World Health Organization

USAID
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WHEELCHAIR SERVICE TRAINING PACKAGE

For Managers

Additional Resources

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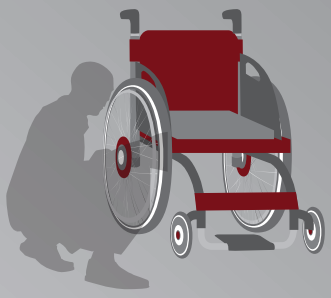

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Possible strategies for developing a wheelchair provision programme

The best strategy for developing a national wheelchair provision programme will depend on the current state of wheelchair services in the country, the available resources, and the needs the service has to meet. It is useful to consider the following questions and strategies outlined in the *Wheelchair Guidelines* when planning wheelchair provision.

- What are the characteristics and specific needs of the user population?
- Do stakeholder groups exist and, if so, what are their interests and opinions?
- Do wheelchair services already exist (through local workshops, community-based rehabilitation, disabled people's organizations, other nongovernmental organizations, the private sector or government)?
- Is there any wheelchair provision outside of the formal infrastructure, for example, provision of mass imported wheelchairs?
- What can be done with existing resources?
- What are the current funding mechanisms?

1. **The government wants to establish a national wheelchair service programme.** The government may contact interested nongovernmental and disabled people's organizations, users, training programmes for health professionals, international organizations such as the World Health Organization (WHO), the International Society for Prosthetics and Orthotics (ISPO), the International Society of Wheelchair Professionals (ISWP) and relevant international nongovernmental organizations to develop an appropriate plan for a national wheelchair service. The government may look at its own prosthetic and orthotic services and use these as a basis for developing a wheelchair service. It may also contact government bodies in other countries to learn from their experience and seek advice.

2. **Wheelchair provision exists, but on a small scale through independent organizations; there is no collaboration.** The government, local organizations or an international nongovernmental organization could assess the possibility of scaling up the operation. A resource centre can be set up to involve people from the different organizations in a collaborative effort. The resource centre can then evolve into either a coalition of organizations interested in wheelchair services or an independent nongovernmental organization in its own right.

3. **There are organizations in the country but no wheelchair service delivery.** An interested nongovernmental or disabled people's organization can serve as the nucleus for a resource centre. The organization needs to identify an appropriate organization with wheelchair provision experience as a partner (e.g. a governmental or nongovernmental organization in a neighbouring country or an international nongovernmental organization) and should follow the other initial steps in scenario 4 below. Alternatively, this process may be started by an international nongovernmental organization, which then seeks out local nongovernmental and disabled people's organizations as partners. Efforts should be made to identify and network with other countries or organizations that have had similar experience in initiating wheelchair services.

4. **There are no organizations in the country and no regular wheelchair service delivery.** An international nongovernmental organization, either on its own initiative or at the invitation of or in partnership with the government, could establish a resource centre in the capital or other major city. The resource centre could be an integral part of an already existing rehabilitation institute. The resource centre should begin by providing important information to users, their families or caregivers and health professionals about mobility needs and wider issues pertaining to mobility. The international nongovernmental organization should develop a stakeholder analysis and survey people who use or require wheelchairs, in order to identify gaps and determine the need for wheelchairs and services. Preliminary participatory research will present options for meeting the needs. Funding should be secured to begin wheelchair provision. Efforts should be made to establish a working relationship between the resource centre and relevant governmental bodies as a first step in establishing a national wheelchair service.

Wheelchair Service (Basic) Referral Form

Sample referral form: This form can be adapted by wheelchair services and provided to referral sources to help them refer wheelchair users to the wheelchair service.

Please complete referral form and send to:
(Wheelchair service name and address)

Name of referral person:			
Organization you work for:			
Referral person contact details (the best way to contact you):			
Wheelchair user's name:		Date of Birth:	
Parent/carer's name:			
Address:			
How can the wheelchair user be contacted?			
Post ☐ Own telephone ☐ Friend/neighbour's telephone ☐			
If by telephone, what is their phone number:			
Wheelchair user's disability, if known:			
Reason for referral: • Has no wheelchair ☐ • Has a broken wheelchair ☐ • Has a wheelchair that does not meet their needs ☐			
Please add any other information about the wheelchair user that you think is important for the wheelchair service to know:			
Has the wheelchair user agreed to being referred to the wheelchair service?		Yes ☐ No ☐	
Signature of referring person:			
Date:			

Wheelchair Service (Intermediate) Referral Form

Sample referral form: This form can be adapted by wheelchair services and provided to referral sources to help them refer wheelchair users to the wheelchair service.

Please complete referral form and send to:
(Wheelchair service provider's name and address)

Name of referral person:			
Organization you work for:			
Referral person contact details (the best way to contact you):			
Wheelchair user's name:		Date of Birth:	
Parent/carer's name:			
Address:			
How can the wheelchair user be contacted?			
Post ☐	Own telephone ☐	Friend/neighbour's telephone ☐	
If by telephone, what is their phone number:			
Wheelchair user's disability, if known:			
Reason for referral: • Has no wheelchair • Has a broken wheelchair • Has a wheelchair that does not meet their needs • For children: o unable to sit upright or not able to pull up to stand by the age of 1; o unable to walk alone by the age of 2.			☐ ☐ ☐ ☐ ☐
Please add any other information about the wheelchair user that you think is important for the wheelchair service to know:			
Has the wheelchair user agreed to being referred to the wheelchair service?		Yes ☐	No ☐
Signature of referring person:			
Date:			

List of service forms and checklists

Note: The Wheelchair Service Referral Forms are included in this manual. All other forms can be found in the WSTP Basic and Intermediate Packages on the Pen Drive.

Basic level services

1. Wheelchair Service (Basic) Referral Form
2. Basic Wheelchair Assessment Form
3. Basic Wheelchair Prescription (selection) Form
4. Basic Wheelchair Summary Form
5. Basic Wheelchair Fitting Checklist
6. Wheelchair Safe and Ready Checklist*
7. Wheelchair Follow-up Form*

Intermediate level services

8. Wheelchair Service (Intermediate) Referral Form
9. Intermediate Wheelchair Assessment Form
10. Intermediate Wheelchair Prescription (Selection) Form
11. Intermediate Wheelchair Summary Form
12. Intermediate Wheelchair Fitting Checklist
13. Intermediate Wheelchair User Training Checklist
14. Postural Support Device (PSD) Table

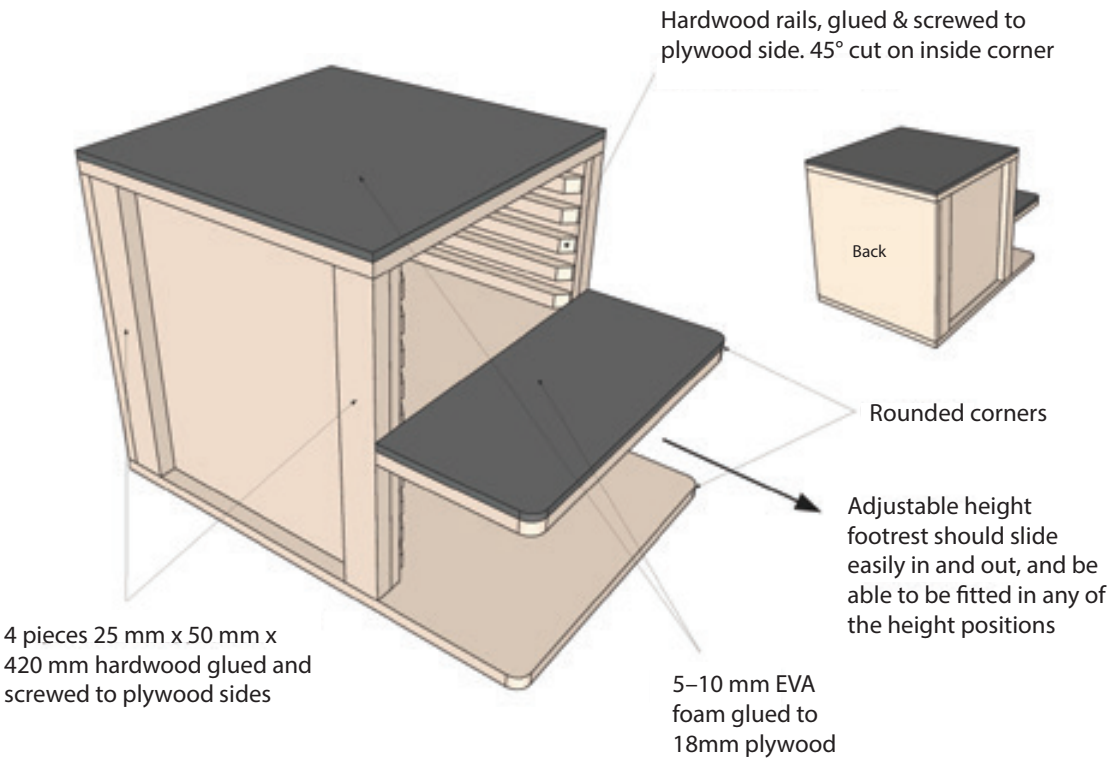
* Forms and checklists are suitable for both basic and intermediate level services

