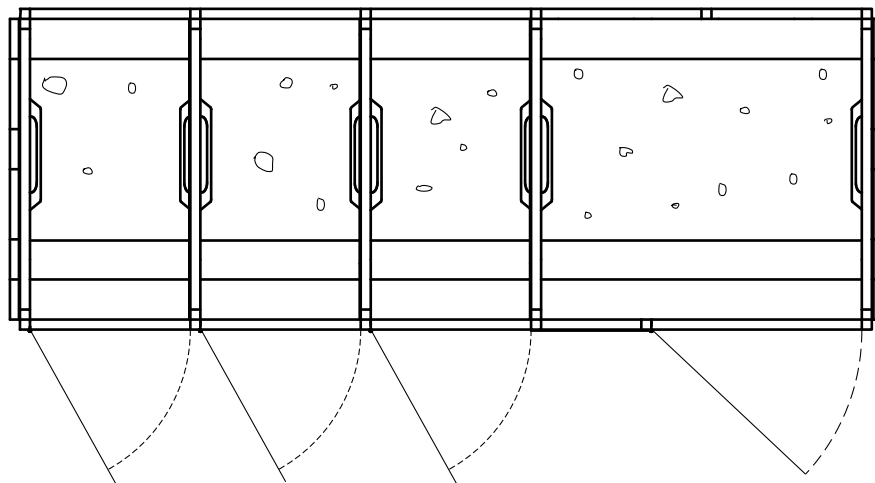
## Front Section



### NOTES

1. Drainage depth to be determined based on number of users and soil infiltration capacity (see Appendix 20 of Engineering in Emergencies or page 213 of UNHCR WASH Manual).
2. In cold climates, pit depth should be deeper than maximum permafrost level.

## Plan View



### NOTES

1. Plastic interagency latrine slabs to be firmly fixed into place with either screws, nails, or wire.
2. All plastic sheeting to meet UN humanitarian standards (i.e. 200g/m<sup>2</sup> 700N tensile strength, UV stabilized laminated woven or braided mesh of black high density polyethylene between two white layers of low density polyethylene).
3. Rainwater catchment system is optional.

**D-700**

#### TITLE

**Emergency Shower Block**  
General Layout

#### PROJECT

Project Name, Country

#### DRAWN BY

B. Harvey - 11/10/15

#### APPROVED BY

M. Burt - 15/11/15

#### SCALE

1:30

#### UNITS

metres

#### SHEET

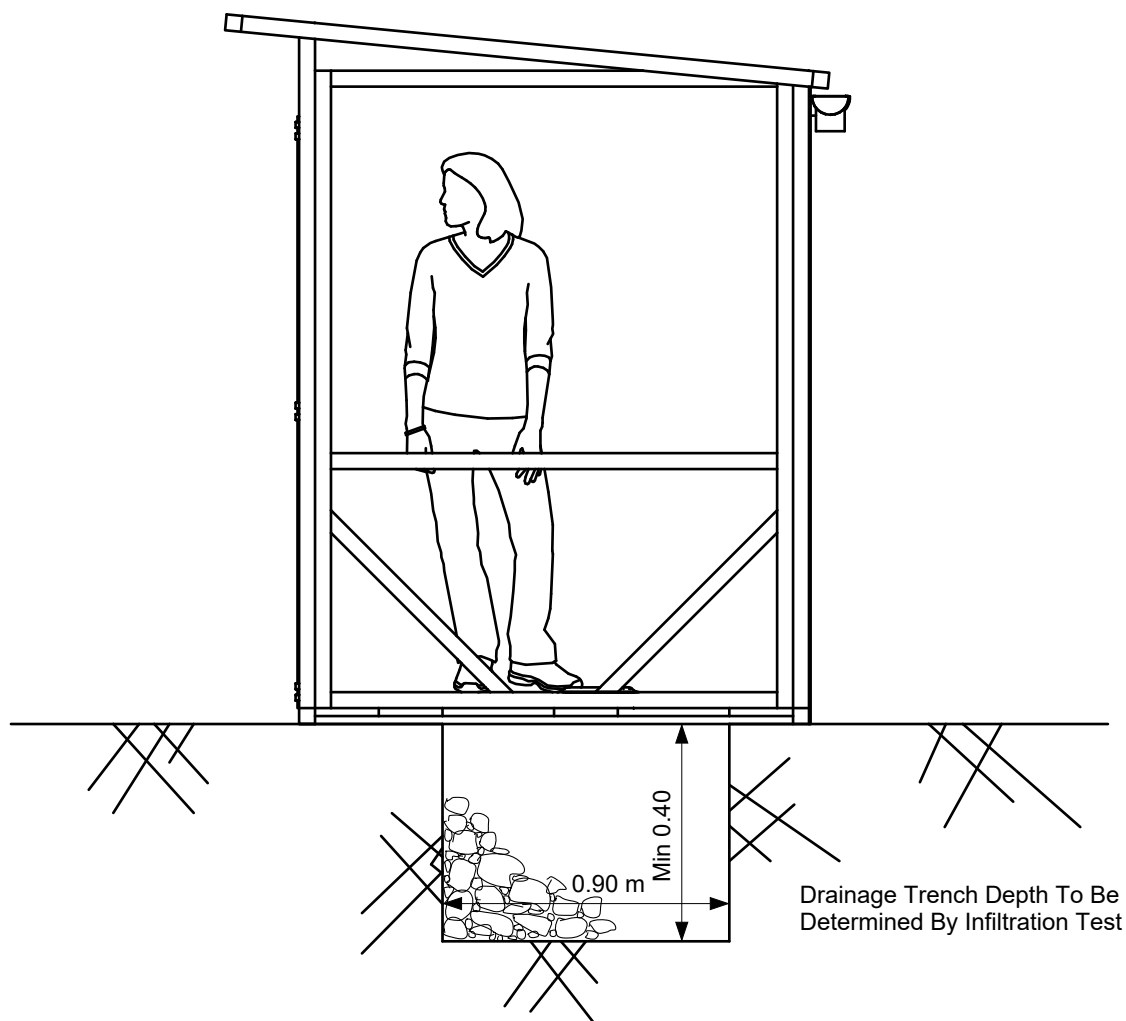
4 of 4

#### DATE PUBLISHED

15/11/15



# Section



## NOTES

1. In soft soils, trenches to be lined with 30cm thick brick masonry.
2. The base of all pits must be at least 1.5m higher than average groundwater table.
3. In cold climates, pit depth should be deeper than maximum permafrost level.

**D-700**

### TITLE

**Emergency Shower Block**  
General Layout

### PROJECT

Project Name, Country

### DRAWN BY

B. Harvey - 11/10/15

### APPROVED BY

M. Burt - 15/11/15

### SCALE

1:30

### UNITS

metres

### SHEET

5 of 5

### DATE PUBLISHED

15/11/15



**UNHCR**  
The UN Refugee Agency



**Important Note:** If it is clear that the emergency will last longer than 6 months and there are cultural issues related to sharing communal facilities it is better not to use this design and move directly to construction of household shower/toilet cubicles shared initially between 4 families.

**1.**

To facilitate bucket showering the emergency shower block must be located within 50m of a water point.

