

PHYSICAL REHABILITATION CENTRES

ARCHITECTURAL PROGRAMMING HANDBOOK

ICRC

REFERENCE

DIAGRAM: PLEASE TURN OVER

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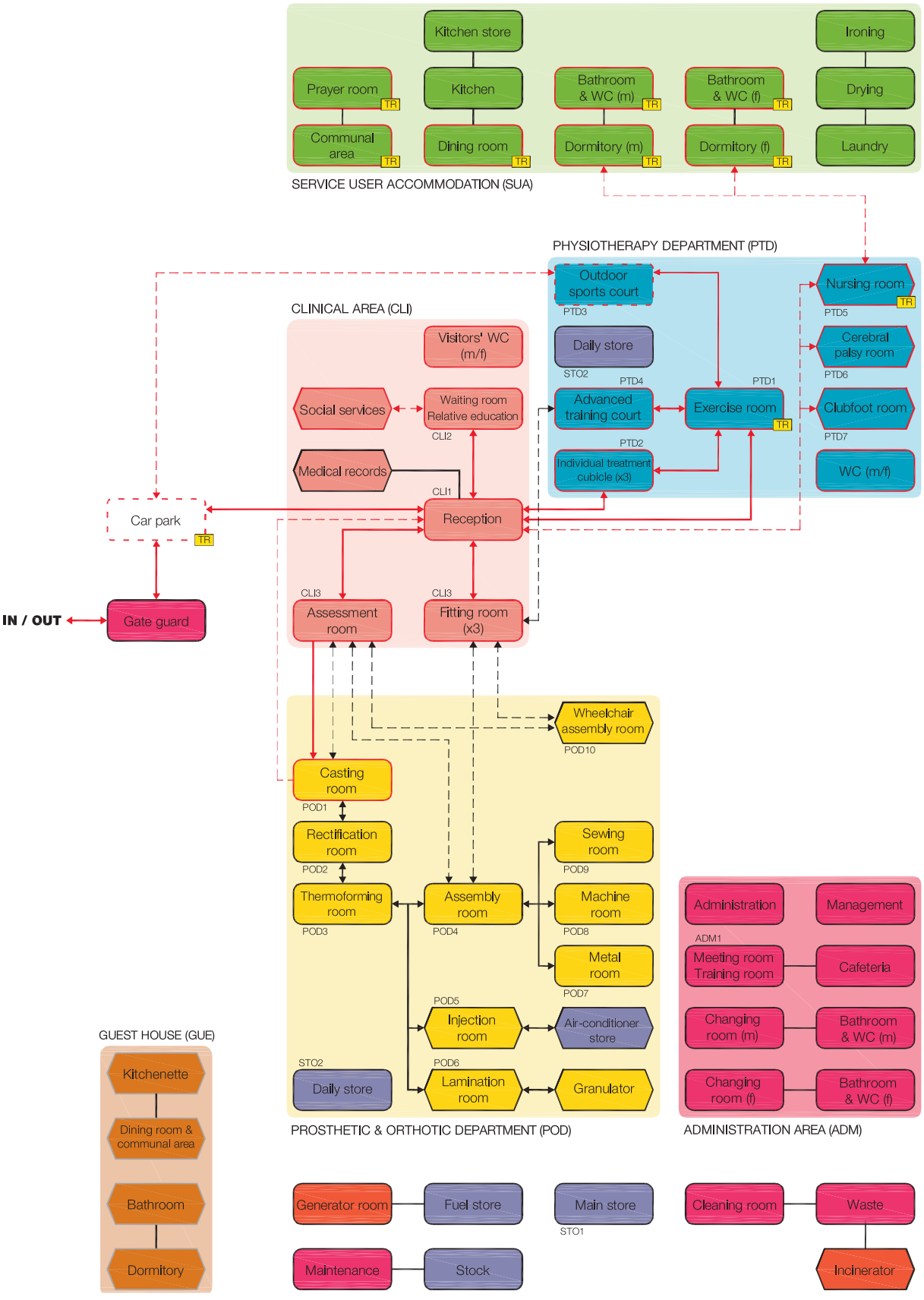

	Administration	ADM
	Clinical area	CLI
	Guest house	GUE
	Physiotherapy department	PTD
	Prosthetic and orthotic department	POD
	Service user accommodation	SUA
	Services area	SER
	Storage	STO

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Author: Samuel Bonnet

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Service user at work on the building site of the Battambang PRC, 1992
Serge Corriera/ICRC

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ABBREVIATIONS AND ACRONYMS

AC	air conditioner
CA	circulation area
CRPD	(UN) Convention on the Rights of Persons with Disabilities
EVA	ethylene vinyl acetate
FECA	fully enclosed and covered area
Federation	International Federation of Red Cross and Red Crescent Societies
HQ	(ICRC) headquarters
HVAC	heating, ventilation, air conditioning
IBC	International Building Code
ISPO	International Society for Prosthetics and Orthotics
IT	information technology
LGF	lower ground floor
MEDDE	Ministry of Ecology, Sustainable Development and Energy, France
MMS	manual motor starter
n/a	not applicable
NFA	net floor area
NGO	non-governmental organization
n/k	not known
OCHA	(UN) Office for the Coordination of Humanitarian Affairs
P&O	prosthetic and orthotic
PECA	partially enclosed and covered area
PC	personal computer
PfR	Planning for Results
PMCP	Protocol for the Management of ICRC Construction Projects
PoP	plaster of Paris
PP	Polypropylene
PRC	Physical Rehabilitation Centre
PRP	Physical Rehabilitation Programme
PRRC	Physical Rehabilitation Reference Centre
PT	physiotherapy
QS	quantity surveyor
RC	reinforced concrete
SA	services area
SP	soak pit
ST	septic tank
SU	service user
SFD	Special Fund for the Disabled
TFA	total floor area
TR	prone trolley
UA	usable area
UN	United Nations
UN-DESA	United Nations Department of Economic and Social Affairs
UPS	uninterruptible power supply
UUCA	unenclosed, uncovered and contained area
UXO	unexploded ordnance
WatHab	Water and Habitat Unit (ICRC)
WT	water tank
WHO	World Health Organization

INTRODUCTION

Rehabilitation refers to a process aimed at removing – or reducing as far as possible – restrictions on the activities of people with disabilities and at enabling them to become more independent and to enjoy the highest possible quality of life in physical, psychological, social, professional and spatial terms. Depending on the type of disability, various measures, such as medical care, physical rehabilitation, vocational training, social support or help in achieving economic self-reliance, may be needed to achieve this end. Physical rehabilitation includes the provision of mobility devices such as prostheses, orthoses, walking aids and wheelchairs together with the therapy that enables people with disabilities to make the fullest use of their devices. Physical rehabilitation must also include activities aimed at maintaining, adjusting, repairing and renewing the devices as needed.[1]

Rehabilitation is an "indispensable element in ensuring the full participation and inclusion in society of people with disabilities."[2]

The physical rehabilitation activities of the International Committee of the Red Cross (ICRC) can be traced back to the Second World War. However, the beginning of the ICRC's major commitment in this field came with the setting up of the Physical Rehabilitation Programme (PRP) in 1979 and the Special Fund for the Disabled (SFD) in 1983.

The PRP is an operational programme run by the Health Unit, part of the Assistance Division within the ICRC's Department of Operations.

The SFD was originally established by the ICRC to help ensure the continuity of its physical rehabilitation activities but has evolved over the years to the extent that it now provides assistance in a wider range of countries. It became an independent foundation in 2001. Today, its mission is to strengthen "national capacity in less-resourced countries to remove barriers faced by people with physical disabilities."[3]

Starting in Angola and Ethiopia, the PRP provided support for more than 163 centres in 48 countries and one territory between 1979 and 2013. In addition to these PRP activities, the SFD has been providing support for physical rehabilitation in low-income countries and has assisted 59 centres in 27 countries since 1983.

The ICRC generally tries to identify existing infrastructures so as to establish its physical rehabilitation projects with national counterparts. In some contexts, however, this is neither appropriate nor possible. In such cases, the ICRC decides either to renovate existing buildings or to construct new centres.

As a result, the ICRC has been actively building physical rehabilitation centres, and sometimes component factories, for more than 30 years. Originally named "orthopaedic centres" (OC) and then "prosthetic and orthotic centres," these centres are now referred to as "physical rehabilitation centres" (PRCs).

This change in name marks the evolution over time towards more comprehensive centres providing mobility devices (prostheses, orthoses, walking aids and wheelchairs), physiotherapy and social inclusion services for people with disabilities.

The primary aim of this handbook is to provide support for all those who are involved in the building or renovation of a PRC operated by, or with the support of, the ICRC. It may also be of use for those interested in the ICRC's construction activities. Its subject is the development of an architectural programme for a PRC.

An architectural programme defines a project in terms of purpose and function. It identifies the range of work involved in designing and ultimately building a PRC.

1 See PRP (ed.), *Annual Report 2012*, ICRC, Geneva, 2013, p. 4.
2 *Ibid.*, p. 6.
3 SFD, *About the ICRC Special Fund for the Disabled*, ICRC Special Fund for the Disabled, Geneva, 2014 (retrieved in June 2014 from http://www.icrc.org/WEB/DOC/sitesfd0.nsf/htmlall/sfd-about).

Architectural programming[4] is a key process in any construction project. It takes place at project inception and runs concurrently with the development of the proposal. It is finalized at the beginning of the design process.

A well-conceived architectural programme is a prerequisite for a successful project. Because it sets out clearly the objectives and limitations of a project as envisaged at the beginning by its promoters and its service providers, it offers a guarantee against time-consuming design revisions or endless building extensions and reorganization over time.

Usual practice is for programming to be the responsibility of the project owner. At the ICRC, it is no different. The project owner is represented by the future service providers of the centre and its promoters.

For a typical PRC project, responsibility for the establishment of the architectural programme thus lies with the Physical Rehabilitation Programme and ICRC Management. They are both advised on their responsibility by the Water and Habitat Unit (WatHab) and this handbook is part of that guidance.

Architectural programming is a decision-making process with regard to purpose and function.

What is the desired impact of the centre? What is the target population? What services have to be provided? How many service users[5] will receive services each year? How many service users will be provided with orthopaedic devices each year? How will the services be organized? What rooms will be included? Which ones will be open to the public? Which areas will be restricted? Which areas will be air-conditioned? Does the centre need a heating system? How many service users will be accommodated in the centre if a dormitory is provided? What will the breakdown by gender be? What will the average length of stay be? Will relatives be allowed to stay? How many? Will lunch and dinner be served for service users at the centre? Has a laundry service to be incorporated? Has a prayer area to be incorporated? Which areas will be accessible to service users after closing time? At what times will the centre open and close? Is a car park needed on the site? How many staff will work at the centre?

These questions are just some of the obvious ones that need to be asked at the start of the process. They concern purposes and functions as seen by ICRC staff. However, an architectural programme must go further. It has to anticipate the explicit or implicit needs of future service users and the requirements of the surrounding community, authorities and national partners. It also has to encompass the technical elements required to enable the activities to be carried out.

Programming a centre in Afghanistan obviously has to take account of different social and cultural behaviours than in South Sudan. That is also true for technical requirements. For example, programming a centre in Afghanistan must incorporate measures to deal with seismic risk and provide a heating system, whereas in South Sudan the focus will be more on developing a cooling strategy.

The development of an architectural programme involves a large number of different factors. It therefore requires the interaction of different specialists. That interaction is often a challenging process because the various stakeholders are not generally used to allowing for interaction and also because their diverse knowledge and backgrounds may sometimes create communication barriers.