Making an Assessment Box

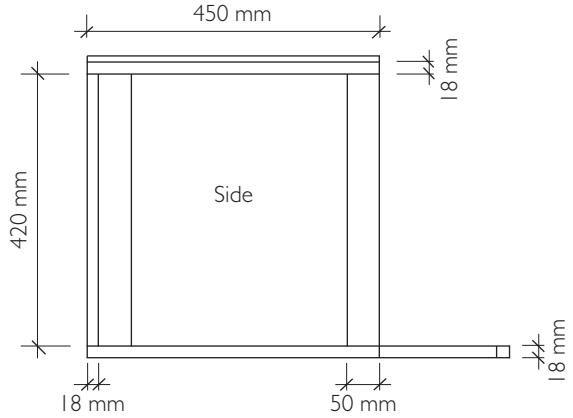
Instructions for making an assessment box

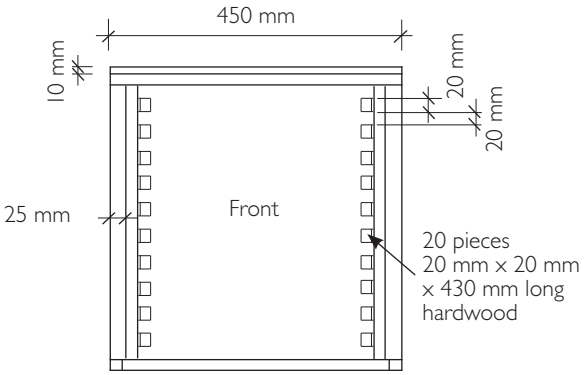
1. All plywood is drawn as 18 mm. If unavailable use 15 mm or 20 mm.
2. Adjustable height footrest should slide easily in and out between rails.
3. Seat surface and footrest surface should be covered by firm 5-10 mm foam (EVA), or a grip mat similar to the type used on some wheelchair footrests.

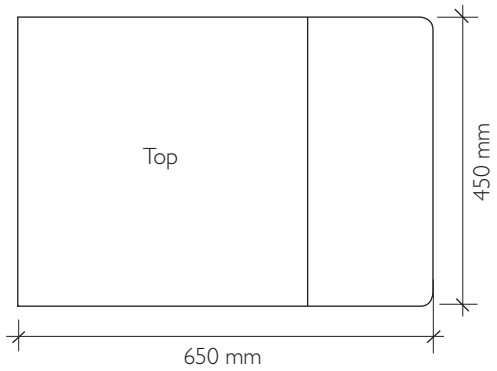
Locally made assessment box

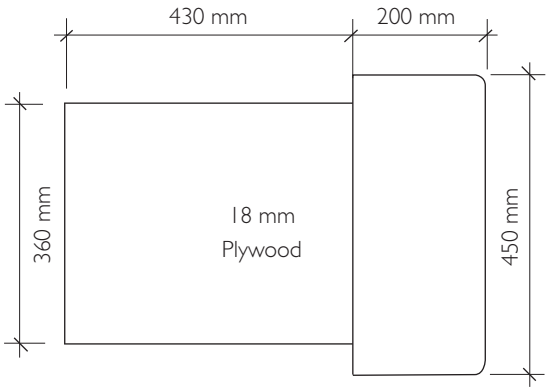


Assessment box dimensions









Adjustable height footrest

Making an Assessment Bed

The assessment bed enables the wheelchair user to sit comfortably in a position where the clinician will be able to make a good assessment for a wheelchair prescription.

The assessment bed should be stable, safe, and at a height suitable for transfers from a wheelchair.

Dimensions

Approximate length is 1800 mm x width 600 mm x height 500 mm for normal wheelchair related assessment.

Materials and construction

- Frame can be made from wood or steel
- Cushion:
    - 13 mm plywood base
    - 50 mm dense chip foam
    - 25 mm soft foam top layer.
- The cushion should be covered in easy-to-clean fabric such as imitation leather (Rexene) or leather. Rexene/leather should be cut to shape, folded, glued and stapled or tacked to the plywood to hold it in place.
- Finish steel frames with anti-corrosive undercoat and top coat with spray-paint finish.

Making Foot Blocks

Foot blocks support the wheelchair user's feet at an appropriate height during the assessment, in order to give them a good sitting position.

In order to position the wheelchair user's feet correctly, it is important that there are a range of foot blocks of varying heights available, or that the foot block is adjustable.

Dimensions

Surface area: 400 mm x 300 mm.

Heights: Varied from 15-150 mm.

Materials and construction

- Blocks of different heights that can be stacked, or an adjustable block.
- Plywood construction.
- For users with a condition that results in uneven foot bases (whether leg length discrepancy or some other problem), two separate blocks of different heights need to be used.