Area of 6m x 3m to be cleared and perfectly leveled.

Trench depth min. 40cm.

**2.**

Undertake a soil permeability test using an upright steel cylinder and following the procedure in Appendix 20 of Engineering in Emergencies. Alternatively refer to the table of typical soil infiltration rates on page 213 of the UNHCR WASH Manual.

The infiltration trench depth may need to be increased based on the number of users and soil infiltration capacity.

**x5**

**3.**

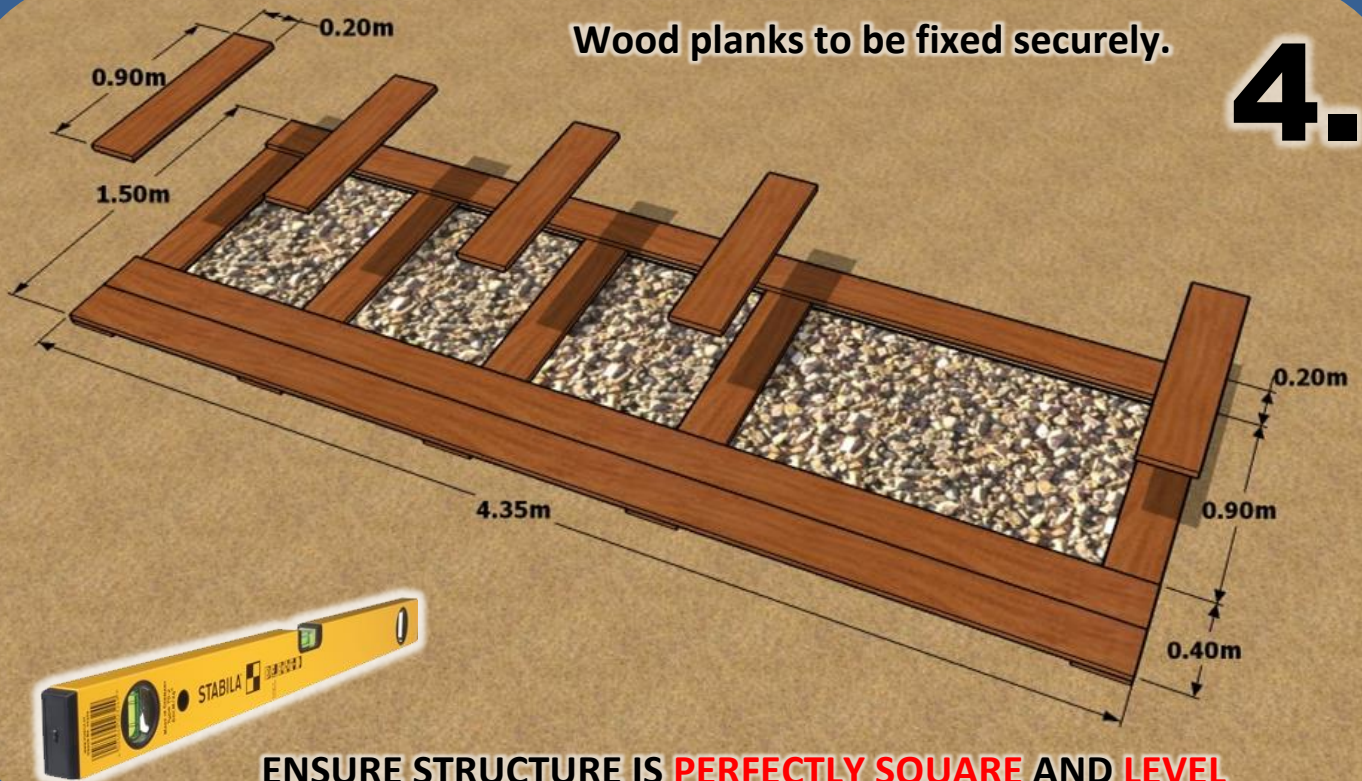


All wood parts in contact with ground to be treated with used engine oil.



Wood planks to be fixed securely.

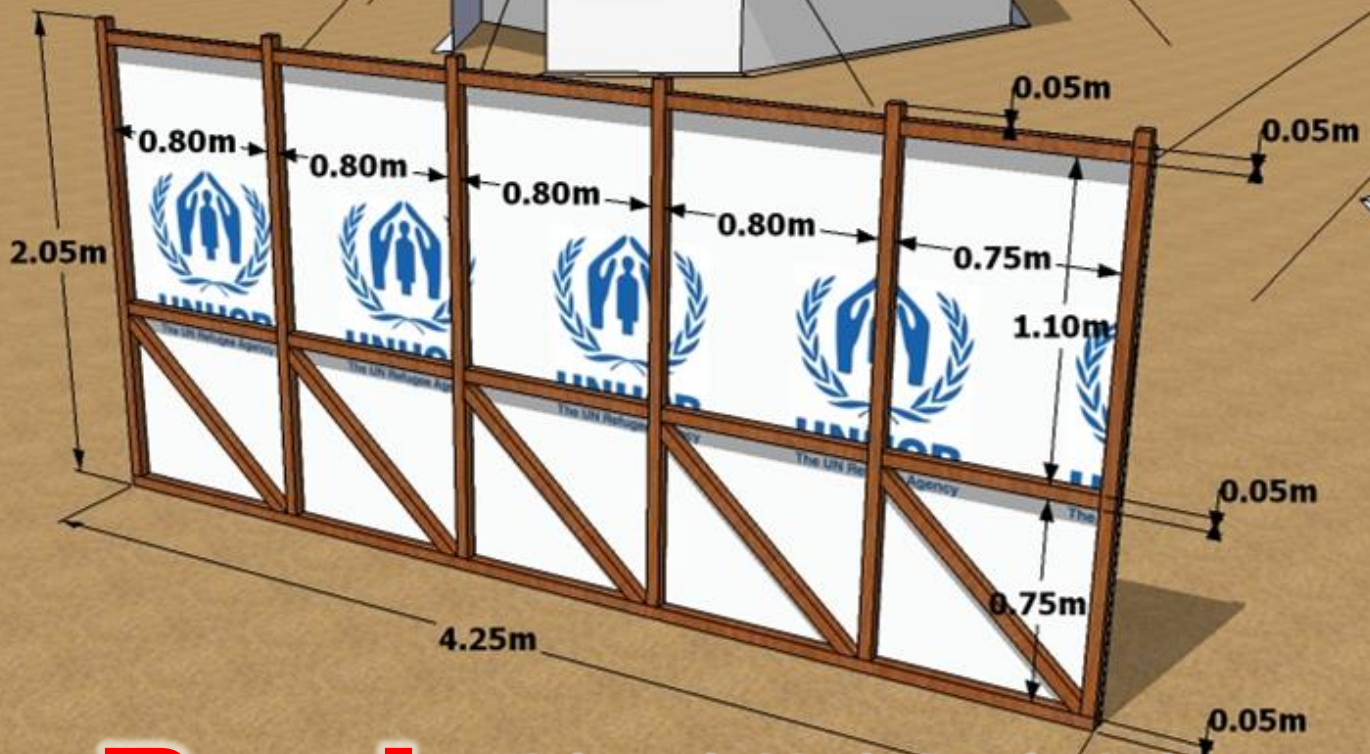
4.