One of the aims of this handbook is to facilitate the interaction of specialists involved in developing the architectural programme of a PRC.

4 "Architectural programming," "programming" and "functional programming" are used synonymously in this handbook. In some countries, the terms "operational programming," "facility programming" and "scoping" may also be used as synonyms.

5 The term "service user" is used to mean those benefiting from services at a Physical Rehabilitation Centre (PRC). The term "patient" is used only for people being treated at a hospital.

The proposed approach is to systematize this important process in the project cycle by establishing a framework that can be used by all parties involved. The framework comprises analytical tools and data sheets which constitute a common point of reference for all parties. At the ICRC, this handbook provides common ground mainly for PRP and WatHab staff.

The handbook is divided into four chapters, each of which provides particular support for those involved in the programming:

1. Architectural programming
2. A ten-centre study
3. Architectural programming tools
4. Accessibility

The first chapter deals with architectural programming and defines what is understood by that term. It also offers guidance in architectural programming specifically for PRCs. It specifies who does what and gives some examples of possible approaches.

The second chapter provides an architectural study of ten existing PRCs built in eight different countries over the past 30 years. It includes a description of each project and highlights recurrent patterns, such as those relating to function and design. It also identifies best practices and practices to be avoided. The purpose is not to establish a model design that can be replicated worldwide but to constitute a database of examples so as to provide some keys to the understanding that is necessary for the development of architectural programmes.

The third chapter presents three sets of tools: bubble diagrams, space cards and component cards. The three sets track three different levels of abstraction of an architectural programme: the first for the services, the second for the rooms and outdoor spaces, and the third for the equipment and furniture. These tools are intended to facilitate the development of the architectural programme and its transition to the concept design.

The fourth and final chapter focuses on accessibility. Because the ICRC operates in countries which have very different understandings of what accessibility is, this chapter specifies a general approach to accessibility as a means of ensuring a universal approach at that level. It provides guidance on defining the appropriate set of design requirements applicable in different contexts.

The four chapters have been designed to support the elaboration of architectural programmes. Each chapter accompanies a different stage of programme development and can be read independently of the others.

Some readers will benefit from comparisons offered by the ten-centre study. Some will use the bubble diagrams to explore functionality. Others will seek to know which accessibility standard to incorporate.

As each chapter is conceived as an independent unit, there is a certain degree of repetition across the chapters. This is necessary in order to ensure that each chapter is completely understandable on its own, without the need to read the whole handbook.

The tools and knowledge provided in this handbook are conveyed primarily by means of plans and diagrams. This means that non-verbal communication is predominant. Verbal communication is often used to make what is communicated non-verbally more readily understandable for readers who are not experts in the subjects discussed.

For the sake of convenience, the masculine pronoun is used to refer to both sexes.

1.
ARCHITECTURAL PROGRAMMING

The objective of this first chapter is to define the term "architectural programming" and to provide general guidance on the development of architectural programmes for Physical Rehabilitation Centres (PRCs). The chapter therefore focuses on the inception of the project of which the architectural programming is part.

To establish a comprehensible definition of architectural programming, it is necessary to understand how the construction process is organized, both in general and at the ICRC.

Among the general public, construction is seldom understood comprehensively. Some people will reduce it to building construction, i.e. the assembly and erection of structures. Others will know that construction requires designs: concept design, developed design and technical design. Few will think of programming, which is, however, one of the first steps in each and every construction project. Many more aspects of construction could be added as construction is a multitasking endeavour that proceeds through a number of different stages.

Construction is a multistage process involving experts with diverse backgrounds. It is standard practice to start with the programming and design stages and then to continue until the handover of the building to its users.

The standard process is no different at the ICRC. Building a PRC involves several operational departments at delegation level and at headquarters (HQ). Besides ICRC staff, end-users, beneficiaries, authorities, consultants, daily workers and constructors may also be involved.

The construction of a PRC does not differ substantially from the construction of other buildings. Several stages have to be completed before the first hard hats and cement bags arrive on the building site or the premises are opened to service users.

At the ICRC, a construction project has to comply with the Protocol for the Management of ICRC Construction Projects (PMCP),[6] hereinafter referred to as the "Protocol." Introduced in 2011, the objective of the Protocol is "to set guidelines to enhance management of construction projects."[7]

The Protocol is a project management mechanism. It defines "two key areas for successful construction project management."[8] The first area is the definition of a standard construction project development cycle. The second is the definition of the roles and responsibilities of all those involved in the project.

The project cycle is divided into seven consecutive stages:
1. Vision
2. Activation
3. Feasibility
4. Design
5. Tender
6. Construction
7. Handover

The first stage, Vision, applies to all construction projects. It involves the elaboration of the project proposal. "The problem is analysed; the needs and relevance are identified, [supporting] 'facts and figures' and statistics are provided […]; [and] broad lines of responses and objectives for solving the problem are set."[9]

The Activation stage concerns the review of the Vision project proposal at HQ. This review may lead to a formal decision as to whether or not to activate the Protocol. Scope, complexity, human resources requirements and availability, and country-specific implications are among the aspects analysed. If

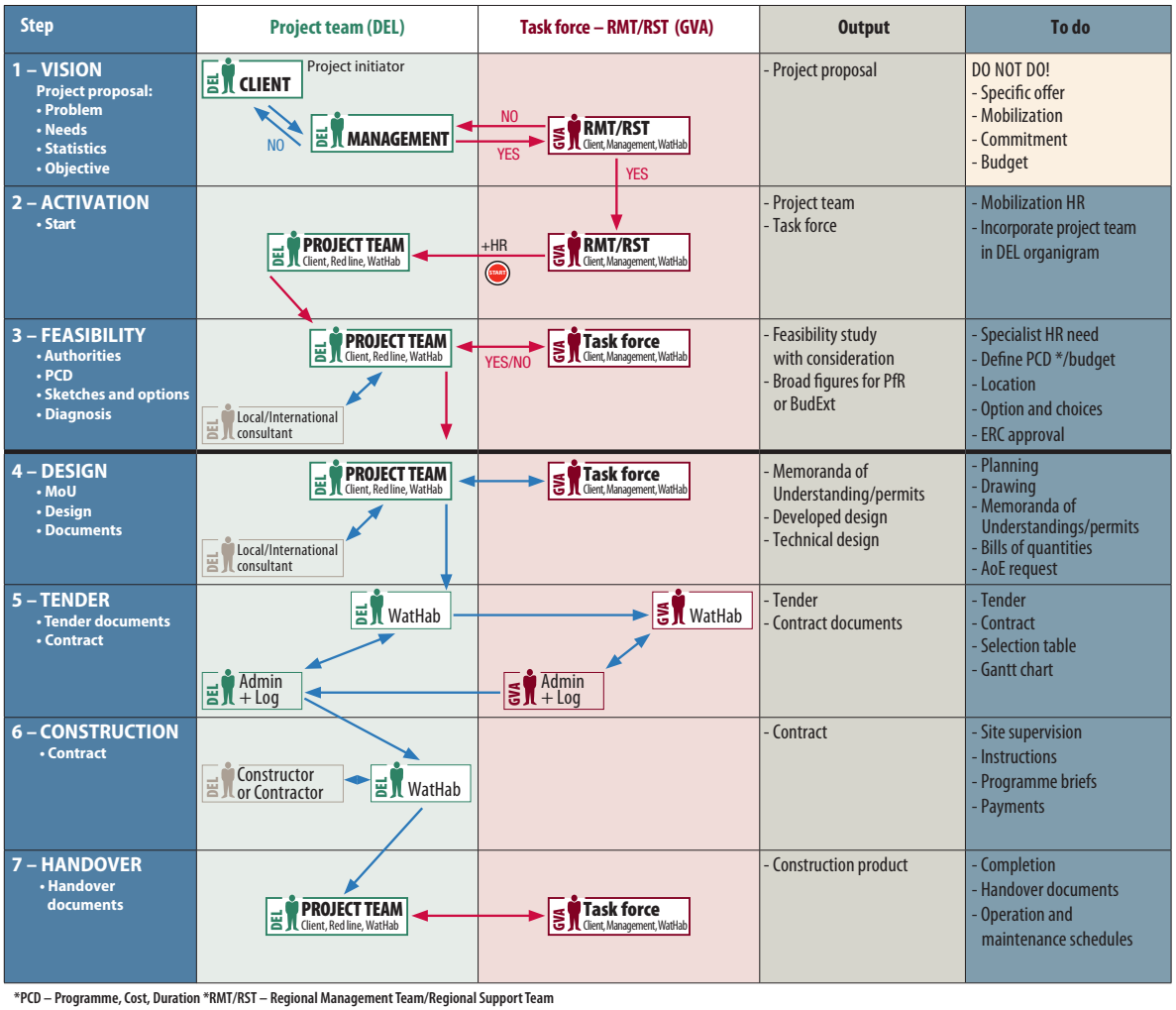
6 WatHab (ed.), *Protocol for the Management of Construction Projects*, ICRC, Geneva, 2011 (internal document).
7 *Ibid.*, p. 2.
8 *Ibid.*, p. 2.
9 *Ibid.*, p. 8.

deemed necessary, a specific project management mechanism – in other words, the Protocol – is activated. Additional WatHab construction specialists are then assigned to the project under the Protocol. If the Protocol is not activated, the above-mentioned five remaining steps (Feasibility to Handover) still apply, but only as guiding principles.

The third stage, Feasibility, involves preparing a study that is "a working document, which should enable the Delegation Management to decide whether or not to continue with the project development. It incorporates a wide range of issues, including areas such as:

- background information on a given project, its context and aim
- sounding out authorities concerning the project and their perception
- developing various technical options with sketches
- providing diagnosis for each option
- selecting/offering a viable option
- preparing the Programme-Cost-Duration (PCD), where the project is broadly outlined and basic estimates and timelines are worked out."[10]

If the Feasibility study is approved by the delegation and HQ, the four subsequent stages of Design, Tender, Construction and Handover can be carried out. Following approval to proceed on the basis of the Feasibility document, the project becomes public and external actors have to be included in the following steps. It is worth recalling that no commitment vis-à-vis external partners should be made and no resources mobilized before the Feasibility document has been approved.



*PCD – Programme, Cost, Duration *RMT/RST – Regional Management Team/Regional Support Team

Figure 1.1
ICRC construction project development cycle and its management structure
Source: WatHab (ed.), *Protocol for the Management of ICRC Construction Projects*, ICRC, Geneva, 2011 (internal document).

10 *Ibid.*, p. 9.

Architectural programming is a decision-making process leading to the definition of a building project in terms of purpose and function. It precedes and feeds into the design stage and is carried out at the very beginning of the construction project.

Architectural programming results in an outline of the spatial requirements of the building, referred to as the (architectural) programme or project brief.[11]

Architectural programming is initiated during the first stage, Vision, and finalized in the Feasibility stage.

The Vision includes a schematic architectural programme for the building: problem analysis, outline of needs, collection of facts and definition of goals. This schematic programme supports the project proposal and specifies the general scope of the project.

The architectural programme is finalized in the Feasibility stage. The finalized programme indicates specific requirements and is a development of the initial schematic programme.