Basic stacking of foot blocks

Examples of Measuring Tools

Callipers

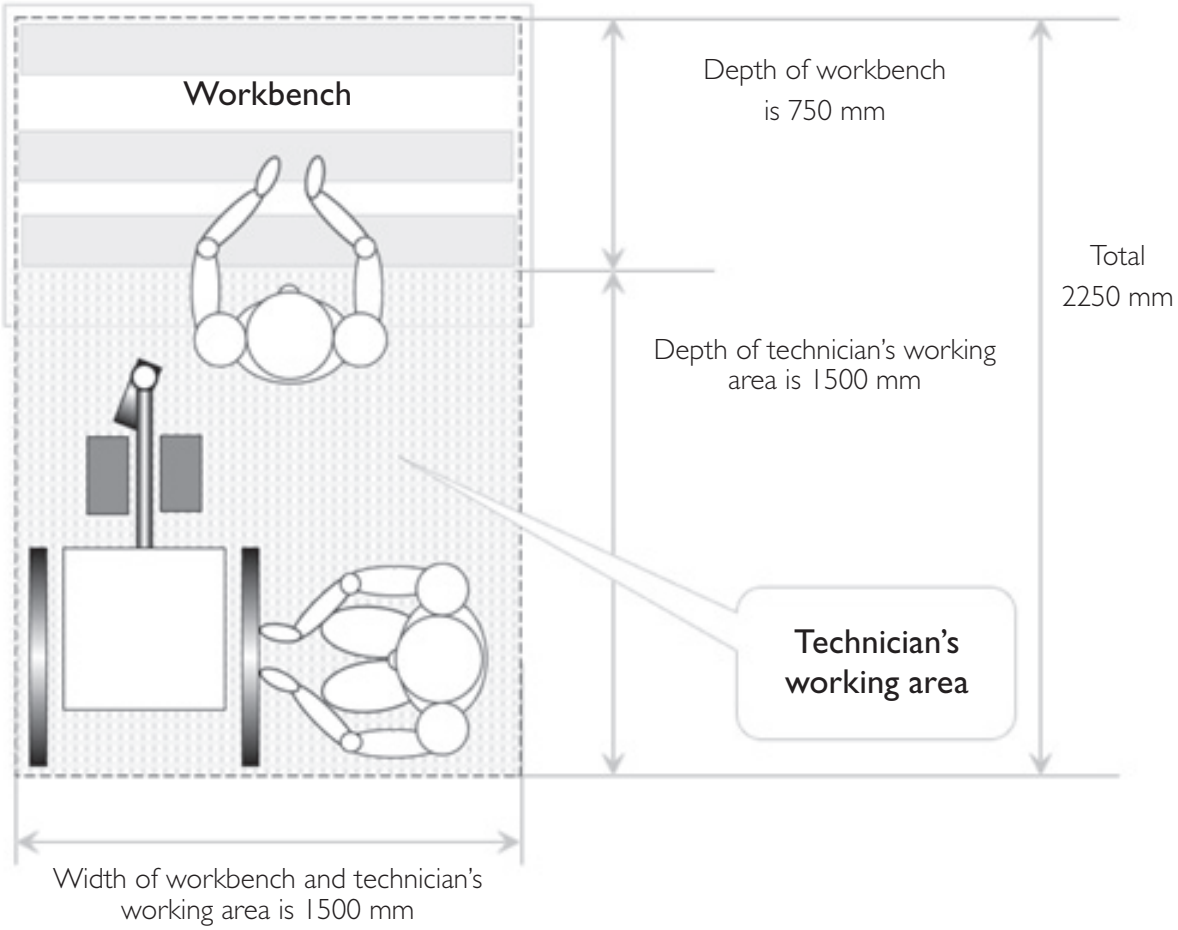
Wooden measuring tool

Material: Plywood 3-9 mm.
Wooden base with measurement markings and strips of Velcro to secure the adjustable side.
Wooden sides: One side is fixed and the other side is adjustable.

Vinyl measuring tool

Vinyl base with measurement markings.
Wooden sides: One side is fixed and the other side is adjustable.

Guide to Technical Facilities: Workbench and Ground Work Area



Guide to Basic Service Technical Resources

The tools listed below are for assembly, set-up, adjustment, maintenance and repair plus basic modifications of products (as covered in the WSTP basic training course).

Tools	Details	Number
Set of metric combination spanners	8 mm to 22 mm (Must include 8, 10, 13, 19 mm sizes)	2
Set of imperial combination spanners		1
Set of metric Allen keys	Long-stem types are best – preferably with a T-bar handle	2
Metal measuring tape	5 m length	1
Philips screwdriver set	Large and medium sizes	1
Flat head screwdriver set	Large and medium sizes	1
Rubber mallet	8 oz head	1
Pliers	Medium short nose	1
Bradawl	Small "flat blade" type point	1
Metal file set (3 files)	Type: medium size second-cut file, half round file, round file, flat file	1
Small pipe cutter and spare blades	Cutting tubes from 12 mm to 38 mm	1
Hand wood saw	A wood "cut" saw (not a ripsaw)	1
12" hacksaw and blades	For metal cutting	1
Foam-cutting knife	Either a long slightly serrated blade or a standard bread knife	1
Box cutter knife and spare blades		1
Heavy duty scissors		1
Needle and thread set	Range of needle sizes, strong nylon thread	1
Air pump for tyres	For both "Schrader" and "Presta" types of bicycle tyre valves	1
Puncture repair kit with tyre levers		1
Fine marker pen		1
Spoke key (wrench)		1

Tools	Details	Number
Safety glasses		1
Paint brushes		1
Cleaning kit	Bucket and brushes	1
Desirable power tools		
Voltage regulator for workshop machinery and hand tools*		1
Sewing machine – heavy duty		1
Heavy duty sewing machine needle set		1
Electric drill	3-13 mm chuck, multiple speed	1
Drill bit set for wood		1
Drill bit set for metal		1
Electric jigsaw		1
Set of wood and metal fine-cut blades		1
Electric angle grinder		1
Set of medium and fine grinding disks		1
Electric extension cables	10 m	2
Power surge protector		1
Storage		
Toolbox		1
Padlocks		2
Metal cabinet with lock		1
Consumables		
Light lubricating oil		
Contact adhesive glue		
Standard PVA wood glue		
Exterior wood varnish		
Enamel metal paint		
Paint thinners		
Soap		
Sponges		
Cloths		

Guide to Intermediate Service Technical Resources

All of the items listed in the Basic Service Technical Resources list are also needed for an intermediate service. In addition, Items marked with * appear in the Basic Service Technical Resources list and have been highlighted to confirm that an additional set is recommended for an intermediate service.

Tools	Details	Number
Essential items		
Voltage regulator for workshop machinery and hand tools*		1
Sewing machine	Heavy duty – able to sew heavy fabrics if required	1
Desirable items		
Arc welder/Mig welder		1
Pair of welding hand protection gloves	Thick leather–6" opening	1
Arc welding eye protection mask		2
Bench grinder	Coarse and fine grade wheels	1
Belt sander	With dust extraction facility	1
Set of sanding belts	Coarse and fine grades	1
Band saw	Medium sized for wood, plywood, PU and EVA foam	1
Compressor	24 L	1
Spray gun kit with hoses		1
Gas brazing kit	Welding torch with assorted nozzle sizes, regulators and hoses	1
Brazing eye protection goggles		1
Pillar drill (3-13 mm chuck size)	Bench standing or floor standing With drill vice clamp (ideally a swivel base cross multidirectional drill vice clamp)	1
Power tools		
Essential items		

Tools	Details	Number
Hand-held electric drill (3-13 mm chuck size)	Multi-speed and multi-torque settings are useful	1
Hand-held electric jigsaw		1
Angle grinder		1
Set of grinding disks	Coarse and fine disks	1
Angle grinder hand protection gloves		1
Electric extension cables*	5 m or 10 m	2
Desirable items		
Electric screwdriver	Cordless, with a set of assorted screwdriver, socket and Allen-key head sizes	1
Cordless hand-held electric drill (3-13 mm chuck size) 18V	Multi-speed and multi-torque settings are useful	1
Circular saw (minimum 185 mm blade)		1
Soldering iron	Pointed end for making holes in webbing and flat end for sealing end of cut webbing	1
Hand tools		
Essential Items		
Hand wood saw (universal)	22", fine cut teeth	1
Coping saw and set of blades	Fine cut for wood	1
Spade bits set		1
Countersink bit		1
Cutting shear (with fixing bolts)	Bench-mounted	1
Bench vice (with fixing bolts)*	6"	2
Pliers	Long-nosed – medium	1
Locking pliers (mole grips)	Short-nosed – medium	2
Locking pliers (mole grips)	Long-nosed – medium	2
C-clamp	6" opening	2
C-clamp	8" opening	2
Eyelet punch set and eyelets	Assorted sizes	1
Staple gun (for wood)		1
Rivet gun (pop riveter)		1

Tools	Details	Number
Metal ruler*	1 metre (metric and imperial scales)	1
Metal ruler	30 cm	2
Metal measuring tape*	5 m	1
Vernier caliper	150 mm jaw width	1
Metal protractor	1-180 degrees (1-degree accuracy)	1
Centre punch		2
Scribe		2
Bradawl*	Useful when drill or power not available	1
Carpenters square	600 mm x 400 mm steel	1
Adjustable spanner	1" Max opening	1
Socket Set	Metric (including 8, 10, 13, 17, 19 mm sizes)	1
Tyre levers*	Set of 4	1
Spoke key*		1
Safety glasses*	General workshop eye protection	4
Ear defenders		2
Dust masks		4
Flat wood file	Medium	1
Wood rasp file set		1
Half round file set (for wood)		1
Desirable items		
Socket set	Imperial	1
Combination spanner set*	Imperial ¼–1½	1
Allen key set (L-shape)	Imperial	1
Spokeshave		1
Combination square		1
Adjustable angle bevel		1
Small square	10"	1
Workshop general		
Waste bins		3
Floor brush		1
Dustpan and brush		1

Tools	Details	Number
Cleaning cloths		1
Workshop cleaning buckets and sponges		2
Workshop furniture and safe storage		
Metal locking cabinet for tools*		2
Locking cabinet for materials		2
Opening cabinet for general use		1
Opening cabinet for PSD components		1
Stool		3
Workbench*		3
Shelving		2
Drying rack	For painted or varnished parts	1
Consumables		
Paint undercoat	Exterior wood paint	
Paint top coat	Exterior wood paint	
Varnish	Exterior grade	
White spirit*	For cleaning brushes and spray gun	
Paint/varnish/glue pots		
Sandpaper	Grades 40, 80 and 150	
Fabric chalk		
Grease		
Brazing rod pack	Assorted sizes	
Brazing flux		
Jigsaw blades	Packets of (fine cutting) blades for wood, metal, and plastic	
Staples	5 mm and 8 mm depth	
Sewing needles	Assorted sizes	
Arc welding rods for steel	Size: 2 mm, 4 mm, 6 mm	
Eyelets	Assorted sizes	
Rivets	Diameter 4 mm and 6 mm Assorted rivet lengths	

Preparing a Hacksaw Blade for Foam Cutting

- Take an ordinary metal hacksaw blade (preferably an old used one) and grind down the saw tooth edge to a sharp knife point (a V-shape cross section).
- This gives you a thin sharp serrated knife blade that cuts through medium and low density Polyurethane foam and chip foam very easily and quickly.
- Wrap some tape around one end of the saw blade to make a handle and protect your fingers from the blade.