ENSURE STRUCTURE IS **PERFECTLY SQUARE** AND **LEVEL**

Plastic sheeting provides lateral bracing and structural stiffness and must be fixed securely with domed nails, battens, bottle tops, or other load spreading method every 30cm or less.

5.



**Back**

Timbers to be joined using galvanized screws or two (2) galvanized skew nails per connection.

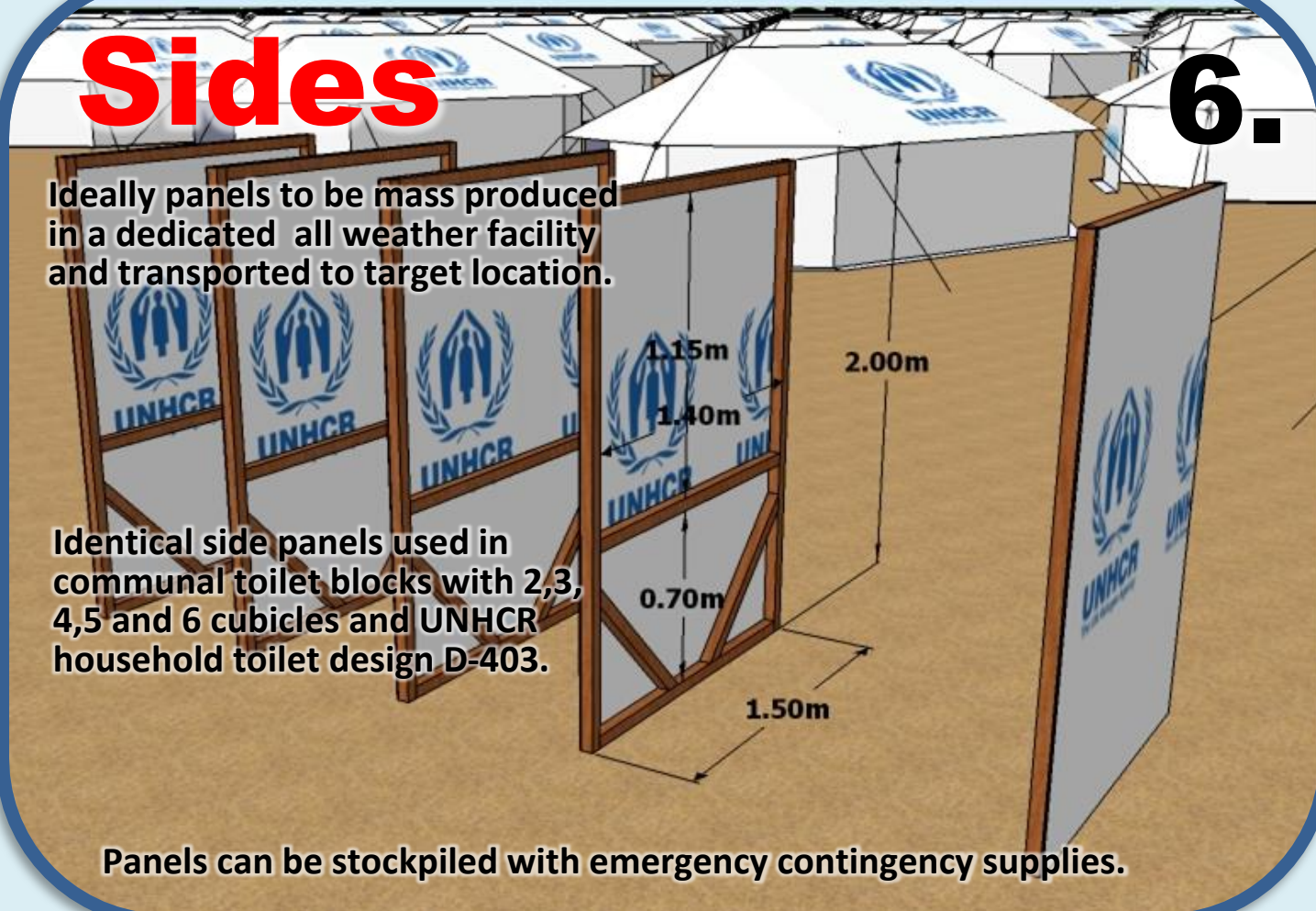


# Sides

6.

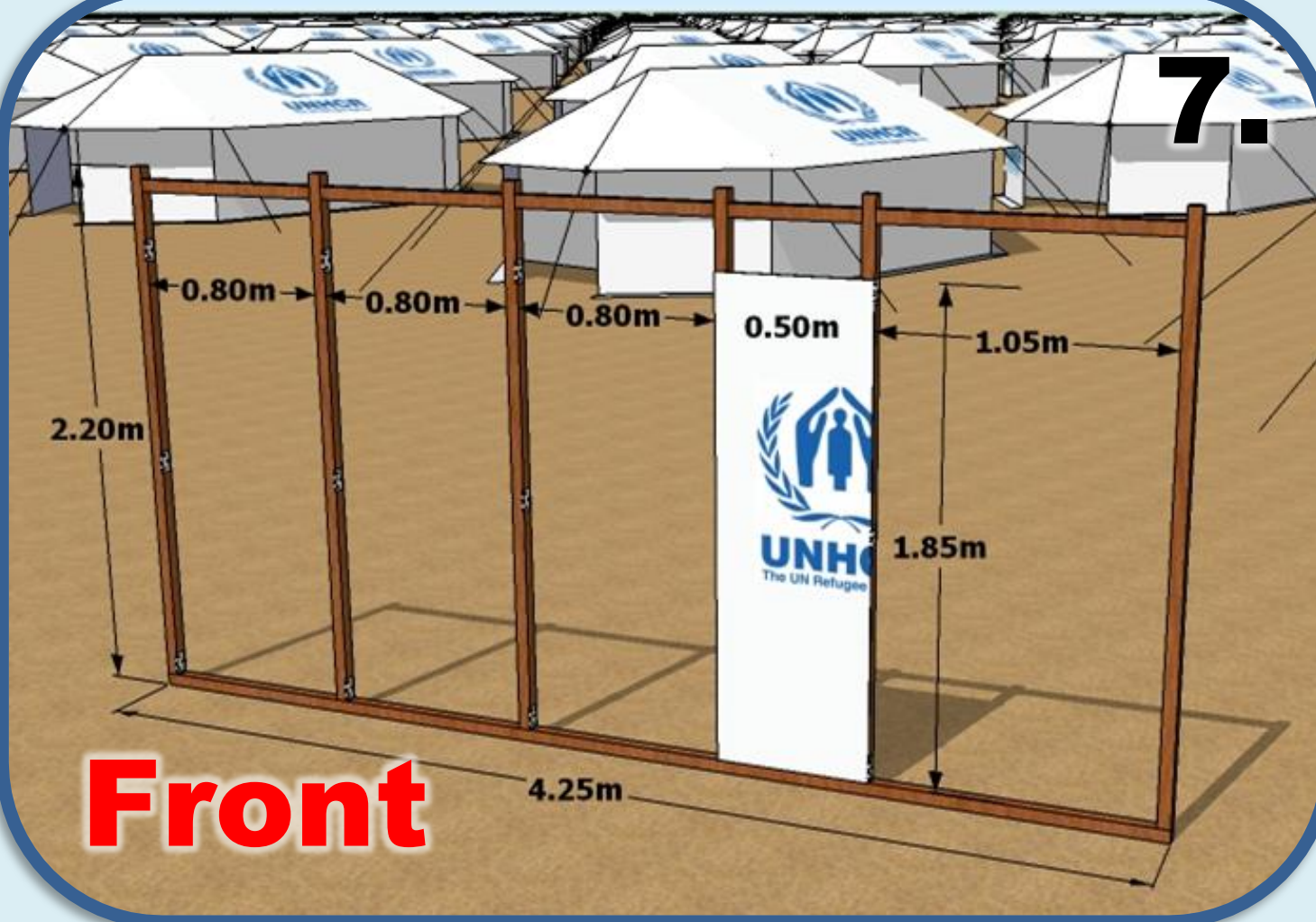
Ideally panels to be mass produced in a dedicated all weather facility and transported to target location.