At the ICRC as elsewhere, "programming is a two-phase process."[12]

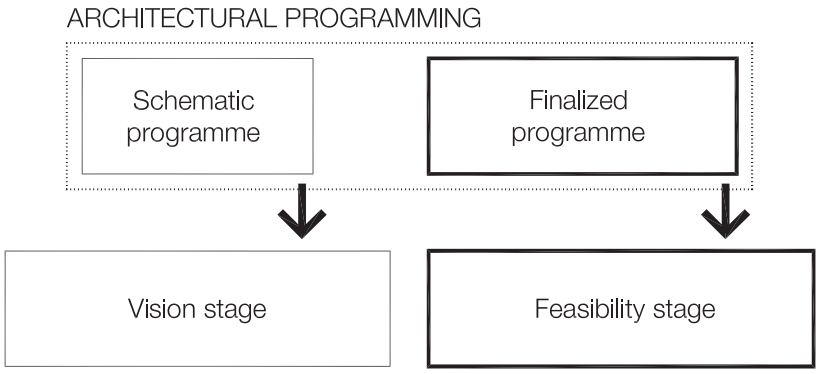


Figure 1.2
Architectural programming as a two-phase process parallel to the first Protocol stages

In order to describe further the specificities of an architectural programme, it is important at this juncture to note the second of the "two key areas for successful construction project management" established in the Protocol. The second key area consists of a clear definition of the roles and responsibilities of those involved in a project. An essential element of the Protocol allowing this clear definition is the project team.

Protocol activation entails the establishment of a project team at the delegation or sub-delegation. Human resources are then mobilized to provide, in particular, WatHab construction specialists for the project team.

"The project team is composed of:

- The project owner (*Maître d'Ouvrage* in French) is the person who expresses the need for a construction product (i.e. project) and owns it when it is completed and handed over. At the ICRC, the roles and responsibilities of the project owner are often shared between representatives of the specialist department and the management of the delegation (or sub-delegation), as the latter has overall responsibility for ICRC operations in the country, and therefore reserves the right of approval for such projects.

11 "Architectural programme" or "project brief" is generally referred to in French as "*programme,*" which is short for *"programme architectural et technique*."
12 William M. Peña and Steven A. Parshall, *Problem Seeking: An Architectural Programming Primer*, 5th ed., John Wiley & Sons Inc., New York, 2012, p. 40.

- The [construction] project manager (*Maître d'Œuvre*), as the title indicates, manages the whole process of ensuring that the construction product is created in line with the project owner's needs. The [construction] project manager is appointed by the WatHab Unit, which possesses the necessary knowledge and technical skills required for project management."[13]

In order to streamline the decision-making process, a task force[14] is set up at HQ level at the same time as the project team is established. This task force provides support for the project team and is its HQ focal point.

"**The project team is pivotal for the development of a construction project and plays a focal role both in defining a project's objectives and scope and ensuring its implementation.**"[15]

It is important to notice that the project team can be established only after the representatives of the project owner have established the Vision for the project. The project owner thus starts work at an earlier stage than the construction project manager, who is appointed only at the beginning of the Feasibility stage.

The development of the schematic programme supporting the Vision is the sole responsibility of the project owner. In a typical PRC project, the project owner is represented by a PRP staff member and a representative of the management at delegation or sub-delegation level.

The project owner expresses the requests and the need for a PRC. According to usual practice, the project owner is therefore responsible for programming. Outside the ICRC, architectural programming is generally handled by consultants, who may be independent architects or programmers working for the project owner. Because of ICRC-specific operational methods, PRC project briefs are developed internally with the support of this handbook.

The first responsibility of the project team is to develop the Feasibility document and therefore to finalize the architectural programme.

The two-stage development of the programme under the project owner's responsibility sets out to clarify what is to be achieved at the Vision stage and at the Feasibility stage. To do this, it is essential to establish a definition of what constitutes a programme.

Among the many definitions of what is included in a programme, an authoritative one sees programming as comprising five different concepts:

1. Establish **goals** – *What* does the project owner want to achieve, and *Why*?
2. Collect and analyse **facts** – *What* do we know? *What* is given?
3. Uncover and test **concepts** – How does the project owner want to achieve the goals?
4. Determine **needs** – *How* much space? What level of quality?
5. State the **problem** – *What* are the significant conditions affecting the design of the building? What are the general directions the design should take?[16]

According to this definition, facts "include statistical projections, economic data, and descriptions of the user characteristics,"[17] while concepts "relate to performance problems."[18] The term "concepts" refers here to functional requirements and indicates the means to achieve the goals. One functional requirement is, for instance, for different flows to be separated, with the result that there is a service user flow, a mixed service user/PT staff flow, and a sequential P&O flow. Other functional requirements include accessibility, flexibility and security control.

13 WatHab (ed.), *op. cit.*, p. 2.
14 *Ibid.*, p. 7: At HQ level a task force is the ad hoc mirror of a project team. It is set up for the duration of a construction project and activated as part of the Protocol at regional management team level. It is composed of the representatives of the project owner and one representative of the construction project manager.
15 *Ibid.*, p. 2.
16 Based on William M. Peña and Steven A. Parshall, *op. cit.*, p. 25.
17 *Ibid.*, p. 70.
18 *Ibid.*, p. 72.

The needs "have a direct bearing on space requirements, which are generated by people and activities,"[19] while the statement of the problem "cover[s] the functional program, the site, the budget, and the implications of time."[20]

The goals, facts and statement of the problem are part of the Vision as it is defined in the Protocol. They are the backbone of the architectural programme.

The latter three concepts have been incorporated into a Vision template that has been designed to provide support for project owner representatives in the development of their proposal. The first Vision template was introduced by the WatHab Unit in 2012. It has been updated since then and its most recent update is appended as Annex 1.

The template follows the structure of the ICRC's Planning for Results[21] framework and its terminology. Considerations of goals, facts and problems have accordingly been renamed as situation analysis, problem analysis for the target population, expected humanitarian impact, specific operational strategies, and objectives. These concepts are complemented by a schematic project brief indicating the main needs of the project and a schematic conceptualization in the form of a schedule of rooms.

Concepts and needs are addressed at the Feasibility stage.

The main needs and schematic conceptualization established in the Vision stage are developed in the Feasibility stage in a dialogue between the construction project manager and the project owner. The finalized architectural programme is incorporated into the Feasibility report.

A first Feasibility report template was introduced by the WatHab Unit in 2011. It has been continuously improved ever since. Its most recent update is appended as Annex 2.

19 *Ibid.*, p. 88.
20 *Ibid.*, p. 92.
21 Planning for Results (PfR) was introduced at the ICRC in 1998 as a new management method and tool for the analysis, formulation and planning of the organization's field operations and at headquarters. It is primarily a process through which delegations submit analyses and objectives to headquarters.

2.
A TEN-CENTRE STUDY

Figure 2.1
Chy-lang temporary prosthetic workshop,
Ho Chi Min City, Viet Nam, 1955
ICRC

Figure 2.2
Centre for people with disabilities, Ho Chi Min City, Viet Nam, 1966
Jean De Heller/ICRC

Figure 2.3
Orthopaedic centre, northern Yemen, 1971
Bertrand Martin/ICRC

Figure 2.4
Hamanna orthopaedic centre, Lebanon, 1986
Dick van Kleef/ICRC

Figure 2.5
Peshawar paraplegic centre, Pakistan, 1991
Yannick Muller/ICRC

Figure 2.6
Kuito-Bié orthopaedic centre, Angola, 1997
Susan Kennedy/ICRC

Architectural case studies are analyses that are often carried out at the inception of a building project. Such analyses are descriptive and explanatory and are based on one or more existing examples.

The following pages feature a study of ten existing Physical Rehabilitation Centres (PRCs) built in eight countries over the past 30 years and presented in this chapter in order of date of completion.

The aim of this ten-centre study is to facilitate the development of architectural programmes and, more specifically, to enhance the capacity to **evaluate the elements that need to be incorporated into them.**

The study adopts a common presentation framework for each of the centres, which are of various sizes, in order to facilitate the comparison of their spatial, activity, production and staffing characteristics. The common presentation framework is intended to structure the reading and to allow the reader to focus on data relevant to programming. It also helps readers to come to their own conclusions.

As well as highlighting recurrent functional and design patterns, the study identifies best practices and practices to be avoided. By looking at different buildings, it also presents examples that can be used for reference and study. It helps the reader to understand the diversity of solutions and relates spatial layouts to production statistics and staffing arrangements.

The ten PRCs in this study are all projects that have been developed by the PRP and SFD since 1985. They are drawn from the ICRC's long history of PRC construction or renovation, which formed part of its involvement in physical rehabilitation activities even before the PRP and SFD were established.

In Finland just after the Second World War, an orthopaedic workshop was set up by the Swedish Red Cross in cooperation with the ICRC. In 1955, a temporary prostheses workshop was financed by the ICRC in Ho Chi Min City (Viet Nam), which was known at that time as Saigon (Figures 2.1 and 2.2). In Jordan in 1956, the ICRC supported the establishment of the Jordanian Red Cross's orthopaedic workshop. Between 1957 and 1959, the ICRC coordinated the creation of a prosthetic component factory in Hungary, using East German machinery and technology. In Algeria between 1958 and 1961, another orthopaedic workshop was set up by the Swedish Red Cross in cooperation with the ICRC. In 1969 in south-eastern Nigeria (then known as Biafra), an orthopaedic workshop with a physiotherapy department was established with, for the first time, one prosthetist and physiotherapists directly employed by the ICRC. In northern Yemen between in 1970 and 1972, an orthopaedic workshop was set up and components were produced locally for the first time to avoid expensive imports (Figure 2.3). In Lebanon in 1977-1979, two orthopaedic workshops and physiotherapy departments were established by the Swiss Red Cross under the umbrella of the ICRC (Figure 2.4). Many of those centres are still in operation today.[22]

The Debre Zeyit rehabilitation centre in Ethiopia (Figure 2.9) and the Agostinho Neto Physical Rehabilitation Centre (Figure 2.10), known at that time as Bomba Alta, in Huambo, Angola, were the first projects to be established by the PRP in 1979.

Those first centres were immediately followed by a second wave of projects, which, in most cases, served as a basis for establishing a national rehabilitation service in the countries concerned. Among the centres still in operation today, mention deserves to be made of the prosthetics and orthotics services at Maputo Central Hospital in Mozambique and the Paraplegic Centre in Peshawar (Figure 2.5), Pakistan, both set up in 1981. The Kabalaye limb-fitting and rehabilitation centre (CARK) in Chad and the Rehabilitation Service at Beit Chabab Hospital in Lebanon, set up in 1981 and 1982 respectively by local NGOs with the support of the ICRC, were part of the same wave and are also both still in service.

This remarkable commitment on the part of the ICRC to the construction and refurbishment of PRCs in situations of armed conflicts and violence over almost 60 years is unfortunately little documented from

22 For further information about the operations referred to in this paragraph and the involvement of the ICRC in prosthetics and orthotics and physiotherapy up to the end of the 1970s, see J.C.M. Gehrels, *ICRC prosthetic technology in technical orthopaedic programmes*, ICRC, Geneva, 1996, p. 1 (internal document).