Guide to Basic and Intermediate Service – Materials

Materials for modifications and fabricating additional postural support devices (PSDs) are used more often at the intermediate level. However, basic level services may also carry out simple modifications using similar materials. The quantity of materials required will depend on a number of factors including the number of wheelchair users accessing the service, the volume of intermediate level wheelchair service delivery, and the types of wheelchairs provided. Clinical and technical staff should be involved in sourcing appropriate materials.

Materials	Used for:	What to look for:
Metal/plastic/ wood	Metal/plastic/wood form the structure of a postural support device – for example rigid seats and backrests.	12 mm plywood is very useful for making rigid seats and backrests. It is strong but relatively lightweight. Marine plywood is the most durable option but it can also be expensive. 3 mm aluminium and 6 mm acrylic or ABS plastic sheets, if available, can also be used to make rigid backrests. Adding a fold in the sheet can increase rigidity. When using any sheet material, take additional care to remove or pad the sharp edges for user safety.
Foam/padding	Foam is used in all PSDs in areas that are in direct contact with the wheelchair user's body. Firm foam, which holds its shape, is used to give PSDs the shape they need to provide the right support. Softer foam is used to add comfort and reduce pressure. Examples of the use of foam: • should be added to straps to reduce pressure and add comfort. • firm foam can be used to make a side trunk wedge or added to a cushion to make a side thigh support or inside thigh support.	Check local markets and visit foam, shoe, mattress and furniture factories to find locally available foam. Try to find local examples of foam in different thicknesses (25 mm and 50 mm) and different firmness. EVA is an example of very firm foam, which is good for providing firm support and structure for a PSD. EVA can sometimes be found where shoes are manufactured. The firm rubber used to make flip flops can be used in place of EVA. Good quality chip foam is an example of a foam of medium firmness. Chip foam can be used as the base of a contoured/layered cushion to make a rear pelvis pad or pre-seat bone shelf, or to provide contours on a rigid backrest. Soft "mattress foam" is an example of softer foam used for comfort layers.

Materials	Used for:	What to look for:
Foam/padding	• Very firm foam (for example EVA) can be used to make a footrest build up or wedge and lateral trunk pads.	The most commonly available, cheapest "very soft" foam is unsuitable on its own for making pressure relieving cushions without a firmer foam base. Coir (coconut fibre) can be used in place of firm foam.
Fabric	Fabric is used to cover PSDs.	Look for a fabric that will be durable and easily cleaned (either by wiping down or removing for washing). A water-resistant fabric is useful for the seat and backrest if wheelchair users are incontinent. A softer, T-shirt type material (cotton or cotton/Lycra) can be used for headrests and trunk side supports. A fabric with some stretch will more easily conform to the shape of the PSD. Synthetic fabrics usually make the person hotter than natural fabrics. Try to have at least a few different colours, and offer wheelchair users a choice, if possible.
Nylon webbing and Velcro or buckles	Nylon webbing and Velcro or buckles are used to make straps, including a pelvis strap, shoulder harness, calf and foot straps.	25 mm, 35 mm and 50 mm nylon webbing is useful. The wider the strap, the more even the pressure. Melting the cut end of nylon webbing stops it from fraying. Cotton webbing is much less effective. Clip buckles (such as those used on backpacks) can be very easy to use. Use good quality buckles, if available, as these will last longer. Test them by clipping them together and trying to pull them apart. They should clip together and undo easily, but still not pull apart unless released. Velcro is a good fastener, however it needs to be kept clean or it will stop working. Pads should be placed under all webbing straps to protect the user's body.
Adhesives	Adhesives are used to stick the wood and foam together.	Have a supply of wood glue (commonly known as white glue or PVA) and foam glue (contact adhesive, shoe glue or yellow glue). Ensure that anyone using adhesives knows how to use them correctly.
Fasteners	Fasteners are used to attach the PSD to the wheelchair.	Useful fasteners include: • bolts with nuts (preferably lock-nuts) and washers • T-nuts (fixed into plywood instead of a nut) • staples (for fixing upholstery). Avoid using sharp screws as they may become a hazard if the PSD is damaged.

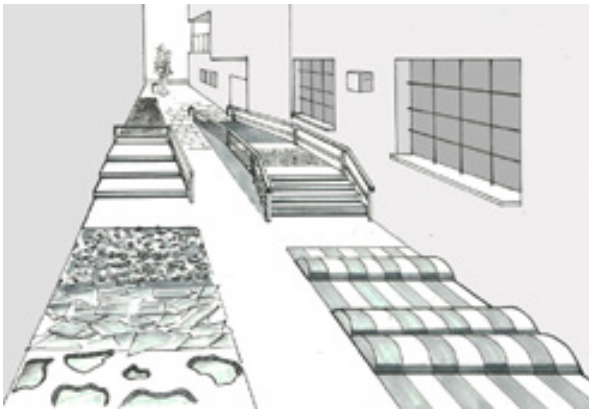
Guide to Setting Up a Mobility Skills Area

A mobility skills training area is essential for wheelchair users to learn to use their wheelchairs correctly and safely.

It should include as a minimum:

- varying locally appropriate terrain
- slopes
- steps

It should be located close to the fitting area, as this is the next service step, and adjustments are often required to the wheelchair set-up once the user has tried to propel the wheelchair. A covered section will be useful in poor weather conditions.



Simulation of local terrain

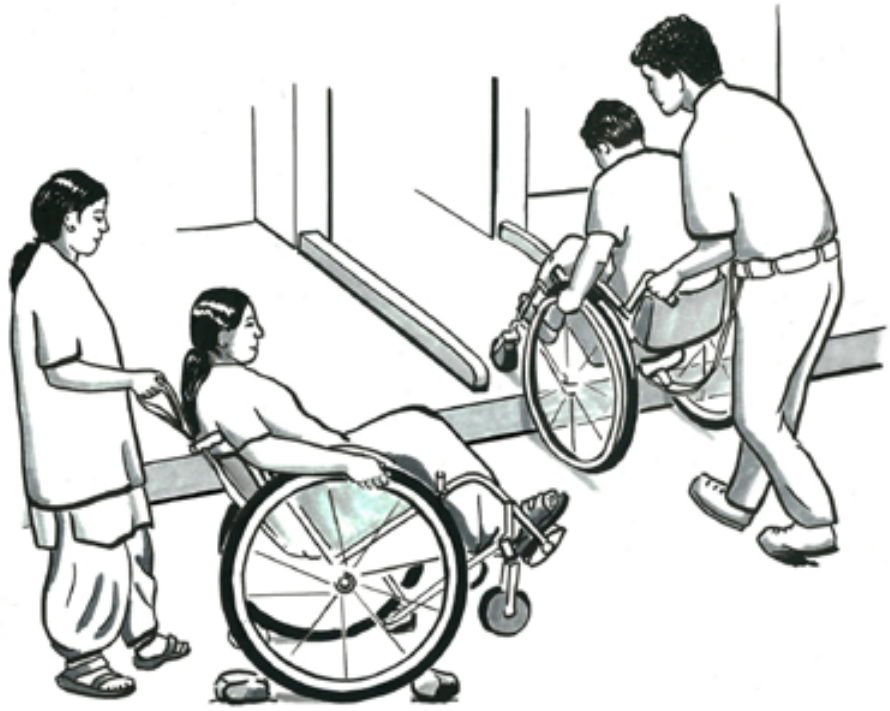
Blocks and 1:12 ramp

A mobility skills training area will comprise the following:

Item	Dimensions	Purpose: For wheelchair users and their assistants to practise:
Flat ground	10 m long x 1 m wide	Basic propelling
Simulation of local terrain (3 areas), such as sand, grass, and rocky ground	Each area should be a minimum of 2000 mm long and 1000 mm wide	Environments found in the user's locality
Block 1	1500 mm x 1500 mm x 25 mm height	Manoeuvring on an individual step
Block 2	1500 mm x 1500 mm x 100 mm height	
Block 3	1500 mm x 1500 mm x 200 mm height	
1:12 ramp	Approximately 3600 mm long x 1000 mm wide Gradient: 0 mm (low end) to 300 mm (high end)	Manoeuvring on a standard slope
1:8 ramp	Approximately 2400 mm long x 1000 mm wide Gradient: 0 mm (low end) to 300 mm (high end)	Manoeuvring on a steep slope
Thresholds (curbs and obstacles) (See Figure 1)	60mm high x 50mm wide x 1000 mm long	Overcoming obstacles in the path and door thresholds
Thresholds (curbs and obstacles) 2 (See Figure 1)	90 mm high x 50 mm wide x 1000 mm long	
Stair steps (See Figure 2)	Approximately 300 mm deep, 150 mm high and 1100 mm wide	Going up and down a series of steps

The dimensions stated in the table above must be amended for the local context if significantly different from suggested standards. It is important that people learn to negotiate their local environments through this training. Ensure that there is access to approach any single part of the mobility training area.

Sometimes an area close to the service area can be identified using the natural terrain available.



Examples of thresholds with different heights

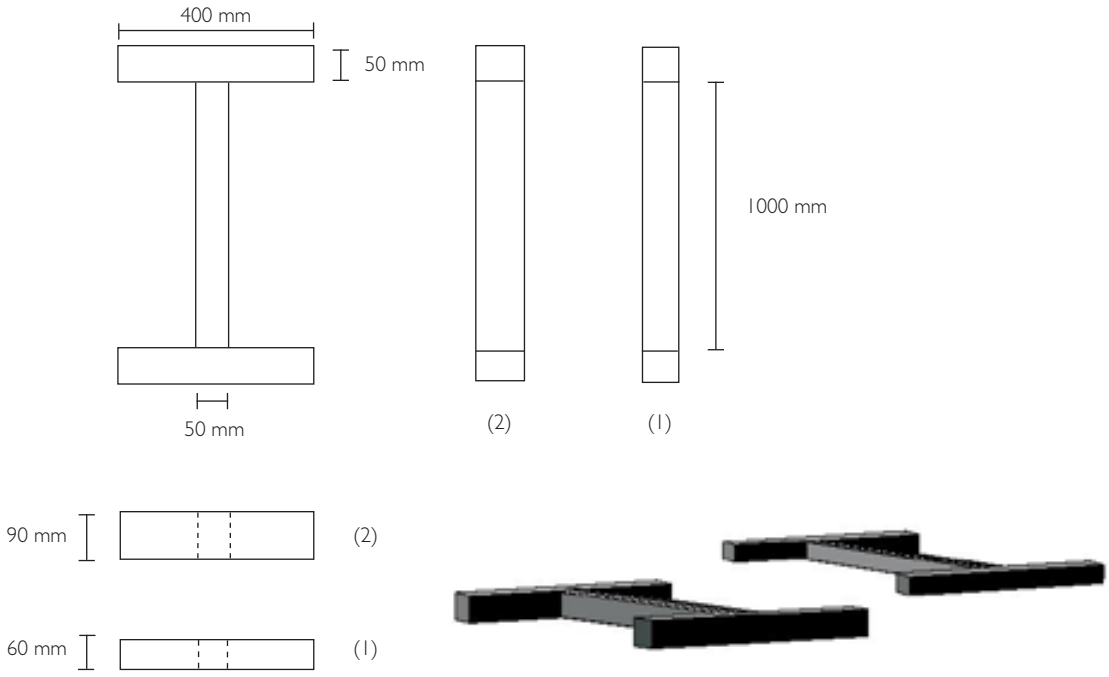


Figure 1 (measurements in mm)

Example of stair simulator

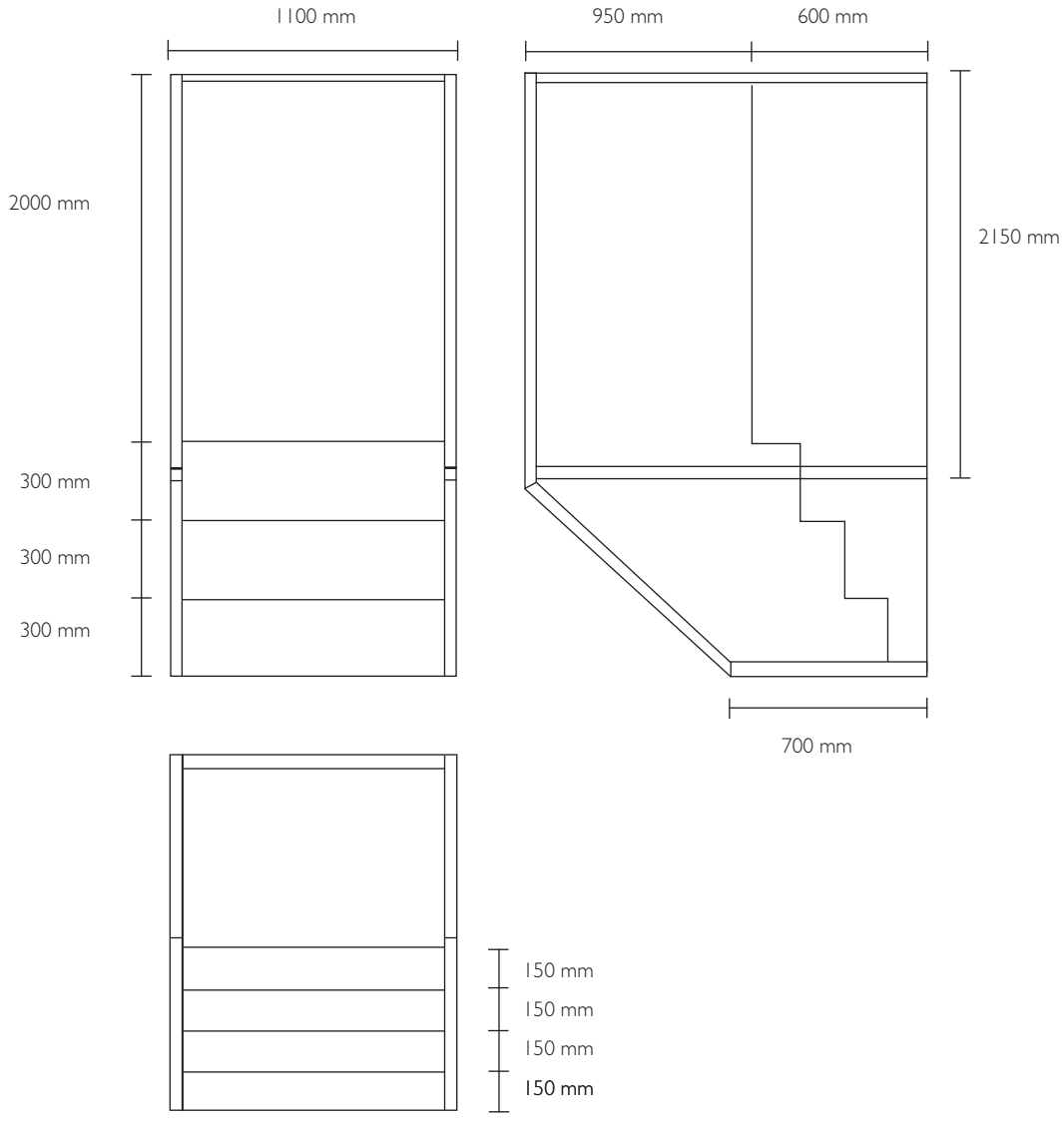


Figure 2 (measurements in mm)

Comparison of different methods of supplying wheelchairs

The main wheelchair supply methods to be considered are local production of wheelchairs, importing new wheelchairs and importing recycled wheelchairs. Wheelchairs can also be recycled within a wheelchair service.