Identical side panels used in communal toilet blocks with 2,3, 4,5 and 6 cubicles and UNHCR household toilet design D-403.



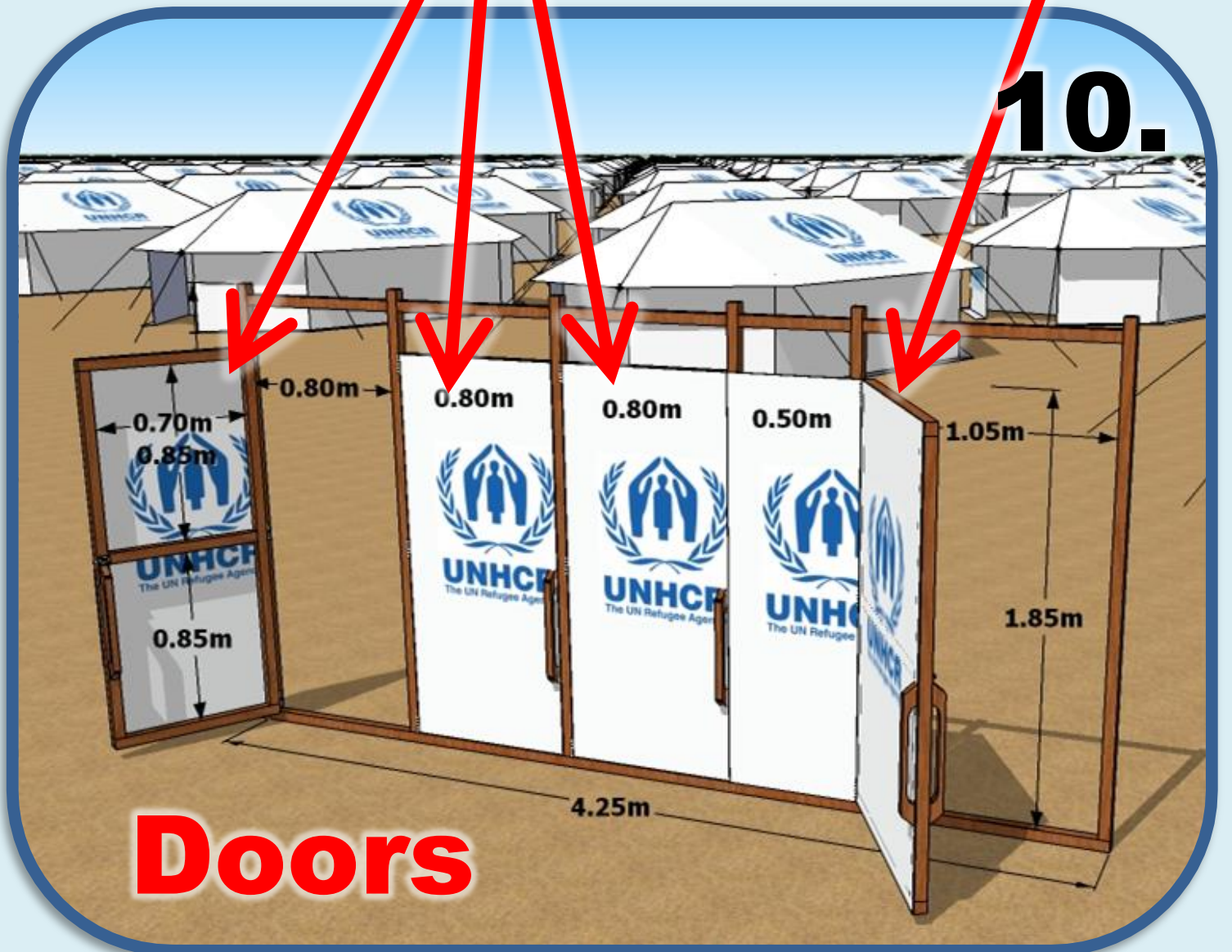
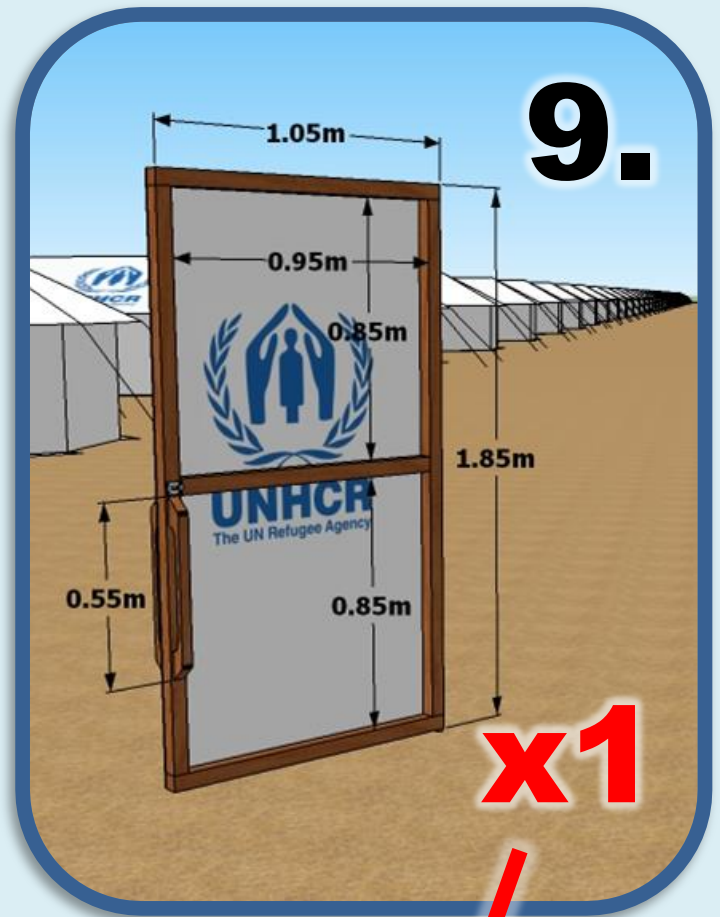
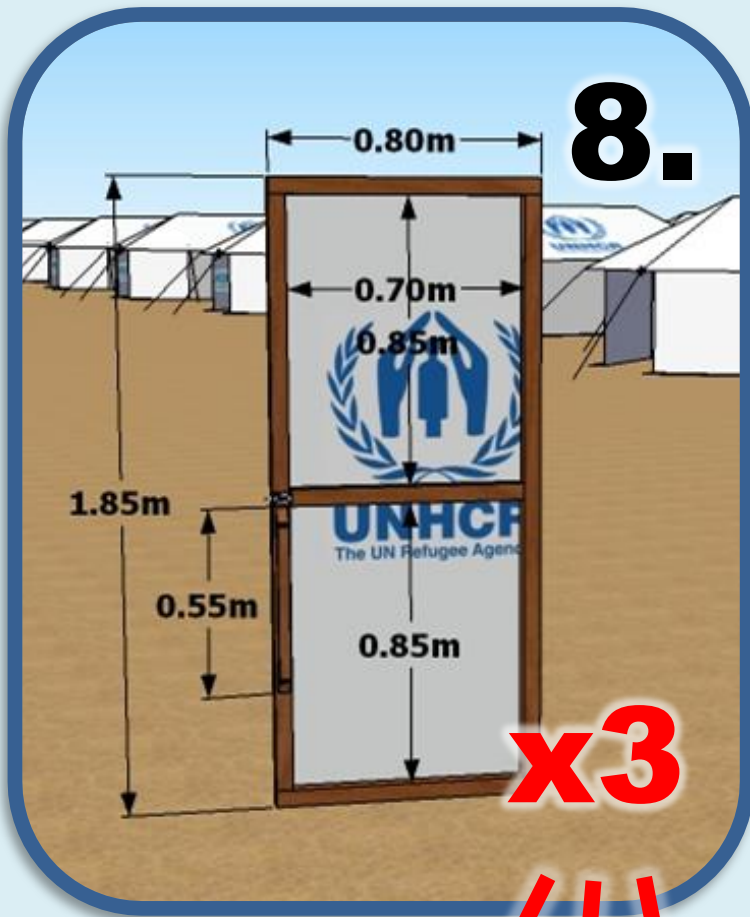
Panels can be stockpiled with emergency contingency supplies.