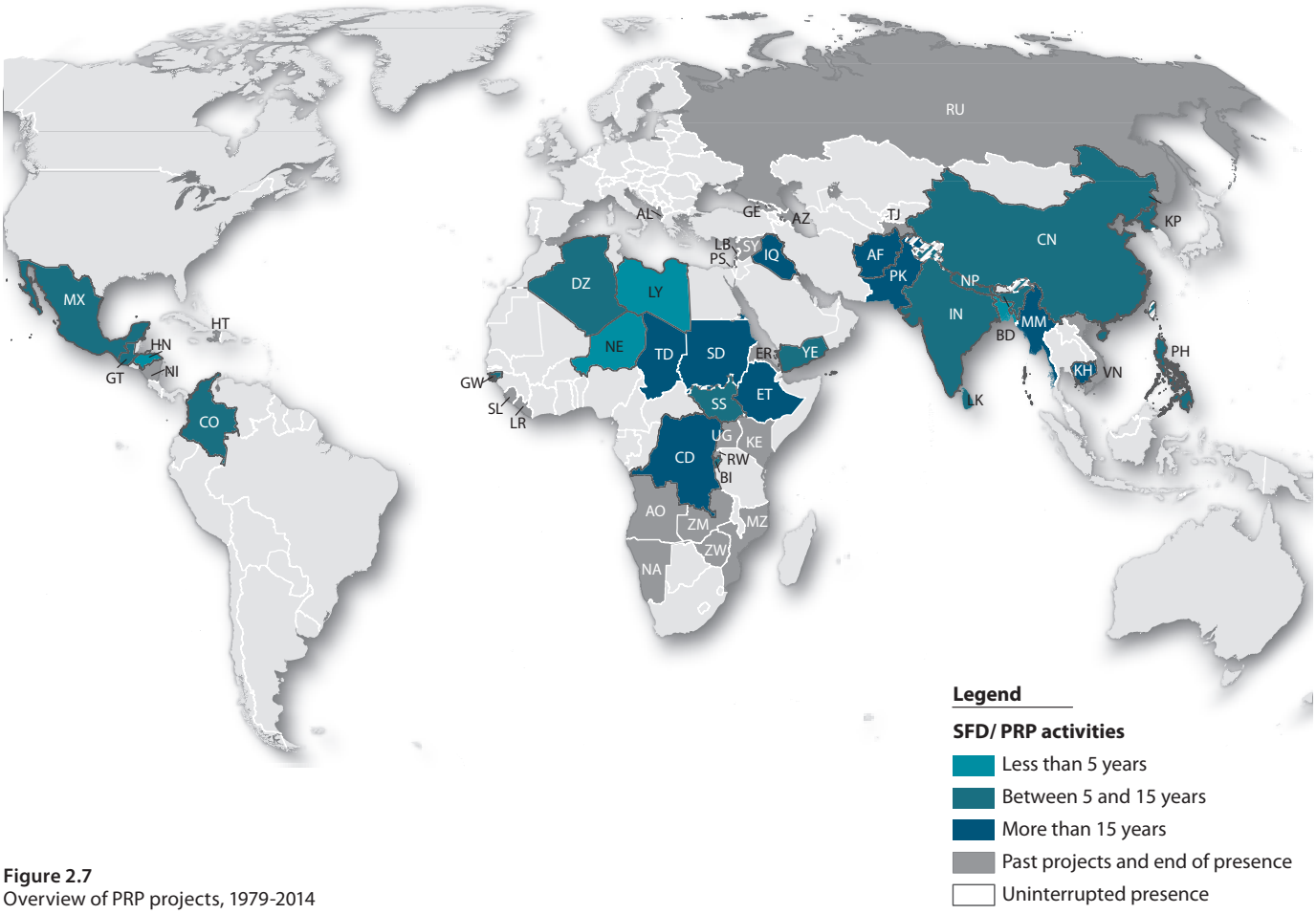


Figure 2.7
Overview of PRP projects, 1979-2014

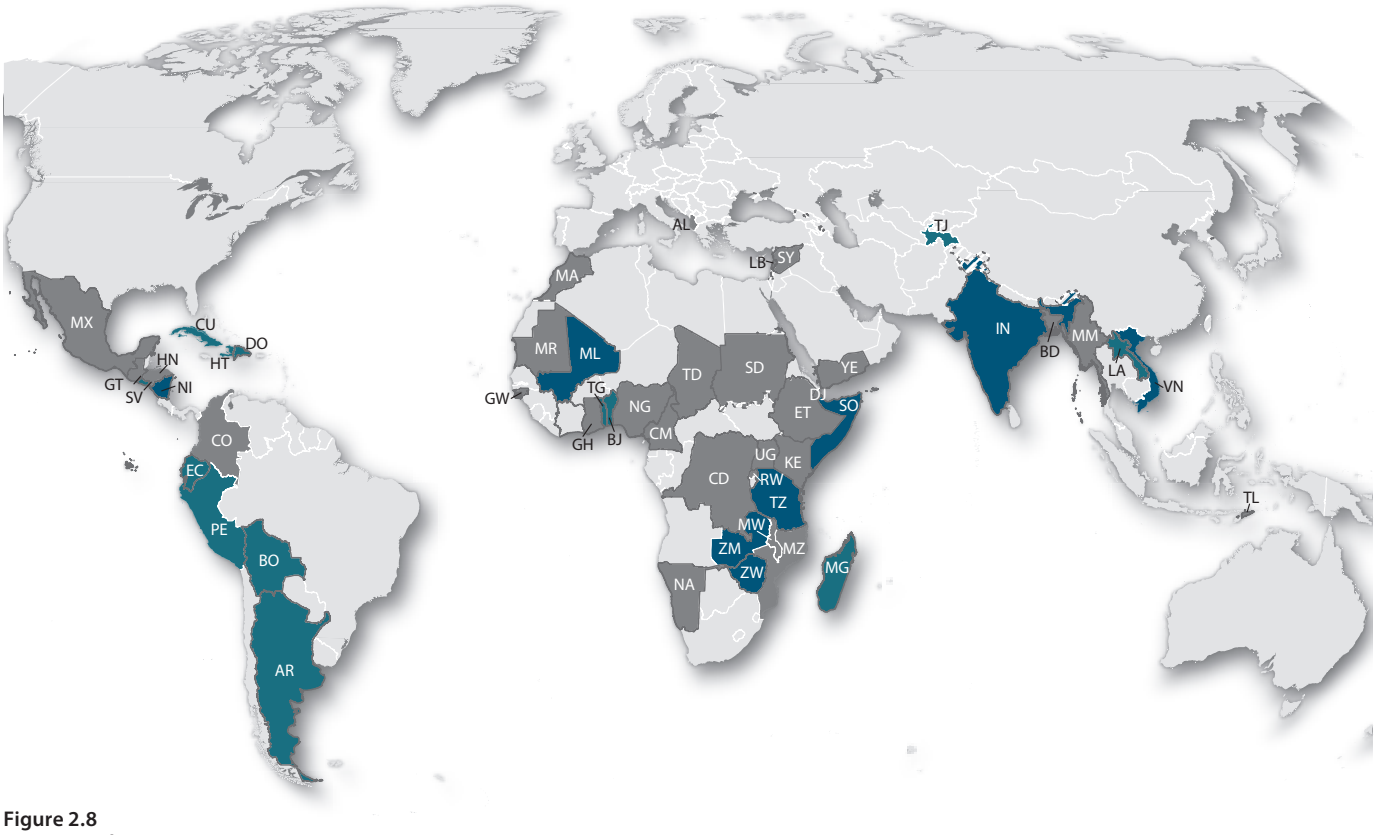


Figure 2.8
Overview of SFD projects, 1983-2014

Figure 2.9
Debre Zeyit rehabilitation centre, Ethiopia, 1979
ICRC

Figure 2.10
Agostinho Neto Physical Rehabilitation Centre, Huambo, Angola, 1984
ICRC

a construction point of view. The ICRC kept few blueprints or architectural programmes that could be of use in the development of new projects. That is also true for some of the centres analysed in this study.[23]

Each of the ten centres featured in this study has its own particular history, although they were all built or refurbished under WatHab supervision for the PRP or the SFD. Following construction, most of them were handed over to authorities or local partners, as is almost always the case with ICRC projects.

Apart from those common aspects, the role played by the ICRC in their establishment differed considerably from one centre to another. Some of them were fully planned and designed by the ICRC. Others were only supervised by the ICRC during their conception and/or construction. For others, the ICRC was merely consulted as an adviser. The information at the ICRC's disposal was therefore disparate and at times scarce.

The development of plans, their analysis and the computation of surface areas presented in this ten-centre study represent a substantial volume of research and modelling. The study is a unique opportunity to compare projects located all over the world and built in very different environmental and political contexts.

All PRCs selected for this study have interesting aspects and lessons to impart. Each of them also has aspects that can be improved. All of them are worth studying.

Although these pages constitute a coherent study of a small selection of PRCs, each new programme may require the analysis of further examples of relevant projects, particularly local ones and/or new ones realized by the PRP or SFD after the publication of this handbook. Each building – and hence each architectural programme – is unique because of the specificities of its local and social context.

The climate control systems adopted, available materials and techniques, existing vernacular typologies and the integration of social and cultural behaviours are some of the contextual elements that a further analysis of local buildings may add to the present study.

This study is therefore not intended to be a substitute for analysing and visiting comparable examples in the context of a new project. An analysis of local examples alongside the examples presented in this study will help to reach a better understanding of the requirements for a new project in terms of organizational structure, spatial requirements and tried and tested solutions.

This architectural study of PRCs is the second carried out in the history of the ICRC. The first was prepared for the ICRC in 1994 as a student thesis at the Ecole d'Architecture et d'Urbanisme de Genève.[24]

23 A filing system, known as ASSENG, which covers all stages of large construction projects has been introduced in recent years in the WatHab Unit in addition to its institutional filing system.
24 Christophe Valentini, *Travaux de recherche*, Ecole d'Architecture et d'Urbanisme de Genève, Geneva, 1994 (unpublished document).

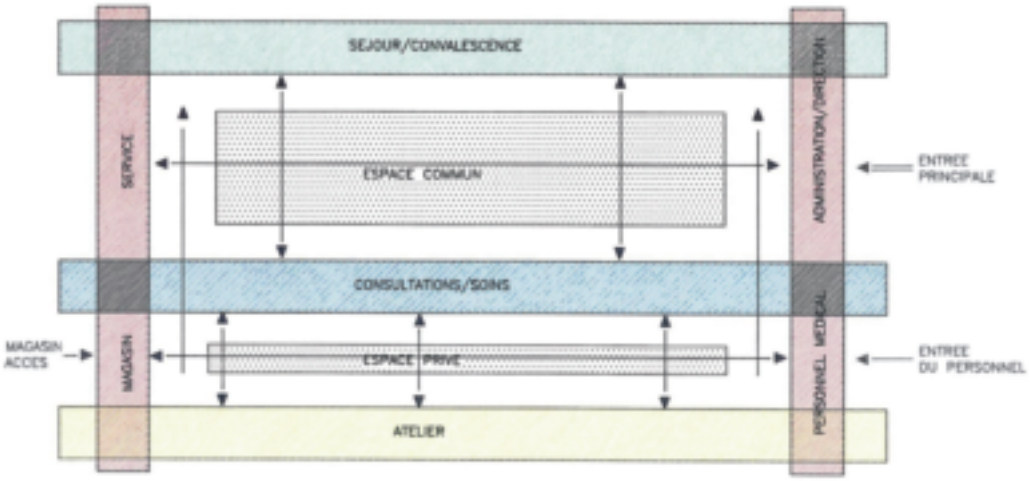


Figure 2.11
Functional organigram (*Organigramme d'ensemble*), 1994

It surveyed and analysed six centres built or renovated by the ICRC. Those centres were all operated by the PRP at the time and are still in service today. They are located in Asmara (Eritrea, 1982), Mazar-e-Sharif and Herat (Afghanistan, 1990 and 1991), Phnom Penh (Cambodia, 1991), and Basrah and Najaf (Iraq, 1994).

This first study was carried out to prepare the ground for the design of a specific project in Cambodia. As it is often the case in architecture, the intention was not to draw general conclusions but to highlight recurrent patterns in similar projects and to identify best practices and practices to be avoided.