Long-term reliable supply of a range of products

Wheelchair users need a long-term supply of a range of appropriate products, as defined in the *Wheelchair Guidelines*. With any supply model, it is crucial to consider the long-term reliability of the product supply. All supply models present challenges in terms of sustainability and quality control and need to be considered on a case-by-case basis in different settings.

Wheelchair users should participate in the planning, implementation, management and evaluation of wheelchair provision[1] and therefore should be involved in determining the best solution for a particular setting.

If local prosthetic and orthotic (P&O) services exist, their choice of local production or imported devices can help decision making on the method of supplying wheelchairs to a wheelchair service. It is also useful to consider similar items in the local marketplace, such as bicycles or steel furniture, and understand the reasons why these local businesses have decided to produce or import their product. The presence or absence of other local manufacturing is a very important indicator of whether wheelchair manufacturing will succeed. The presence or absence of established local businesses which import products is a good predictor of the possibility of a reliable supply chain for importing goods.

Before a decision is made on which supply model to use, it is recommended that a full feasibility study is carried out. Costs need to be calculated and compared. The full cost of an imported product can be estimated in advance (product quote, shipping and importation, storage), but attention needs to be paid to issues that will be outside of the wheelchair services' control such as shipping delays or exchange-rate fluctuations. Establishing the cost of a locally manufactured product requires significant knowledge of workshop running costs alongside the actual product costs and can be unpredictable. Logistics such as staff required, storage needed, and management of the importation or local production needs to be calculated.

1 Guidelines on the provision of manual wheelchairs in less resourced settings 2008, p 34 (http://www.who.int/disabilities/publications/technology/wheelchairguidelines/en/).

Comparison of benefits of local production and imported products

Whether products are produced locally or imported, all wheelchairs should be appropriate, as defined in the *Wheelchair Guidelines*[2]. In the past it was not possible to import wheelchairs which were specifically designed for less resourced settings; therefore, local production was the only way to ensure a supply of appropriate products. However, wheelchairs specifically designed for use in less resourced settings are becoming increasingly available for import. With this in mind, it is useful to consider the benefits of both approaches.

The comparison table highlights a number of considerations when choosing a supply model to best ensure a range of appropriate wheelchairs are available for wheelchair users.

Local production	
Advantages	**Disadvantages**
• Government commitment to local production can send a message that disability is an issue belonging to the community and has to be tackled in all its aspects, including wheelchair manufacturing. • Production can be tailored to local needs. • Products can easily be supplied with locally accessible spare parts. • Creates local manufacturing jobs and skills that can then support local wheelchair repair and maintenance. • The need for customized wheelchairs can be addressed if the local manufacturer has capacity. • Easier to maintain consistent stock levels with local production. • Minimal storage for stock needed due to continual and flexible production. • Much easier to involve local users in product development and react faster to needs and problems.	• Difficult to maintain quality with small scale non mechanized production. • Initial investment needed in machinery, tools, manufacturing space and staff training. • Difficult to retain workshop staff when product orders do not cover production workshop running costs. • Management of production workshop can be complex. • Reliant on consistent local availability of materials and components. • Limited production numbers can increase cost of products. • Less time to focus on clinical aspects of wheelchair provision due to labour intensive nature of local production.

2 Guidelines on the provision of manual wheelchairs in less resourced settings 2008, p 71 (http://www.who.int/disabilities/publications/technology/wheelchairguidelines/en/).

Imported wheelchairs	
Advantages	**Disadvantages**
• Imported wheelchairs can complement locally available products to ensure a range of different products and components are available to meet individual needs of users. • Consistent product quality, due to established manufacturers with well established quality control mechanisms. • Potential cost savings due to higher volume production than may be possible locally. Cost savings can lead to more wheelchairs distributed. • Wheelchair service will have more capacity to focus on clinical skills as less time is spent on production. • Local jobs can be developed for assembly, adjustments, posture support modifications, maintenance and servicing. • Less initial investment needed in machinery, tools, materials, and security than for local production. • Less complicated workshop/technician management needed than for local production.	• Logistics and cost of customs importation. • Cost of shipping can require larger volume orders to be cost effective. • Less flexibility in terms of minimum order quantities. • Longer lead time on shipping, and potentially longer lead time on production if there is a minimum number requirement before production commences. • Larger volume orders require significant capital, larger storage space and greater inventory control mechanisms. • Difficult to maintain consistent stock levels with less frequent larger stock purchases. • Commonly available imported products may not be tailored to local needs. • Products may not be supplied with locally accessible spare parts. • Does not create local manufacturing jobs. • Increased difficulty of involving local users in product development.

Importing recycled wheelchairs

In many well resourced settings, frequent replacement of wheelchairs or short-term use of wheelchairs often leads to stockpiles of used wheelchairs. As a response, several organizations have collected, restored and exported these wheelchairs for reuse in less resourced settings.

When deciding if importing recycled wheelchairs is a good option for your organization, keep in consideration what an appropriate wheelchair means:

- meets the user's needs and environmental conditions;
- provides proper fit and postural support;
- is safe and durable;
- is available in the country: and
- can be obtained and maintained and services sustained in the country at an affordable cost.

Some considerations when considering importing recycled wheelchairs are:

- How do you ensure available products are suitable for less resourced settings?
- How do you respond to identified needs within a country when available products may vary widely in type, size and quality?

- How do you offer a consistent supply of spare parts?
- How do you offer the right tools for adjustment and set-up of a wide range of products from different manufacturers?
- The impact on existing local manufacturers and service providers.

Recycling wheelchairs within the existing service provision

As services grow, it is inevitable that a portion of clients will either grow out of their wheelchair, receive a new wheelchair, or no longer be using their wheelchair.

As a response to this, some organizations will opt to develop a system where wheelchairs are returned to the service and recycled for another user. This can benefit more users, but there are many considerations to take into account before deciding if this is a good option for your service.

If an organization does choose to recycle products it is important to keep in consideration that a recycled wheelchair should still be appropriate for the user. Many parts will need to be replaced or repaired and any part that can hold bacteria (foam, upholstery, straps, etc.) should be replaced for the safety and health of the next user.

Some of the factors that will affect the complexity and viability of recycling wheelchairs within your programme are:

- access to replacement parts
- volume of clients seen
- funding mechanisms used with clients
- ages of clients
- quality of products provided
- local terrain and environmental factors (which will affect the lifespan of the wheelchair)

Some additional considerations include the:

- need to transport wheelchairs back to the service for recycling
- additional workshop space for refurbishment
- need for advanced technical and quality control training.

Tool for measuring participation at time of assessment for assistive technology

Identify respondent:	Location:
Date:	Name of interviewer:

1. Do you have any assistive devices? ☐ Yes ☐ No (Skip to 5)
2. If **Yes**, what assistive devices do you have? _____
3. If **Yes**, do you currently use any of the assistive devices you have? ☐ Yes ☐ No (Skip to 5)
4. If **Yes**, which ones do you use? ☐ All ☐ Some, specify:

_____

Next are some questions regarding how much difficulty you have carrying out daily activities in your home. This includes assistance from other people and the use of any assistive devices.

5. To what extent do you have problems using transportation as a passenger to get around?

☐	☐	☐	☐	☐	☐
No problems	Mild problems	Moderate problems	Severe problems	Impossible	Not applicable

6. To what extent do you have a problem to do housework like washing or cleaning?

☐	☐	☐	☐	☐	☐
No problems	Mild problems	Moderate problems	Severe problems	Impossible	Not applicable

7. To what extent do you have a problem to go to school and study?

☐	☐	☐	☐	☐	☐
No problems	Mild problems	Moderate problems	Severe problems	Impossible	Not applicable

8. To what extent do you have problems getting and keeping a job?

☐	☐	☐	☐	☐	☐
No problems	Mild problems	Moderate problems	Severe problems	Impossible	Not applicable

9. To what extent do you have problems participating in recreational and leisure activities such as sports, games, arts and crafts, dance, music, etc.?