7.



# Front







# 10.

Child friendly  
door bolt  
4cm long

Child friendly  
door handle  
55 cm long  
both sides

Child friendly  
door handle  
55cm long  
both sides

# 11.

Every hinge  
hole to be filled  
with a screw  
of at least 4cm.  
Nails must not  
be used!

Every door to  
have 3 heavy  
duty steel  
hinges at least  
75mm long.

# Assembly

# 12.

Plastic sheeting should be fixed to the wood frame every 30cm or less.

Panels to be **BOLTED** together for ease of storage, assembly,  
disassembly, moving and reuse in new locations



Larger double- compartment to facilitate use by elderly person and carer or mother and young child.

13.

**Grab Rails x 8**

Rear shelf to keep soap or clothes off the ground.

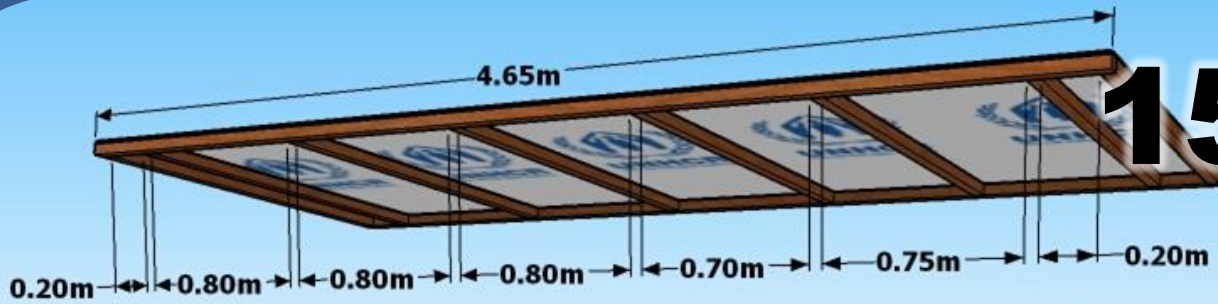
All plastic sheeting to meet humanitarian standards  
i.e..200g/m2,700N.UV.stabilized triple-layer.HDPE.

14.

Gap between door and floor < 10mm.



# 15.



## Roof

Note that during a 1st phase emergency response the roof panel may be left off the design provided it is added within 3 months.

# 16.



Panels to be **BOLTED** together for ease of storage, assembly, disassembly, moving and reuse in new locations.

## Assembly



0.43m<sup>3</sup> of outward sloped concrete (dosage 320 kg/m<sup>3</sup>)  
or tamped clay seal to prevent water ingress.

17.



18.



During a 1st phase emergency response, flaps of plastic sheeting may be used as doors provided they are weighted at the bottom and are upgraded within 3 months. If used for female blocks an additional privacy wall must be installed.



# Security

## 19.



All female communal facilities to include a privacy wall.  
All doors securely lockable with child-friendly mechanism.

Night time illumination to at least 50 lumens per m<sup>2</sup>  
(verified using any smartphone light meter app). Lighting  
should not be provided solely at toilet blocks as there is a  
risk men will congregate at these locations.

# Upgrades

## 20.



All plastic sheeting to be upgraded within 6 months  
to more permanent structural materials e.g. GI  
sheeting, bricks, or wood cladding.

When decommissioning note that side panels are identical in  
D-403, D-404, D405, D406 and D700.



# Cold Weather 21.

Drainage trench depth should extend below the permafrost depth ~1m.



Water heating options include electricity, passive solar or gas depending on local context and availability.

## BILL OF QUANTITIES

Description	QTY
Wooden Posts (4m x 5cm x 5cm)	40 pcs
Wooden Planks (4m x 20cm x 2.5cm)	9 pcs
Coarse Gravel for Drainage Trench (6mm – 10mm)	1.5 m <sup>3</sup>
Nails (10cm Galvanized)	4 kg
Domed Head Nails (4cm Galvanized)	3 kg
Plastic Sheeting (50m x 4m)	¼ roll
Metallic Door Bolt (4cm Galvanized)	4 pcs
Metallic Door Hinge (4cm x 8cm x 2mm Galvanized)	12 pcs
Threaded Metal Bolt (M10 x 12cm Galvanized)	30 pcs
Metal Washers (M10 Galvanized)	60 pcs
Metal Nut (Hexagonal M10 Galvanized)	30 pcs
Wooden Grab Rails and Door Handles (Minimum 50cm Length)	12 pcs
Coarse Sand	0.2 m <sup>3</sup>
Coarse Gravel (6mm – 10mm)	0.4 m <sup>3</sup>
Cement (50kg sacks)	3 sacks
Optional Water Heater and Accessories (Selection Based on Context)	1 pcs