After the review of the six centres, the study presented a schematic functional organigram (Figure 2.11) of a generic centre (Figure 2.12), which was proposed for the construction of a series of centres in Cambodia.

The schematic functional organigram subdivides the centre into seven main areas: administration, service user accommodation (*séjour et convalescence*), clinical and physiotherapy areas (*consultations et soins*), prosthetic and orthotic workshop (*atelier*), store (*magasin*), dining area (*services*) and staff rooms (*personnel medical*). Access to the store (*accès magasin*), the main entrance (*entrée principale*) and the staff entrance (*entrée du personnel*) are also shown.

The administration, the service user accommodation and the dining area are considered to be public spaces. The prosthetic and orthotic workshop, the store and the staff rooms are considered to be restricted areas. The clinical and physiotherapy areas are a spatial buffer between the public and the restricted areas.

All activities at the PRC are distributed around two central outdoor areas: a public one (*espace commun*) for the public spaces and a private one (*espace privé*) for the restricted areas. These outdoor areas are not given over to any activities and are courtyards.

As we will see in the ten-centre study, this functional organigram inspired the designs of some projects in the field. Although the student thesis stated that the schematic organigram and layout were not to be understood as a model PRC, they gradually became one. This can be explained by the lack of resources about existing PRCs in humanitarian contexts available to designers in the early 2000s.

The model was first used for Hpa-an Physical Rehabilitation Centre in Myanmar in 2002 and was further developed for the Juba Physical Rehabilitation Reference Centre (PRRC) in South Sudan in 2008. Those two buildings are organized around central open spaces as in the functional organigram. The layout of the Juba PRRC even replicates the concept of restricted and public courtyards separated by the physiotherapy rooms and the clinical area.

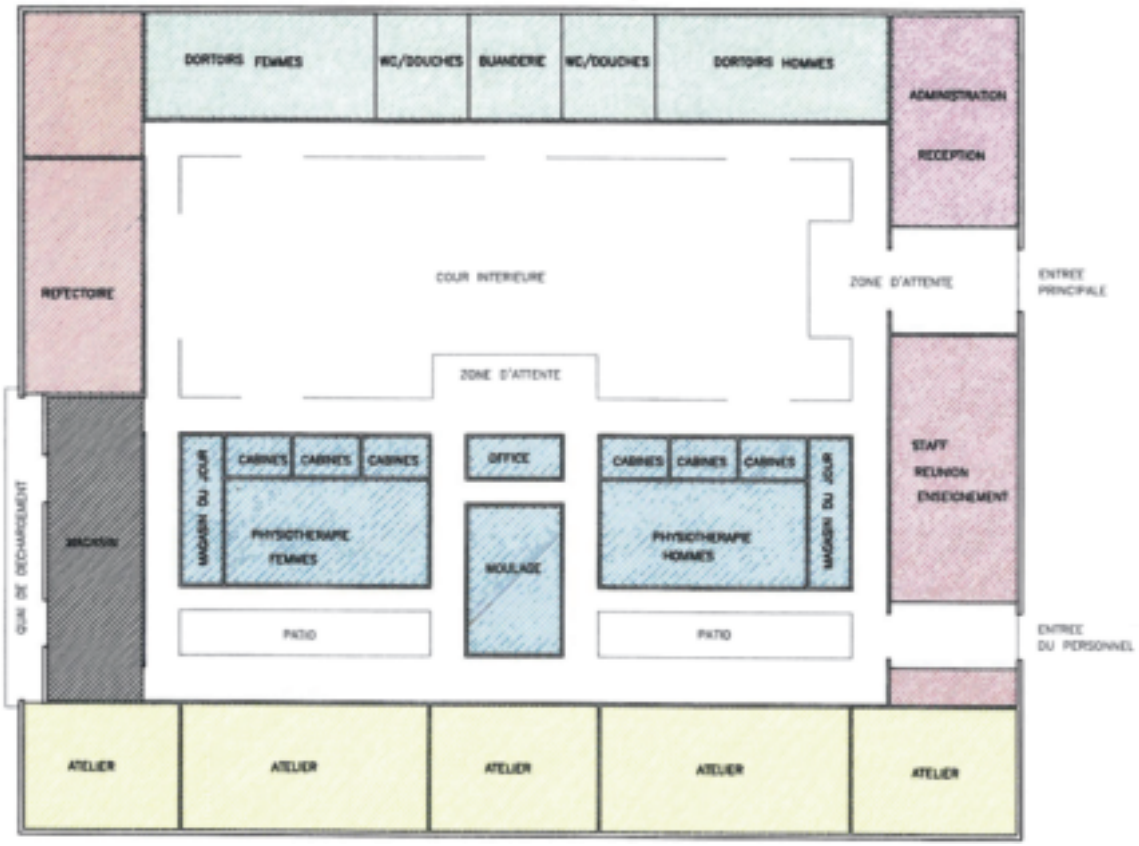


Figure 2.12
Architectural composition (*Composition/Partitions*), 1994

The courtyards at the two aforementioned centres are enclosed by covered galleries that lead to rooms. The combination of a courtyard with surrounding loggias is a well-known typology of classical architecture. Following the ancient examples of peristyles and sehans, this spatial configuration facilitates passive cooling in warm climates. The central courtyards allow cross-ventilation of the rooms and the inner facades are shaded by the galleries. By setting up activities in the courtyards and thus limiting the number of enclosed spaces, these layouts are also less expensive to build and less difficult to maintain in environments where it may be difficult to ensure a constant energy supply for climate control purposes.

The upgrade of the functional organigram with this architectural typology was developed for tropical climates (classified "A" under the Köppen-Geiger climate classification system[25]), and more specifically for Myanmar and South Sudan, which are assigned to the tropical monsoon ("Am") and tropical savannah ("Aw") Köppen-Geiger categories respectively. The functional organigram was developed initially for Cambodia, which is also classified as having a tropical savannah ("Aw") climate.

The functional organigram and its associated layout (Figures 2.11 and 2.12) were also used as a model in Iraq and Afghanistan, both of which have arid climates ("B"). However, in those cases, the organigram was not used for passive climate control. The organigram presented the advantage of a symmetric layout, which enabled gender separation in the public spaces. The design of the new Faizabad PRC, currently under construction in Afghanistan, is one of the organigram's most fully developed applications in terms of gender separation.

25 Some humanitarian actors, such as OCHA, have started to use an updated version of the terminology used by Wladimir Köppen and Rudolf Geiger. In recent publications (Kottek *et al.*, 2006) the "A" group is renamed "equatorial climates," "Am" is now known as "equatorial monsoon climate" and "Aw" as "equatorial savannah with a dry winter climate." The "A" group is characterized by constant high temperatures above 18° C at sea level and low elevations in all months of the year. "Am" is a tropical/equatorial climate with a wet and dry season and "Aw" is a tropical/equatorial climate with a pronounced dry season. In essence, the "Aw" climate, for which this architectural typology was first introduced by the ICRC for a PRC, tends to have less rainfall than an "Am" climate or more pronounced dry seasons.

A study of this kind with schematic designs can have a major influence, albeit unintentionally, on the development of future programmes and designs. An architectural study of a selection of sites is generally developed in order to establish the lessons to be learned from the project. Those lessons lead to design rationalization with a view to improving future building projects.

A model design to be replicated worldwide will always have limited use. Conditions change, particularly in ICRC contexts. Architectural programmes are always different from one another. The establishment of rural or urban referral centres, the presence or absence of potential operating partners, the climate and the shortage of materials are some of the factors explaining the constant need to adapt.

Instead of a model design, the ten-centre study discussed on the following pages highlights the need to focus on architectural programming. Chapter 3 will present tools – some of which were developed in the course of this study – that are intended to improve the architectural programming of PRCs.

2.1 TEN NOTABLE PHYSICAL REHABILITATION CENTRES

Ten notable PRCs are presented on the following pages:

Figure 2.13
Location of the ten PRCs discussed in the study

Unlike case studies in other fields, those concerning the building environment mainly report information through plans, pictures and tables. Accordingly, most of this chapter consists of graphics. The text serves to introduce graphical content in order to make it understandable for readers who are less accustomed to interpreting diagrams such as floor plans.

As already mentioned, the material available for the development of these presentations varied in quantity and quality. For some of the earlier projects, information was scarce. Despite this heterogeneity, all presentations follow the same structural arrangement so that comparisons can be made more easily.

Each case contains a description of the historical background, the role of the ICRC and the construction process. This is complemented by illustrations of the centre and the presentation of relevant positive

and negative aspects of the design. Finally, significant statistics regarding spatial characteristics, production and staff are provided.

It is worth mentioning that most of the positive and negative aspects reported here were submitted by present and past PRP and SFD staff members. Service user opinions are not included.

The graphical material consists of plans on a scale of 1:500. Each plan has a graphic scale and a north point to facilitate comparison.

A colour code is used to identify the main activities at the PRCs. The designation of the different departments was agreed with the PRP Technical Commission in 2013. **The colour code, the service designations and their three-letter acronyms are used not only in this chapter but throughout the handbook.**

	Administration	ADM
	Clinical area	CLI
	Guest house	GUE
	Physiotherapy department	PTD
	Prosthetic and orthotic department*	POD
	Service user accommodation	SUA
	Services area	SER
	Storage	STO
	Internal circulation	
	External circulation	

* The wheelchair assembly area is incorporated into the prosthetic and orthotic department.

As with living organisms, buildings are constantly evolving. This is particularly true for some of the centres presented here. Both their graphical and written presentations therefore have to be considered as snapshots. The buildings are depicted at a specific point in their evolution and some centres may have evolved significantly since then.

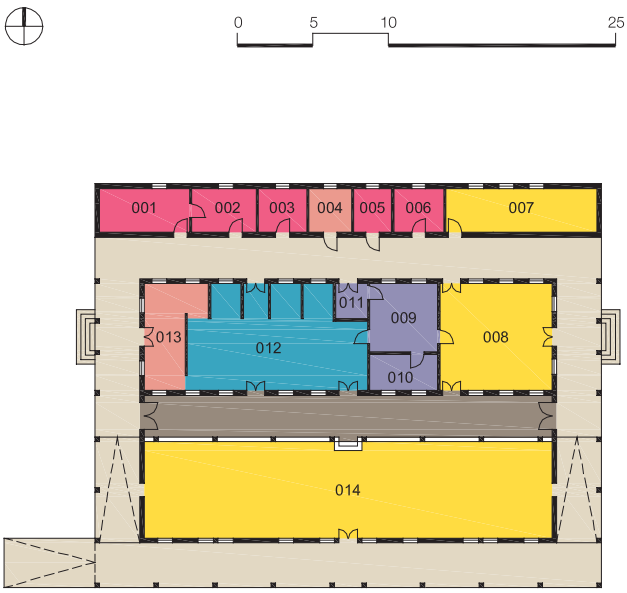


Figure 2.1.1.1
Plan of Beira PRC as built in 1990

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m^2)
001	Meeting/training room	ADM1	17
002	Management		12
003	Administration		9
004	WC		8
005	WC		7
006	Staff room		10
007	Rectification room	POD2	29
008	Thermoforming room	POD3	53
009	Main store	STO1	20
010	Store		11
011	Daily store	STO2	5
012	Exercise room	PTD1	74
013	Reception	CLI1	23
014	Assembly room	POD4	172
	Circulation area		402
	Net floor area (NFA)		**852**

2.1.1 Beira (Mozambique, 1986)

The ten-year-long liberation war which ended with the independence of Mozambique in 1975 and the subsequent internal conflict between the two political parties, FRELIMO and RENAMO, left soldiers and civilians in need of physical rehabilitation.