☐	☐	☐	☐	☐	☐
No problems	Mild problems	Moderate problems	Severe problems	Impossible	Not applicable

10. To what extent do you have problems actively participating in social activities?

☐	☐	☐	☐	☐	☐
No problems	Mild problems	Moderate problems	Severe problems	Impossible	Not applicable

Tool for measuring satisfaction and outcomes at time of follow-up of assistive technology

Identify respondent:	Location:
Date:	Name of interviewer:

1. What assistive device are you using?

_____

2. How long ago did you get it?

_____

3. Do you currently use the assistive device? ☐ Yes (Skip to 5) ☐ No
4. If No, why do you not use it?

_____

(Skip the remaining questions if you answered question 4.)

Next are some questions about how much difficulty you currently have carrying out activities in your home. This includes assistance from other people and the use of assistive devices.

5. To what extent do you have problems using transportation as a passenger to get around?

☐ No problems ☐ Mild problems ☐ Moderate problems ☐ Severe problems ☐ Impossible ☐ Not applicable

Comment _____

6. To what extent do you have a problem to do housework like washing or cleaning?

☐ No problems ☐ Mild problems ☐ Moderate problems ☐ Severe problems ☐ Impossible ☐ Not applicable

Comment _____

7. To what extent do you have a problem to go to school and study?

☐ No problems ☐ Mild problems ☐ Moderate problems ☐ Severe problems ☐ Impossible ☐ Not applicable

Comment _____

8. To what extent do you have problems getting and keeping a job?

☐ No problems ☐ Mild problems ☐ Moderate problems ☐ Severe problems ☐ Impossible ☐ Not applicable

Comment _____

9. To what extent do you have problems participating in recreational and leisure activities such as sports, games, arts and crafts, dance, and music.

☐ No problems ☐ Mild problems ☐ Moderate problems ☐ Severe problems ☐ Impossible ☐ Not applicable

Comment _____

10. To what extent do you have problems actively participating in social activities?

☐ No problems ☐ Mild problems ☐ Moderate problems ☐ Severe problems ☐ Impossible ☐ Not applicable

Comment _____

Next are some questions about how satisfied you are with the assistive device.

11. How satisfied are you with its size? (How big it is?)

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

12. How satisfied are you with its weight? (How heavy it is?)

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

13. How satisfied are you with how easy it is to move from place to place?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

14. How satisfied are you with how it looks?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

15. How satisfied are you with how easy it is to use?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

16. How satisfied are you with the time it takes to set up?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

17. How satisfied are you with its reliability?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

18. How satisfied are you that it meets your needs? (Does it do everything that you want it to do, within a reasonable time?)

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

Next are some questions about how satisfied you are with the way you got the assistive device.

19. How satisfied are you with the advice given on what technology would be best for you?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

20. How satisfied are you with the time it took to get?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

21. How satisfied are you with assistance if it is not working properly?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

22. How satisfied are you with the help and advice you were given on how to use it?

☐ Terrible ☐ Unhappy ☐ Mostly dissatisfied ☐ Mixed ☐ Mostly satisfied ☐ Pleased ☐ Delighted

Comment _____

Next are some questions about your experiences using the assistive device.

23. Think about how much you used your present assistive device over the past two weeks. On an average day, how many hours did you use it?

☐ None ☐ Less than 1 hour a day ☐ 1 to 4 hours a day ☐ 4 to 8 hours a day ☐ More than 8 hours a day

Comment _____

24. Think about the situation where you most wanted to perform or do better before you got your present assistive device. Over the past two weeks, how much has the assistive device helped in that situation?

Has not helped at all	Helped slightly	Helped moderately	Helped quite a lot	Helped very much
☐	☐	☐	☐	☐

Comment _____

25. Think again about the situation where you most wanted to perform or do better. When you use your present assistive device, how much difficulty do you STILL have in that situation?

Impossible	Quite a lot of difficulty	Moderate difficulty	Slight difficulty	No difficulty
☐	☐	☐	☐	☐

Comment _____

26. Considering everything, do you think your present assistive device sufficiently useful? (Do the benefits you get from using the assistive device outweigh any difficulties storing/maintaining/transporting/using the device?)

Not at all worth it	Slightly worth it	Moderately worth it	Worth it	Very much worth it
☐	☐	☐	☐	☐

Comment _____

27. Consider the difficulties that led you to get an assistive device. Over the past two weeks, with your present assistive device, how much have the difficulties for which you got the assistive device affected the things you can do?

Impossible	Significantly affected	Moderately affected	Slightly affected	Not affected at all
☐	☐	☐	☐	☐

Comment _____

28. Consider the difficulties that led you to get an assistive device. Over the past two weeks, with your present assistive device, how much do you think other people were concerned about the difficulties for which you got the assistive device?

Very much	Quite a lot	Moderately	Slightly	Not at all
☐	☐	☐	☐	☐

Comment _____

29. Considering everything, how much has your present assistive device changed your enjoyment of life?

Worse	No change	Slightly better	Quite a lot	Very much
☐	☐	☐	☐	☐

Comment _____

Sources:

WHO International Classification of Functioning, Disability and Health (ICF).
QUEST 2.2. Modified from the QUEST 2.1: Children's Version by Sonya Murchland 2011.
IOI-HA. Cox RM, Stephens D, Kramer SE (2002). Translations of the International Outcome Inventory for Hearing Aids (IOI-HA). International Journal of Audiology 41(1):3-26.

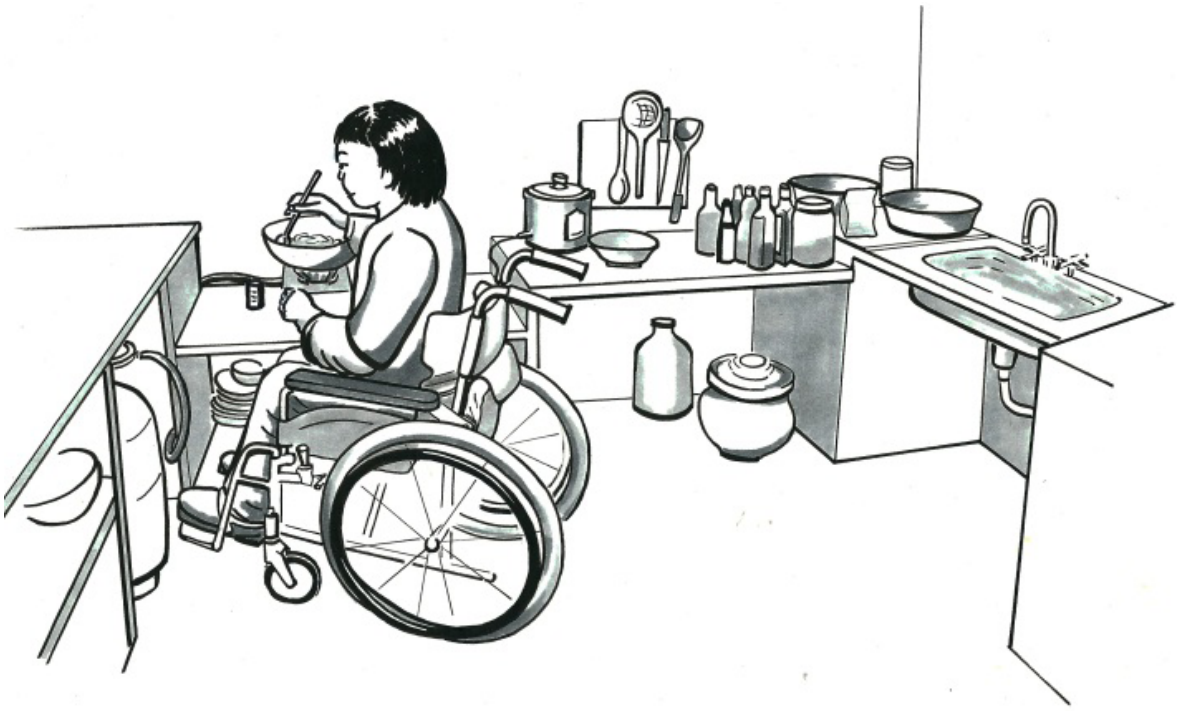
Accessibility Information

Partnerships with government ministries: health, education, transport and community organisations to advise on accessibility can significantly improve inclusion and participation of people with mobility disabilities in society. Making buildings accessible at the time of construction costs significantly less than modifying it later.