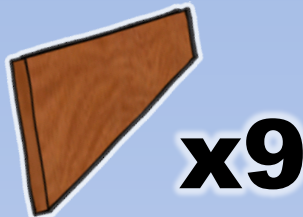


# Bill of Quantities

1. Wooden Posts (pc)  
5cm x 5cm x 4m



2. Wooden Planks (pc)  
2.5cm x 20 cm x 4m



3. Nails 10cm (kg)



4. Domed Head Nails 4cm (kg)



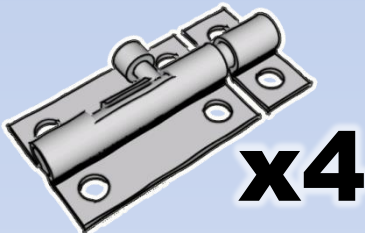
5. Gravel for drainage trench (m3)



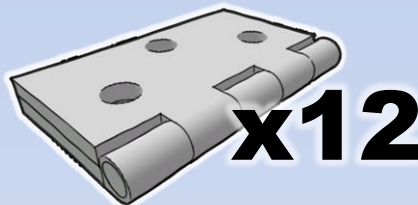
6. Plastic Sheetting  
50m x 4m (roll)



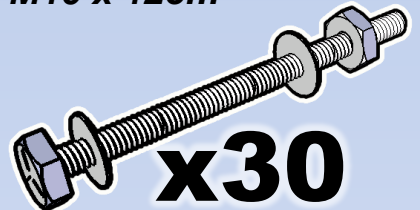
7. Door Bolt 4cm (pc)



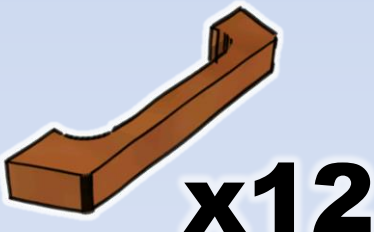
8. Door Hinge (pc)  
4cm x 8cm



9. Metal Bolts + Washers  
M10 x 12cm



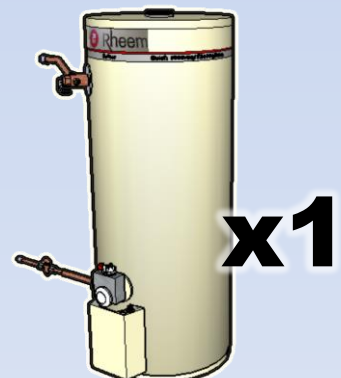
10. Grab Rails and Door  
Handles 50cm (pc)



11. Cement 50kg (sacks)



12. Water Heater (pc)



13. Sand (m3)



14. Gravel (m3)



## **SPECIFICATIONS FOR WASH INFRASTRUCTURE IN REFUGEE SETTINGS**

### **400 SCOPE**

- 400.1 These design guidelines specifically define the quality of materials and workmanship to be used when constructing WASH infrastructure in refugee settings. A description of principles of WASH interventions in addition to technical options and their advantages and disadvantages can be found in the UNHCR WASH Manual.

### **401 SITE SELECTION**

- 401.1 A basic requirement is that the site selected for the WASH facility is free from the risk of high winds, flooding, subsidence, or erosion.

### **402 PREVENTION OF SURFACE OR GROUND WATER CONTAMINATION**

- 402.1 UNHCR and WASH actors must ensure that all WASH infrastructure including any pits, tanks, lagoons, sewerage or soakaway do not contaminate surface water or shallow groundwater sources.
- 402.2 All WASH infrastructure should be located at least 30 metres away from groundwater sources. The bottom of any pit or soak-away must be at least 1.5m above the highest average groundwater table level. These distances should be increased for fissured rocks and limestone.
- 402.3 In some situations temporary groundwater contamination from on-site WASH systems may not be of immediate concern if the groundwater is non-potable. An example of this can be found in coastal areas where groundwater is heavily saline beyond drinking water health limits of 1,500µS/cm<sup>2</sup>. In all cases, local legislation should be respected.

### **403 GUIDELINES FOR PIT REINFORCEMENT**

- 403.1 All toilet pits should have an upper reinforcement ring of either: wooden beams, wooden trunks, brick masonry or concrete to evenly spread the load of the superstructure and raise it above ground level by at least 20 - 30cm to avoid water entering the pit.
- 403.2 Any toilet built on soft, sandy or collapsing soils should have a brick or concrete lined pit to at least 1m below the ground surface or greater if the soil is still unstable. Any desludgable toilet should have a fully lined pit that is able to withstand repeated evacuation. Safety should be of the utmost consideration when manually excavating pits. In soft soils, pit walls should be adequately cross-braced and excavation must never exceed 2.0m depth.

## **404 GUIDELINES FOR TOILET SLAB STRENGTH**

- 404.1 The toilet slab and supporting beams must be sufficiently strong to support the weight of users and should not flex or give the user reason to doubt its strength. Support beams should span at least 50cm into each of the pit walls.
- 404.2 Wooden, concrete or plastic slabs should be tested with the weight of 4 persons before use. Concrete slabs should be reinforced regardless of their type. Wooden planks, trunks and beams should be free from insect attack of any kind with no other defects which would affect its strength. Wooden structures in contact with the ground should be treated with used engine oil or diesel to deter termites.

## **405 GUIDELINES FOR TOILET SLAB ANCHORAGE**

- 405.1 Latrine slabs should be firmly anchored in place. If plastic latrine slabs are used they should be firmly attached to the support structure either through the use of sufficiently long nails, bolts with washers, metal stakes, or heavy gauge wire.

## **406 GUIDELINES FOR SANITARY SEALING**

- 406.1 In all toilet installations there should be no visible gaps between the squat plate and the pit walls either through the use of at least 30cm of tamped clay soil or 30cm of concrete sanitary seal.

## **407 GUIDELINES FOR THE USE OF PLASTIC SHEETING**

- 407.1 Plastic sheeting used in WASH infrastructure should meet the international minimum humanitarian standards (i.e. 200g/m<sup>2</sup> 700N tensile strength, UV stabilized laminated woven or braided mesh of black high density polyethylene between two white layers of low density polyethylene). Plastic sheeting is typically supplied as sheets 6m x 4m or in rolls 4m x 50m long. Before using plastic sheeting consider if there are more suitable durable materials available locally.
- 407.2 Plastic sheeting should be attached to wooden frames using domed head nails, or standard nails with either wooden battens or some other form of load spreading structure (e.g. bottle tops). The most effective way of attaching plastic sheeting to a wooden frame is to wrap it around a wooden batten and then nail the batten to the support structure. Nails spacing should be no more than every 30cm. Some humanitarian plastic sheeting contains reinforcing bands of grey colour and nails should pass through these bands.
- 407.3 Plastic sheeting should be securely fixed to the ground by wrapping the edge in a wooden post and burying it to at least 40cm deep. If rope is attached to plastic sheeting it should either be attached through a reinforced eyelet or it should be tightly tied around a knot in the plastic sheeting itself.



- 407.4 The use of plastic sheeting for WASH superstructures is an emergency solution and must be phased out after the first six months of any response. Flaps of plastic sheeting may be used in the initial first phase response provided they are adequately weighted at the bottom of the flap and they are phased out within 3 months. Female blocks with plastic flap doors should be equipped with a privacy screen.