The ICRC started a physical rehabilitation project in collaboration with the Ministry of Health in 1981 and supported the provision of services at the Central Hospital in Maputo. During its presence in the country, between 1981 and 1995, the ICRC assisted the four PRCs in Maputo, Beira, Quelimane and Nampula.

The centre in Beira was refurbished by the ICRC and opened in 1985. The ICRC handed its activities over to the Ministry of Health in 1995.

The PRC is a monolithic colonial-style building. It consists of a central body surrounded on all sides by an external gallery and an extension on the northern side. From the outside, the central body is easily recognized by its barrel roof and semicircular pediments.

Figure 2.1.1.2
Main facade and entrance, 1987
Thierry Gassmann/ICRC

All the rooms at the PRC lead off from the gallery, which has a protruding ramp so as to be accessible by people with disabilities. Because the gallery is large and not enclosed, it is also used for practical training, making it a sort of ambulatory around the central part of the building. The shade generated by the gallery roofing facilitates passive cooling of the centre.

The central body of the building is divided into two parallel parts by an internal corridor. The reception, a physiotherapy room, the stores and the P&O thermoforming room are located on one side of the corridor, at the centre of the PRC. The central position of the store in a PRC of this size is optimal, making it easy for all departments to access.

On the other side of the central corridor is a large single space for the P&O workshop. The rectification room is located separately in the northern extension, adjacent to the administration rooms and toilets outside the main body of the building. The division of the P&O area does not enhance the production flow.

The Beira PRC was renovated by the ICRC to accommodate P&O training for 18 to 20 students. Initially, the layout of the building was therefore adapted mainly for training activities.

TFA	928 m²
NFA	852 m²
Plot	n/k
Plot ratio	n/k
Clinical area	31 m²
PT department	74 m²
P&O department	254 m²
SU accommodation	0 m²
Administration	55 m²
Storage	36 m²
Services area	0 m²
Circulation/NFA	47%

In 1995, 294 people with physical disabilities received services at the PRC. That same year, the PRC produced and supplied 173 prostheses and 121 orthoses.

To provide the activities, in 1995 the PRC had a staff of 15: 6 P&O technicians, 3 benchworkers, 2 administration and management staff, and 4 general staff. No information is available on current production and current staffing levels.

The total floor area (TFA) of the PRC is 928 m^2. Its net floor area (NFA) is 852 m^2 with 47% dedicated to circulation but partially used for PT activities.

PROS

- The gallery provides natural cooling of the main building and a semi-public space to accommodate PT activities;
- The single-storey construction makes the building easily accessible for people with disabilities.

CONS

- Casts were being made outside the building and the rectification room is cut off from the main P&O workshop flows;
- The machine room is not separate from the assembly room.

Figure 2.1.1.3
General view from south-east, 1987
Thierry Gassmann/ICRC

Figures 2.1.1.4 and 2.1.1.5
P&O department workshop, 1987
Thierry Gassmann/ICRC

Figure 2.1.1.6
PT department – outside exercise room, 1992
Peter Poetsman/ICRC

Figure 2.1.1.7
PT department – inside exercise room, 1992
Pierre Boussel/ICRC

0 5 10 25

Figure 2.1.2.1
Plan of Battambang PRC in 2014

Key: page 41

2.1.2 Battambang (Cambodia, 1991)

Between 1969 and 1999 the people of Cambodia suffered almost continuous war, political clashes and deadly violence: the spillover of the Viet Nam war into their country, the establishment of the Khmer Rouge's Democratic Kampuchea in 1975, the collapse of the Khmer Rouge regime as a result of the Vietnamese invasion in 1979, and the slow transition of the country to the 1991 Paris Peace Accords with the People's Republic of Kampuchea that ultimately led to the restoration of the Kingdom of Cambodia in 1993. The violent events left the country littered with mines and other explosives remnants. This unexploded ordnance (UXO) caused many injuries leading to amputations in a country that had no physical rehabilitation service before the 1980s.

To address the needs, the international non-governmental organizations (NGOs) American Friends Service Committee and Handicap International set up ten small PRCs between 1981 and 1991. Among them were Battambang, set up in 1988-89, and Kompong Speu, set up in 1991. Today, the Cambodian Ministry of Social Affairs, Veterans and Youth Rehabilitation manages 11 PRCs throughout the country. Two of them, Battambang and Kompong Speu, receive financial and technical support from the ICRC, which established a permanent presence in Cambodia in 1979.

The Battambang centre was taken over by the ICRC from Handicap International in 1991. The ICRC first renovated the premises and then installed its equipment. Following the ICRC renovation, the first amputees were admitted at the end of 1991. Several new buildings were constructed over the following years in order to increase the centre's capacity. In 1992, a new workshop and the main warehouse were added. In 1993, a physiotherapy building, a kitchen, an outdoor obstacle training course and two dormitories comprising 120 beds with showers and toilets were also added.

Figure 2.1.2.2
PT department – advanced training court, 1993
François Rueff/ICRC

The centre of Battambang consists of several buildings spread over a large plot of land planted with palm trees. The built area occupies only one-third of the plot. The large remaining space offers an outdoor environment for different activities.

All buildings are one storey high. The steeply sloping roofs of the buildings reflect the local architectural style. They give the whole centre an architectural character which is highly appreciated by users. The steep roofs and high ceilings enable passive cooling and are very appropriate for humid and warm climates. All services are accessible from outside. This avoids the need for internal corridors, which easily accumulate stagnant and humid air in tropical climates.

The site is divided into three main areas. The clinical area, the PT department and the P&O department are located in the first area, to the south. The main building at the entrance to the site contains the reception and the workshop with its stores. The PT building, the assessment rooms and a covered advanced training court are accessible from the rear of the main building. Outdoor sports courts are located behind the PT building. Palm trees surround the sports areas and keep them cool.

TFA	3,006 m²
NFA	2,755 m²
Plot	11,916 m²
Plot ratio	0.3
Clinical area	118 m²
PT department	634 m²
P&O department	322 m²
SU accommodation	656 m²
Administration	110 m²
Storage	209 m²
Services area	144 m²
Circulation/NFA	20%

Service user accommodation with female and male wards and a dining area is in the second main area of the site, to the north. Bathrooms and toilets are separate from the wards. The dining area is positioned between the two symmetrical dormitory buildings. It is open to the air and covered by a roof.

The administrative and technical buildings are located on the third part of the site, immediately in front of the entrance.

The PRC provides the full range of services, including mobility devices (prostheses, orthoses, walking aids and wheelchairs) and physiotherapy services. The PRC serves as a regional centre covering five provinces: Battambang, Pursat, Pailin, Odar Manchey and Banteay Manchey.

In 2013, the 120-bed centre provided services for 7,747 people with physical disabilities, 4,200 of whom were given physiotherapy only. It produced and supplied 1,162 prostheses, 614 orthoses and 1,263 pairs of crutches. It also provided 352 wheelchairs.

To provide the activities, the PRC now has a staff of 57: 9 P&O technicians, 15 benchworkers, 9 PT staff, 4 administration and management staff and 20 general staff.

The total floor area (TFA) of the PRC is 3,006 m^2 on a plot of land measuring 11,916 m^2. Its net floor area (NFA) is 2,755 m^2 with 20% dedicated to circulation.

PROS

- The constructions on the site occupy only a small part of the plot of land, giving the PRC a good ratio of outdoor space to buildings;
- High ceilings facilitate passive cooling of the buildings;
- Outdoor covered spaces create comfortable areas for activities, protected from rain and shaded from the sun;
- External circulation avoids the need for central corridors, which may easily accumulate stagnant and humid air;
- The absence of internal corridor reduces the built floor area.

CONS

- One single building contains two functional areas (the P&O workshop and the reception) which are not compatible because of the noise from the workshop and the need for a quiet atmosphere at the reception.

Figure 2.1.2.3
Service user accommodation – dormitories, 1993
François Rueff/ICRC

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Cerebral palsy room	PTD6	29
002	Chronic pain room		20
003	Daily store	STO2	42
004	Store		33
005	Store		14
006	Generator		16
007	Generator		16
008	Store		25
009	Machine room	POD8	37
010	Main store	STO1	47
011	Sewing room	POD9	7
012	Store		4
013	Store		5
014	Assembly room	POD4	218
015	Rectification room	POD2	41
016	Casting room	POD1	19
017	Waiting room	CLI2	21
018	Social services		21
019	Reception	CLI1	19
020	Medical records		14
021	Advanced training court	PTD4	266
022	Exercise room	PTD1	173
023	Bathroom		17
024	WC		6
025	WC		6
026	Exercise room	PTD1	30
027	Assessment room	CLI3	30
028	Waiting room	CLI2	13
029	Fuel store		9
030	Maintenance		22
031	Maintenance		22
032	Administration		17
033	Management		17
034	Administration		25
035	Meeting/training room	ADM1	45
036	Guard		6

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
037	Store		10
038	Kitchen		29
039	Dormitory		104
040	Dormitory		117
041	Store		3
042	Bathroom		2
043	Bathroom		2
044	WC		2
045	WC		2
046	WC		2
047	WC		2
048	Bathroom		4
049	Laundry		3
050	Dining room		85
051	WC		22
052	Office		11
053	Kitchen store		11
054	Dormitory		253
055	Store		3
056	Bathroom		2
057	Bathroom		2
058	WC		2
059	WC		2
060	WC		2
061	WC		2
062	Bathroom		4
063	Store		3
064	Outdoor sports court – volleyball	PTD3	
065	Outdoor sports court – basketball	PTD3	
066	Advanced training court		38
067	Waiting area		49
068	Water treatment		
069	Water tank		
070	Maintenance		
	Circulation area		562
	Net floor area (NFA)		**2,755**

Figure 2.1.2.4
Service user accommodation – dining area, 2014
Alessandro Giusti/ICRC

Figure 2.1.2.5
PT department – exercise room, 2014
Alessandro Giusti/ICRC

Figure 2.1.2.6
P&O department – workshop, 2014
Alessandro Giusti/ICRC

Figure 2.1.2.7
P&O department – workshop, 2014
Alessandro Giusti/ICRC

Figures 2.1.2.8 and 2.1.2.9
P&O department – workshop, 2014
Alessandro Giusti/ICRC

Figure 2.1.2.10
Service user accommodation – dormitories, 2014
Alessandro Giusti/ICRC

Figures 2.1.2.11 and 2.1.2.12
PT department – outdoor sports area and advanced training court, 1999
Chamrong Lo/ICRC

Bruno l'Hoste/ICRC

Figure 2.1.3.1
Plan of Kabul PRC in 2014

Key: page 47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Entrance

2.1.3 Kabul (Afghanistan, 1995)

The ICRC has been permanently present in Afghanistan since 1987, towards the end of the Soviet war in Afghanistan (1979-1989). The physical rehabilitation project started one year later in order to provide services for amputees who had lost their limbs during the conflict. Today, the ICRC's physical rehabilitation project combines physical rehabilitation services for people with physical disabilities with activities aimed at social inclusion. The centre is managed directly by the ICRC with the close collaboration of the Ministry of Public Health, the Ministry of Education and the Ministry of Labour, Social Affairs, Martyrs and Disabled.

The construction of the PRC started during the Soviet withdrawal from Afghanistan and was completed in 1991. In the period from the collapse of the communist Republic of Afghanistan (1992) to the foundation of the Islamic Emirate of Afghanistan (1996), Kabul was the scene of several battles. The PRC, situated in Ali Abad, was suddenly on the front line. This led to its relocation in 1993 to a safer place in Wazir Akbar Khan, Kabul.