Some simple information is listed below. Further details can be found in the resources included with this package.

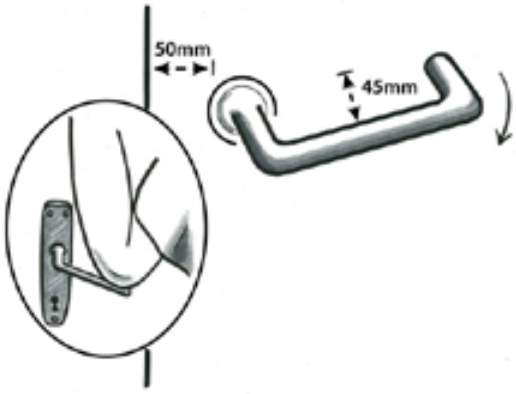
Making homes accessible

- Key considerations include height of shelves and access under work surfaces
- Doorways: width, opening direction, handles.



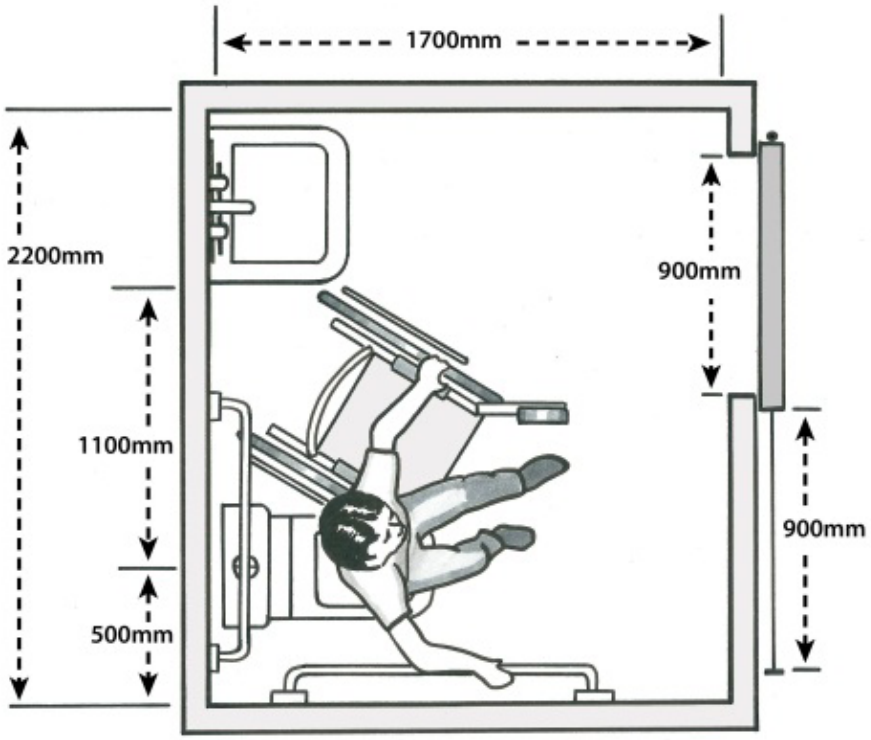
Doorways

- Width of doorway: 900 mm
- Try to hinge doors so they open inwards from busier areas to quieter areas. For example, from a living area to a bedroom.
- Try to get hinges that allow opening as close to 180° as possible.
- Circulation space: a clear approach space on both sides of a door is required.[3]
- Where access is limited: a sliding door can be considered (see diagram: accessible toilet). Floor tracks must be well maintained for the door to slide well.



Toilets

- Doorways that open into a bathroom reduce space inside a bathroom and should be avoided if possible. An alternative is a sliding door.
- A grab-rail next to the toilet is useful for wheelchair transfers.



[3] Design Considerations for Accessibility, 2006, USAID, John Grooms, Motivation Charitable Trust UK, Disability Organisations Joint Front

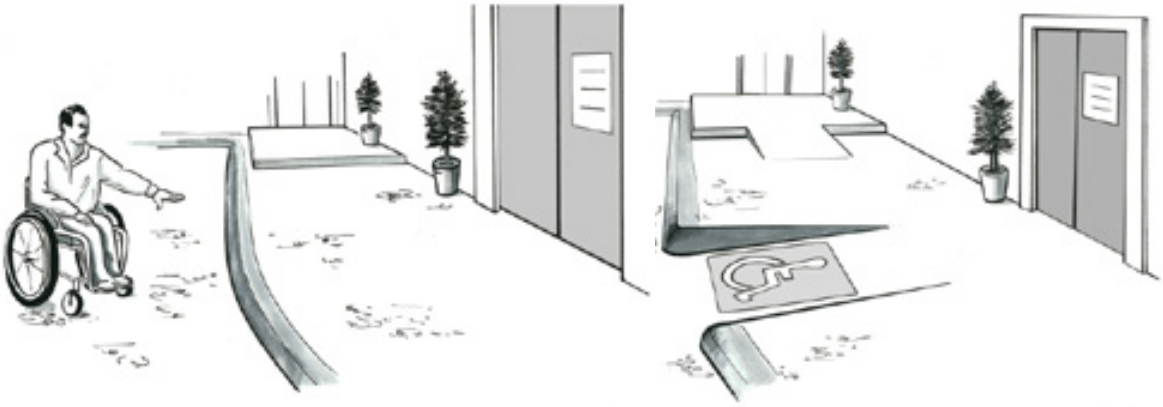
Making the community accessible

Pathways

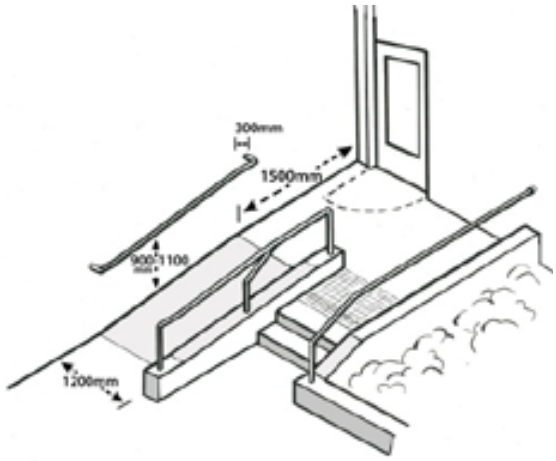
- The width of a pathway should be 900 mm of unobstructed space.
- Heavily used pathways benefit from 1500 mm width to allow two wheelchair users to pass by each other.

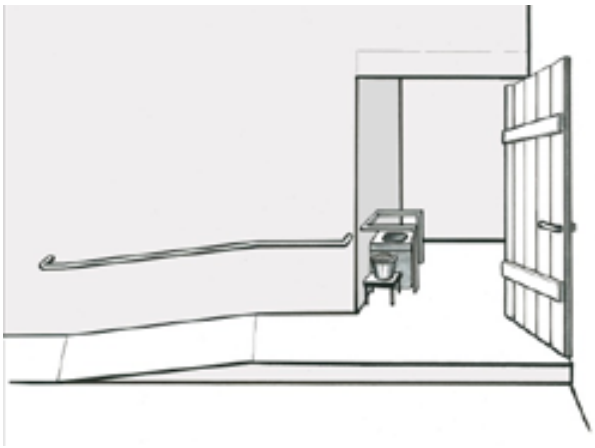
Kerbs

- Dropped kerbs – kerbs/curbed ramps where there is a level change (see illustration below).



Ramps





When making buildings accessible – consider the needs of all people. For wheelchair users consider the following specific points:

- Slope gradients: indoor 1:12, outdoor 1:15.
- Surface: non-slip.
- Handrails: should continue for 300 mm on bottom and top landings before finishing.
- Landings should be present at the bottom and top of slopes and when there is a change of direction: dimensions 1200 mm – 1500 mm.
- Top landings should be measured to the edge of the door opening circle.

For more information, contact:

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20 Avenue Appia
CH-1211 Geneva 27
Switzerland

http://www.who.int/disabilities/en/
Email: assistivetechnology@who.int

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