## 408 GUIDELINES FOR WASH FACILITY DOORS

- 408.1 Every door should be hung straight and vertical with no more than 3mm gap between both sides of the door and the door frame and a maximum 10-20mm gap between the door and floor. All doors should open and close properly without fouling on the floor or door frame.
- 408.2 Each door should have at least three hinges of good quality heavy duty steel at least 50mm long, and every hole in the hinges should be filled with a screw of at least 4cm length.
- 408.3 All doors should be fitted with a long upright handle of at least 50cm length on the inside and the outside that allows both children from 3 years of age and adults to open and close the toilet. A simple to use yet secure internal locking device should be installed that is positioned for use by children and adults (such as a metal bolt).

## 409 GUIDELINES FOR COMMUNAL PRIVACY WALLS

- 409.1 Privacy walls should be installed completely around all female WASH facilities. Solid wooden fencing posts of at least 3m length should be installed every 4m to a depth of at least 1m. Wooden braces should be used every 5 posts and at corners. Small holes of 2 or 3cm should be cut in the plastic sheeting every 20cm to reduce wind load and deter theft. A double privacy screen with a small gap may be required in some cultures and contexts where there is a risk of people creating peep holes. Care should be taken on steep ground and a privacy roofing structure may be required to prevent onlookers.

## 410 GUIDELINES FOR LIGHTING

- 410.1 Ideally all WASH facilities should be adequately illuminated to at least 50 lumens per square metre (this can be easily verified using a smart



phone light meter app). However, lighting should not be provided solely at WASH blocks as there is a risk that men will congregate at these locations. Lighting for WASH blocks should be planned in consultation with users in particular women and girls.

## **411 GUIDELINES FOR VECTOR CONTROL MEASURES**

- 411.1 UNHCR and WASH actors should ensure that the design of toilets eliminates fly and mosquito breeding. All vent pipes should be fitted with galvanized metal fly screens. Toilet cubicles should be kept shaded with lightly sprung self-closing doors. If the toilet is not of the VIP design, tightly fitting closable lids should be used.



## **412 GUIDELINES FOR RAIN AND STORMWATER PROTECTION**

- 412.1 The ground directly around the outside of the WASH facilities should be backfilled and compacted to slope outwards and prevent surface water entering or eroding the toilet facilities. A drainage ditch at least 30cm deep should be installed around the WASH services to minimize external surface water entering the block.

## **413 GUIDELINES FOR ADDITIONAL WASH BLOCK ACCESSORIES**

- 413.1 Small modifications to WASH facilities can greatly increase the dignity of users. UNHCR and WASH actors should ensure that all toilet and shower cubicles are equipped with either hooks or shelves so that users are able to hang additional clothes or possessions off the floor when using the facilities. If possible, the relatively cheap addition of a mirror can greatly improve the experience of using WASH facilities.

## **414 COLLECTION OF ANAL CLEANSING AND SANITARY MATERIALS**

- 414.1 UNHCR and WASH actors should ensure that provision is made for the separate collection and disposal of used anal cleaning materials or women's sanitary material if there is a risk they may block or damage the toilet infrastructure or any desludging equipment. This also has the added advantage of extending the life of the system.



## 415 MATERIAL SPECIFICATIONS OF COMMON CONSTRUCTION MATERIALS

- 415.1 Gravel used for constructing concrete toilet slabs must be clean and free from mud, dust and plant material. UNHCR and WASH actors must ensure that only crushed aggregates (not river gravel) between 6mm and 10mm are used to prevent inter granular crack propagation across the thin toilet slab and to ensure an adequate covering under bars.
- 415.2 Sand used for latrine slabs should be coarse (no fines), clean and free from mud, dust and plant material.
- 415.3 Water should be non-saline and free from organic matter.
- 415.4 Bricks should be fully burnt (ringing sound when two bricks are hit together), of consistent shape and size and should be sufficiently strong (crush test) with a high proportion of clay.
- 415.5 Cement must be fresh (manufactured in the last three months) dry, and should be stored in a safe, dry, place at least 15cm off the ground. Toilet slabs should be cast with a 1:2:4 concrete mixture. Care should be taken to ensure that the mixture is not over watered (bucket slump test should show no greater than ¼ reduction in the slump height). Cast slabs should be immediately covered with straw, cement bags, sacking or leaves to keep the concrete moist and cool. The concrete should be cured with frequent watering at least twice daily for at least 10 days before use.
- 415.6 Reinforcement bars should be free from rust and of the correct type and size for concrete construction work (typically a characteristic yield stress of at least 210 N/mm<sup>2</sup>). Steel reinforcement should be placed on the lower side of the slab (the part in tension) with at least 12mm concrete covering under every bar. Reinforcement should be laid in both directions. Where the slab is rectangular, the bars parallel to the smaller span should be below the bars reinforcing the greater span. Domed Mozambican slabs must be reinforced with the correct size chicken wire covered with wire mesh and a mixture of 1 part cement to two parts sand.

### Box: Spacing of mild steel bars for concrete toilet slabs

	65mm Slab		80mm Slab	
Span	Ø 6mm	Ø 8mm	Ø 6mm	Ø 8mm
1.00m	150mm	250mm	150mm	250mm
1.25m	150mm	250mm	150mm	250mm
1.50m	125mm	200mm	150mm	250mm
1.75m	75mm	150mm	125mm	200mm
2.00m	50mm	125mm	75mm	150mm

Source: Franceys, Pickford & Reed (1992) 'Guide to the development of on-site sanitation'. World Health Organization, Geneva.

## **416 HANDWASHING STATIONS DESIGN CONSIDERATIONS**

- 416.1 UNHCR and WASH actors must plan for at least one functional hand washing dispenser per communal or public toilet block, ensuring at least one handwashing dispenser for every five toilet cubicles. Handwashing dispensers should be conveniently located within 10m of each toilet exit and their use should be actively promoted. The water dispensing device and soap must be located within easy reach of all users, especially children. Liquid soap, or bars attached to string, may be used if there is soap theft. All handwashing units that use bars of soap should have a fixed self-draining dish where the soap can be placed between use without getting dirty or becoming mislaid.
- 416.2 Hand-washing water storage containers should be sized to hold at least half a day of hand-washing water. To conserve water and avoid wastage, the hand-washing taps may need to be restricted with orifice plates to flows of 50 cubic centimetres per second (0.05 litres per second). Calculation of the total volume of hand-washing water required should be based on 0.5 to 1.0 litre of water per person per day. Hand washing reservoirs must be covered to prevent contamination or vector breeding.

## **417 ENVIRONMENTAL CONSIDERATIONS FOR SOURCING WOOD**

- 417.1 Ensure that all supplies of wood for household latrine slabs, latrine superstructures, privacy screens, and latrine brick production has been procured from sustainable sources outside of the refugee camp environment.

## **418 DECOMMISSIONING**

- 418.1 The toilet should be decommissioned when the level of excreta is within 50cm of the surface (DO NOT WAIT FOR THE PIT TO FILL TO THE SURFACE OF THE LATRINE SLAB). The superstructure should be removed and the pit should be back-filled with earth to a height of approximately 50cm to allow for settlement. Approximately 10 kg of lime may be used per cubicle to help neutralize the pH of the pit and assist in decomposition and drying. Where possible, quick growing plants or trees should be planted on the site to assist with drying of the pit.