At the beginning of 1994, the centre was moved back to Ali Abad as the security situation stabilized. However, six months later the centre had to be moved back to Wazir Akbar Khan once again. The original buildings in Ali Abad were repeatedly and severely damaged during the Battle of Kabul (1992-1996). Nevertheless, repairs to the buildings were systematically carried out straight away in order to prevent further deterioration. Following the fall of Kabul (2001) under the US-led Operation Enduring Freedom, the component factory moved back to Ali Abad in 2002. In 2004, the entire centre was transferred again to its original location and additional premises were erected. The ICRC designed and built the entire PRC in Ali Abad.

Figure 2.1.3.2
Entrance, 2010
Samuel Bonnet/ICRC

TFA	7,401 m²
NFA	6,498 m²
Plot	16,080 m²
Plot ratio	0.5
Clinical area	437 m²
PT department	1,674 m²
P&O department	1,536 m²
SU accommodation	798 m²
Administration	357 m²
Storage	812 m²
Services area	221 m²
Circulation/NFA	10%

The PRC is situated on a large plot of land that is easily accessible to beneficiaries. Construction started with extensive groundwork because the plot is steeply sloped. The ground was levelled and a retaining wall built. A narrow strip of the site above the retaining wall, much higher than the levelled ground, is used only as a technical and maintenance area.

The centre consists of four main buildings which are located along an internal road lined with trees. They were all erected during the same initial development phase and their typology is identical. It consists of closed, compact single-storey buildings each with a narrow internal courtyard with rooms on either side of their longitudinal wings. The wings all have single-pitch roofs that slope towards the courtyards.

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Store		21
002	WC		25
003	Store		69
004	Painting room		34
005	Carpentry workshop		203
006	Dressing room		16
007	Store		6
008	Exercise room	PTD1	51
009	Casting room	POD1	32
010	Rectification room	POD2	27
011	Casting room	POD1	20
012	Waiting room	CLI2	9
013	Store		2
014	Store		2
015	WC		6
016	Office		13
017	Office		18
018	Thermoforming room	POD3	16
019	Machine room	POD8	26
020	Assembly room	POD4	90
021	Exercise room	PTD1	48
022	Meeting/training room	ADM1	48
023	Main store	STO1	205
024	Machine room	POD8	23
025	Store		74
026	Wheelchair assembly room	POD10	151
027	Wheelchair assembly room	POD10	46
028	Store		94
029	WC		3
030	WC		3
031	WC		7
032	WC		8
033	WC		7
034	WC		7
035	Store		82
036	Store		73
037	Social services		80
038	Social services		19
039	Social services		65
040	Janitor's room		37
041	Store		47
042	Fuel store		88
043	Fuel pump		27
044	Pharmacy		31
045	Kitchen		47
046	Kitchen store		15
047	Pharmacy		15
048	Pharmacy		14
049	Pharmacy		25
050	Pharmacy		31
051	WC		9
052	Dining room		177
053	Kitchen store		9
054	Kitchen		36
055	WC		7
056	Generator		14
057	Generator		17
058	Generator		17
059	Transformer		30
060	Generator		15
061	Water pump		13
062	Kindergarten		13
063	Cerebral palsy room	PTD6	59
064	Maintenance		48
065	Thermoforming room	POD3	116
066	Leather workshop		20
067	Laundry		71
068	WC		3
069	WC		3
070	WC		69
071	Guard		5
072	Waiting room	CLI2	40
073	Dormitory		49
074	Exercise room	PTD1	60
075	Reception	CLI1	50
076	Exercise room	PTD1	25
077	Exercise room	PTD1	149
078	Dressing room		27
079	Exercise room	PTD1	26
080	Fitting room	CLI3	13
081	Medical records		16
081	Dormitory		18
083	WC		13
084	Dormitory		52
085	Office		8
086	WC		8
087	Exercise room	PTD1	51
088	Dressing room		13
089	Staff room		13
090	Dormitory		48
091	Store		13
092	Dressing room		13
093	Dormitory		49
094	Waiting room	CLI2	15
095	WC		4
096	Dormitory		34
097	Medical records		25
098	WC		9
099	WC		7
100	Waiting room	CLI2	18
101	Assessment room	CLI3	12
102	Dormitory		49
103	WC		13
104	WC		2
105	WC		2
106	Advanced training court	PTD4	274
107	Orthotic workshop		100
108	WC		23
109	Staff room		16
110	WC		2
111	WC		2
112	WC		2
113	Metal room	POD7	253
114	Machine room	POD8	50
115	Prosthetic workshop		24
116	Prosthetic workshop		61
117	Prosthetic workshop		41
118	Office		16
119	Office		16
120	Store		13
121	Waiting room	CLI2	45
122	Casting room	POD1	49
123	Casting room	POD1	49
124	Office		23
125	Office		23
126	Administration		48
127	WC		4
128	WC		10
129	IT		4
130	Reception	CLI1	32
131	Driver		16
132	Office		10
133	Office		11
134	Office		10
135	Meeting/training room	ADM1	48
136	Leather workshop		26
137	Leather workshop		17
138	Covered basketball court		723
139	Water tank		
140	Water tank		
	Circulation area		662
	Net floor area (NFA)		**6,498**

Figure 2.1.3.3
General view from the south-west, 1991
Yannick Muller/ICRC

The concrete structure with masonry infill walls has enabled the buildings to survive numerous rocket strikes. The facade openings are protected by precast concrete sunshades, which give the buildings their architectural identity. The four buildings house the main activities: the clinical area, the P&O department, the PT department, the service user accommodation and the administration. For cultural reasons, the PT department is gender separated.

To cope with the steady increase in activities, extensions were built over time in some of the courtyards (rooms 025, 035, 076, 099, 105, 108, 114, 120 and 128). Other services were added mainly by constructing new buildings at the back of the site or by refurbishing existing structures: a component factory (001 to 005), a school for P&O technicians (006 to 020), a department for social integration activities (037 to 039) and a kindergarten (062). A sports facility, including a basketball court for wheelchair users (138), was also added to the initial constructions.

These extensions are all small entities, with the exception of the component factory, the school for P&O technicians and the sports facility. The component factory is linear in structure and the school is an L-shaped building. They are both concrete structures with masonry infill walls and double Howe metallic trusses supporting double-pitched roofs. The sports facility is a metal structure.

All buildings on the plot of land are single-storey. The construction techniques employed are familiar to local contractors and the buildings are therefore easy to maintain.

The entire PRC is accessible to people with disabilities. In accordance with a positive discrimination policy, more than 90% of employees or trainees at the centre are people with disabilities.

In 2013, the 150-bed PRC provided services for 31,922 people with physical disabilities, 22,268 of whom were given physiotherapy only. Although the PRC was originally built for amputees only, services are now provided for people with all kinds of physical disabilities. Among the newly registered users, the ratio of amputees to other disabled persons is 1:8.

Figure 2.1.3.4
General view from east, 1992
Gianluca Thorimbert/ICRC

In 2013, the PRC produced and supplied 1,173 prostheses, 5,325 orthoses, 2,553 pairs of crutches and 471 wheelchairs. The initial projection was 2,000 service users a year, 100 beds and production of 800 prostheses.

To provide the activities, the PRC now has a staff of 268: 26 P&O technicians, 108 benchworkers, 46 PT staff, 8 administrative and management staff and 80 general staff.

The total floor area (TFA) of the PRC is 7,401 m^2 on a plot of land measuring 16,080 m^2. Because of the 0.5 plot ratio[26] and the site topography, the extension of the centre is now curtailed. The net floor area (NFA) is 6,498 m^2 with 10% dedicated to circulation.

PROS

- The buildings are easily maintainable by local craftsmen as they have been built using local techniques;
- All buildings are single-storey and thus easily accessible by people with disabilities;
- Outdoor spaces are landscaped and have outdoor lighting;
- Fire hose reels connected to a specific water network have been installed throughout the site as part of the fire safety strategy.

CONS

- "Bukharies," traditional oil or wood-fired heaters common in the northern part of Southern Asia, are used to heat the PRC. This system is not appropriate for premises of this scale as each "bukhari" heats only one room and consumes large amounts of fuel. For a building the size of Kabul PRC, numerous "bukharies" are required and fuel costs become prohibitive. A new central heating system is currently being installed in some buildings;
- Construction density and the distances between some buildings require specific attention to be paid to fire safety access and egress.

26 Refer to section 2.2 for a definition of "plot ratio."

Figure 2.1.3.5
Advanced training court, 2008
Ash Sweeting/British Red Cross

Figure 2.1.3.6
Basketball court, 2014
Jessica Barry/ICRC

Figure 2.1.3.7
PT department – advanced training court, 2009
Laurent Bedel/ICRC

Figure 2.1.3.8
PT department – advanced training court, 2010
Samuel Bonnet/ICRC

Figure 2.1.3.9
P&O department, 2013
Sean Maguire/ICRC

Figure 2.1.3.10
P&O department – school for P&O technicians, 2013
Jacob Simkin/ICRC

Figure 2.1.4.1
Plan of Hpa-an PRC in 2014

Key: page 55

2.1.4 Hpa-an (Myanmar, 2002)

Physical rehabilitation for people who have had limbs amputated following a landmine incident has been part of the ICRC's work in Myanmar since its delegation opened in 1986.

Today, many people with physical disabilities find it difficult to obtain adequate access to rehabilitation services. The problem is particularly acute for people living in the various conflict zones along the borders between Myanmar and Thailand and between Laos and China. The ICRC is currently providing support for two PRCs managed directly by the Ministry of Health. These centres are situated in Mandalay and Yenanthar. In Kayin State, the ICRC provides technical, material and financial support for the Hpa-an Orthopaedic Rehabilitation Centre, which is managed by the Myanmar Red Cross.

The Hpa-an PRC was designed and built by the ICRC. The design stage started at the beginning of 2001 and construction began at the end of the same year. The building was completed in 2002 after only seven months of work although, at the time of construction, the building site was in the middle of the conflict-affected area.

Figure 2.1.4.2
General view from the south-west – staff dining room and dormitories, 2014
Javier Curras Paredes/ICRC

The main building is a single-storey linear structure with a courtyard. Covered outdoor galleries surround this central landscaped space. This architectural typology promotes passive cooling with cross-ventilation of rooms and shade from the galleries. The different spaces have separate entry points, which avoids congestion of the circulation flows. Some rooms are accessible from the galleries on the courtyard and others directly from outside the building.

A large covered outdoor area in the courtyard serves primarily as a physiotherapy advanced training court but is also used as a service user recreational area. As a result of locating activities in the courtyards and providing external corridors, enclosed spaces are limited in number. This programmatic choice promotes passive cooling and simplifies maintenance in tropical climates. In the initial 2002 arrangements, only toilets and washrooms were located in two separate buildings outside the main one.

Over the past ten years, constant spatial planning reorganization and upgrading work has been carried out. One noticeable upgrade was the replacement of the initial roof panels containing asbestos by colour-coated galvanized sandwich panels. The underside of the panels is covered with a mineral ceiling that provides an additional thermal buffer. A screen of bamboo mats hangs from the edge of the roof overhangs to give additional protection from the direct heat of the sun.

Another upgrade was carried out in the thermoforming room, where ovens were recessed into the external wall and aligned with the inner face of the wall. The ovens are covered outside by an adjacent open porch with its roof positioned at mid-height of the facade.