## **419 UNHCR STANDARD TOILET DESIGNS FOR REFUGEE SETTINGS**

- 419.1 The following drawings should be used in conjunction with these technical design guidelines.

D-400/2015a	Communal Trench Latrine (Poles + Plastic) – EMERGENCY
D-401/2015a	Communal Trench Latrine (Wood + Plastic) – EMERGENCY

D-402/2015a	Household Domed Slab Mass Fabrication
D-403/2015a	Household Toilet / Bathing Unit (1 Family, Dome Slab, Alternating)
D-404/2015a	Household Toilet / Bathing Unit (Septic Tank and Drain Field)
D-405/2015a	Raised Storage Latrine (Holding Tanks) - EMERGENCY
D-406/2015a	Urine Diverting Dry Toilet (UDDT)
D-407/2015a	Institutional Latrine (Desludgable with Raised Option)
D-408/2015a	Institutional Latrine (Septic Tanks and Drain Field)

## USEFUL REFERENCES

- ◆ ACF (2005), 'Water, sanitation and hygiene for populations at risk – second edition'. ACF, Paris, France.  
[http://www.actioncontrelafaim.org/publications/fichiers/wsh\\_acf\\_0.pdf](http://www.actioncontrelafaim.org/publications/fichiers/wsh_acf_0.pdf)
- ◆ Bastable A. (2000). 'Guidelines for excreta disposal in emergencies. An Oxfam Technical Manual'. Oxfam GB, Oxford, UK.  
[http://ec.europa.eu/echo/files/evaluation/watsan2005/annex\\_files/OXFAM/OXF7%20-%20Guidelines%20for%20exceta%20disposal%20%20in%20emergencies.PDF](http://ec.europa.eu/echo/files/evaluation/watsan2005/annex_files/OXFAM/OXF7%20-%20Guidelines%20for%20exceta%20disposal%20%20in%20emergencies.PDF)
- ◆ CAWST (2011) 'Introduction to low-cost sanitation'. Centre for Affordable Water and Sanitation Technology CAWST, Calgary, Canada.  
[http://resources.cawst.org/system/files/Sanitation\\_Manual\\_2011-02\\_en.pdf](http://resources.cawst.org/system/files/Sanitation_Manual_2011-02_en.pdf)
- ◆ Franceys, Pickford & Reed (1992) 'Guide to the development of on-site sanitation'. World Health Organization, Geneva. [http://whqlibdoc.who.int/publications/1992/9241544430\\_eng.pdf](http://whqlibdoc.who.int/publications/1992/9241544430_eng.pdf)
- ◆ Harvey P. A (2007) 'Excreta disposal in emergencies: A field manual'. WEDC, Loughborough University, UK. <http://www.unhcr.org/4a3391c46.html>
- ◆ Harvey P. A., Baghri S. and Reed R. A. (2002) 'Emergency sanitation – assessment and programme design'. WEDC, Loughborough University, UK.  
<http://reliefweb.int/sites/reliefweb.int/files/resources/2533D212287DCAC6C1256D780035CC8D-lou-water-02.pdf>
- ◆ Lambert, R., and Davis, J. (2002), 'Engineering in emergencies 2nd Ed.', Register of Engineers for Disaster Relief (RedR), London.
- ◆ Obika A. (2004) 'Catalogue of low cost toilet options'. WEDC, Loughborough University, UK. <http://www.ircwash.org/sites/default/files/Obika-2004-Catalogue.pdf>
- ◆ PEN (2010). 'Philippine emergency sanitation reference toolkit (excreta disposal)'. Philippine Ecosan Network, Manila.  
[http://www.sswm.info/sites/default/files/reference\\_attachments/PEN%202010%20Philippine%20Emergency%20Sanitation%20Reference%20Toolkit.pdf](http://www.sswm.info/sites/default/files/reference_attachments/PEN%202010%20Philippine%20Emergency%20Sanitation%20Reference%20Toolkit.pdf)
- ◆ Reed R. A. (2010) 'Emergency excreta disposal standards and options for Haiti'. DINEPA and Global WASH Cluster, Haiti.  
[http://wedc.lboro.ac.uk/resources/pubs/Emergency\\_EDS\\_and\\_options\\_for\\_Haiti.pdf](http://wedc.lboro.ac.uk/resources/pubs/Emergency_EDS_and_options_for_Haiti.pdf)
- ◆ Tilley, E (2008) 'Compendium of sanitation systems and technologies', SANDEC and EAWAG, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland.  
[http://www.eawag.ch/forschung/sandec/publikationen/compendium\\_e/index\\_EN](http://www.eawag.ch/forschung/sandec/publikationen/compendium_e/index_EN)
- ◆ Van den Noortgate J., Maes P. (2010) 'Public health engineering in precarious situations – second edition'. MSF, Brussels.  
[http://refbooks.msf.org/msf\\_docs/en/public\\_health\\_en.pdf](http://refbooks.msf.org/msf_docs/en/public_health_en.pdf)

- ◆ USAID (1982) 'Designing aqua privies. Water for the world technical brief', USAID, Washington USA.  
<http://www.lifewater.org/resources/san1/san1d4.pdf>
- ◆ USAID (1982) 'Designing latrine pits. Water for the world technical brief', USAID, Washington USA.  
<http://wiki.watermissions.org/GetFile.aspx?Page=Simple%20Excreta%20and%20Washwater%20Disposal%20SAN1&File=san1c2.pdf>
- ◆ USAID (1982) 'Designing latrine slabs. Water for the world technical brief', USAID, Washington USA.  
<http://wiki.watermissions.org/GetFile.aspx?Page=Simple%20Excreta%20and%20Washwater%20Disposal%20SAN1&File=san1d1.pdf>
- ◆ USAID (1982) 'Simple methods of excreta disposal. Water for the world technical brief', USAID, Washington USA.  
[http://wiki.watermissions.org/\(S\(qmdltna0sc2kvjumvmak4z45\)\)/GetFile.aspx?Page=Simple%20Excreta%20and%20Washwater%20Disposal%20SAN1&File=san1m1.pdf](http://wiki.watermissions.org/(S(qmdltna0sc2kvjumvmak4z45))/GetFile.aspx?Page=Simple%20Excreta%20and%20Washwater%20Disposal%20SAN1&File=san1m1.pdf)
- ◆ WHO (2005) 'Emergency sanitation - planning'. Technical notes for emergencies #13'. World Health Organization, Geneva.  
[http://www.who.int/entity/water\\_sanitation\\_health/publications/2011/WHO\\_TN\\_13\\_Planning\\_for\\_excreta\\_disposal\\_in\\_emergencies.pdf](http://www.who.int/entity/water_sanitation_health/publications/2011/WHO_TN_13_Planning_for_excreta_disposal_in_emergencies.pdf)
- ◆ WHO (2005) 'Technical options for excreta disposal in emergencies'. Technical notes for emergencies #14'. World Health Organization, Geneva.  
[http://www.who.int/water\\_sanitation\\_health/publications/2011/tn14\\_tech\\_options\\_excreta\\_en.pdf?ua=1](http://www.who.int/water_sanitation_health/publications/2011/tn14_tech_options_excreta_en.pdf?ua=1)