A series of fire hose reels were introduced as part of the fire safety strategy.

Significant extensions to the main building have been carried out over time, providing a dormitory with bathrooms, a gait training room and dining rooms.

TFA	2,019 m²
NFA	1,906 m²
Plot	6,785 m²
Plot ratio	0.3
Clinical area	41 m²
PT department	284 m²
P&O department	296 m²
SU accommodation	503 m²
Administration	184 m²
Storage	88 m²
Services area	50 m²
Circulation/NFA	24%

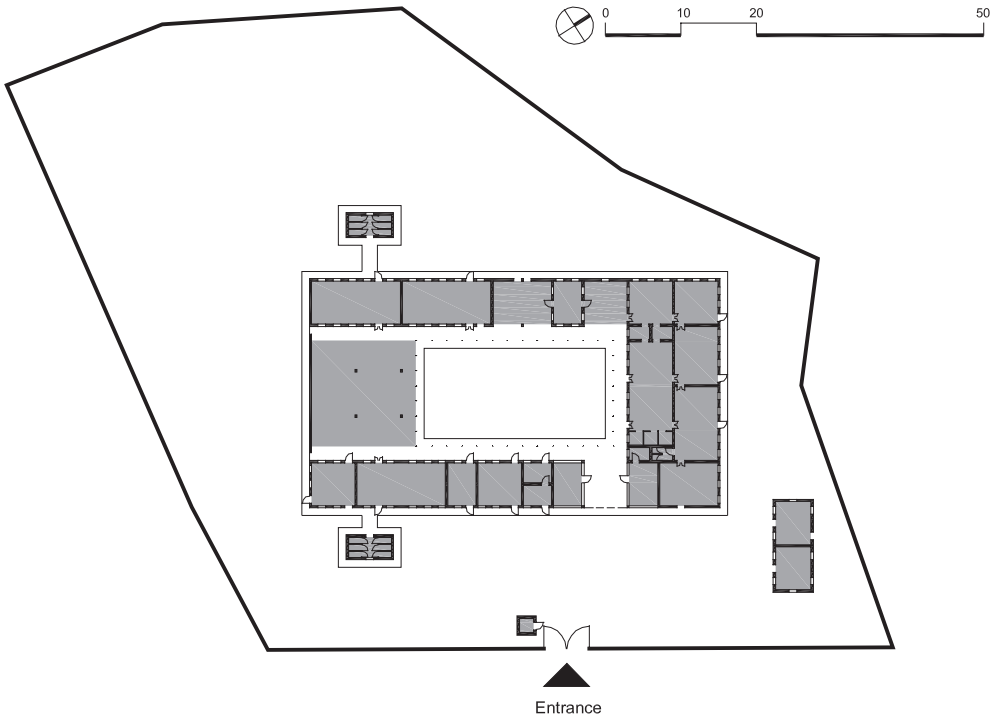

Figure 2.1.4.3
Plan of Hpa-an PRC as built in 2002

Figure 2.1.4.4
View from the south-west – service user accommodation, 2003
Theo Verhoeff/ICRC

Figure 2.1.4.5
View from the courtyard to the reception, 2002
Franz Engler/ICRC

Figure 2.1.4.6
The name of the construction workers on a wall in the reception, 2002
Franz Engler/ICRC

Key

No	DESIGNATION	CODE (section 3.2)	AREA (m^2)
001	Generator		27
002	Foot production unit		27
003	Main store	STO1	44
004	Staff room		21
005	WC		5
006	WC		5
007	Assembly room	POD4	80
008	Assessment room	CLI3	5
009	Assessment room	CLI3	5
010	Rectification room	POD2	67
011	Machine room	POD8	19
012	Thermoforming room	POD3	32
013	Casting room	POD1	32
014	Fitting room	CLI3	5
015	Fitting room	CLI3	5
016	Changing area (staff)		32
017	Kitchen		21
018	Dining area		44
019	Dormitory		67
020	Dormitory		67
021	Bathroom		15
022	Advanced training court	PTD4	193
023	Exercise room	PTD1	32

No	DESIGNATION	CODE (section 3.2)	AREA (m^2)
024	Dormitory		67
025	Bathroom		15
026	Laundry		21
027	Meeting/training room	ADM1	32
028	Management		10
029	Administration		10
030	Reception	CLI1	21
031	Guard		4
032	Bathroom		26
033	Dormitory		108
034	Dining room		52
035	Dining room (staff)		32
036	Advanced training court		59
037	Outdoor sports court – volleyball		
038	Waste management		23
039	Fenced outdoor female area		
040	Store		44
041	Outdoor foot production unit		34
042	Car park		38
043	Water tank		
	Circulation area		460
	Net floor area (NFA)		**1,906**

In 2013, the 52-bed PRC provided services for 2,548 people with physical disabilities, 898 of whom were given physiotherapy only. It produced and supplied 1,030 prostheses, 16 orthoses and 660 pairs of crutches. It also provided 15 wheelchairs. The initial projection was a production of 600 prostheses a year. The centre is now at maximum capacity, taking into consideration the several extensions completed over the years.

To provide these activities, the PRC now has a staff of 43: 8 P&O technicians, 7 benchworkers, 4 PT staff, 6 administration and management staff and 18 general staff.

The total floor area (TFA) of the PRC is 2,019 m^2 on a plot of land measuring 6,785 m^2. The net floor area (NFA) is 1,906 m^2 with 24% dedicated to circulation.

PROS

- The courtyard and external covered outdoor corridors favour passive cooling;
- A maintenance department was incorporated into the design from the outset; unlike the situation at many other PRCs, the department covers the centre's needs;
- Perimeter circulation allowed new buildings to be added to the one that already existed without disrupting the circulation flows.

CONS

- The haphazard addition over time of new buildings to the one that already existed led to a site which today offers no possibility of further development, although the plot ratio of 0.3 is fairly low;
- The architectural form of a closed linear building with a courtyard cannot be easily extended. Over time, the initial project brief proved to be inconsistent with the development of the centre.

Figure 2.1.4.7
PT department – advanced training court, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.8
Courtyard with the service user accommodation and the P&O department, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.9
PT department – advanced training court, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.10
PT department – advanced training court, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.11
Dining area, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.12
P&O department – workshop, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.13
P&O department – thermoforming room with recessed ovens, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.14
Service user accommodation – men's dormitory, 2014
Javier Curras Paredes/ICRC

Figure 2.1.4.15
Courtyard and clinical area – reception, 2003
Theo Verhoeff/ICRC

Figure 2.1.5.1
Plan of Kampong Speu PRC as built in 2005

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Guard		59
002	Reception	CLI1	44
003	Rectification room	POD2	33
004	Store		17
005	Machine room	POD8	43
006	Exercise room	PTD1	177
007	Casting room	POD1	21
008	Assembly room	POD4	123
009	Store		15
010	WC		4
011	WC		4
012	WC		4
013	WC		4
014	Sewing room	POD9	9
015	Administration		31
016	Management		7
017	Meeting/training room	ADM1	33
018	Kitchen		18
019	Store		32
020	Store		9
021	Dining room		104

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
022	Social services		8
023	Dormitory		94
024	Main store	STO1	65
025	Dormitory		155
026	Advanced training court	PTD4	144
027	Generator		27
028	WC		3
029	Kitchen		25
030	Bathroom		4
031	Bathroom		4
032	Bathroom		4
033	Bathroom		4
034	Bathroom		4
035	Bathroom		4
036	Bathroom		4
037	Bathroom		4
038	Outdoor sports court – basketball	PTD3	
039	Water tower		
040	Administration		63
	Circulation area		79
	Net floor area (NFA)		**1,483**

2.1.5 Kompong Speu (Cambodia, 2005)

In 2004, the ICRC began renovating the Kompong Speu PRC after starting to support the activities of the centre, which is now managed by the Cambodian Ministry of Social Affairs, Veterans and Youth Rehabilitation. After this renovation, the centre reopened its doors at the beginning of 2005.

Like the Battambang PRC (section 2.1.2), the Kompong Speu centre receives financial and technical support from the ICRC, which established a permanent presence in Cambodia in 1979.

Figure 2.1.5.2
PT department – outdoor sports court with the service user accommodation on the left and the advanced training court on the right, 1998
Darren Whiteside/ICRC

The Kompong Speu PRC has several similarities with the Battambang centre. One of them is the general layout comprising several buildings spread over the site. Nevertheless, Kompong Speu has been developed on a much smaller plot of land and thus has less greenery than the Battambang PRC. The plot ratio is accordingly far higher in Kompong Speu and it is almost impossible to extend this PRC. Another similarity is that the Kompong Speu PRC also combines outdoor and indoor spaces in a manner appropriate to tropical climates.

The buildings are either one or two storeys high. The main building is located next to the gate. It contains the reception, the clinical area, the PT department, the P&O department with some stores and the administrative services. Because this building contains all the main functions of the centre with almost no internal corridors, the flows of service users and staff are intertwined. Moreover, the proximity of the various services, and particular of the noisy P&O workshop and the PT room, where a calm atmosphere is required, is a source of noise nuisance.

The PT advanced training court is located out of doors and opens onto the outdoor sports court on the west side of the plot. This space and the dining area are covered but not enclosed, taking advantage of natural ventilation. The service user accommodation with its dining area and wards is located in three parallel buildings situated in the northern part of the site.

In common with Battambang, the Kompong Speu PRC provides the full range of physical rehabilitation services, including the provision of mobility devices (prostheses, orthoses, walking aids and wheelchairs) and physiotherapy services.

In 2013, the 40-bed PRC provided services for 3,316 people with physical disabilities, 1,462 of whom were given physiotherapy only. It produced and supplied 435 prostheses, 552 orthoses and 316 pairs of crutches. It also provided 228 wheelchairs.

TFA	1,552 m²
NFA	1,483 m²
Plot	3,250 m²
Plot ratio	0.5
Clinical area	52 m²
PT department	324 m²
P&O department	237 m²
SU accommodation	429 m²
Administration	196 m²
Storage	138 m²
Services area	27 m²
Circulation/NFA	5%

To provide these activities, the PRC now has a staff of 38: 6 P&O technicians, 7 benchworkers, 5 PT staff, 3 administrative and management staff and 17 general staff.

The total floor area (TFA) of the PRC is 1,552 m^2 on a plot of land measuring 3,250 m^2. Its net floor area (NFA) is 1,483 m^2 with 5% dedicated to circulation.

PROS

- The clinical area is located on the ground floor, making it easily accessible by service users;
- Outdoor covered spaces create comfortable areas protected from rain and providing shade from the sun;
- External circulation avoids the need for internal corridors, where stagnant and humid air may easily accumulate in tropical climates, and reduces the built floor area.

CONS

- The high plot ratio does not allow for further development of the PRC;
- There is a clash of patient and staff flows;
- Physiotherapy rooms are noisy as they are too close to the P&O workshop.

Figure 2.1.5.3
General view from the west – the service user accommodation on the left and the P&O department on the right, 2014
Didier Cooreman/ICRC

Figures 2.1.5.4 and 2.1.5.5
PT department – exercise room and advanced training court, 2014
Didier Cooreman/ICRC

Figures 2.1.5.6 and 2.1.5.7
P&O department – workshop, 2014
Didier Cooreman/ICRC

Figure 2.1.5.8
P&O department – workshop
Didier Cooreman/ICRC

Figure 2.1.5.9
Administration – meeting/training room, 2014
Didier Cooreman/ICRC

Figure 2.1.6.1
Plan of Rakrang PRC as built in 2005

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m^2)
001	Main store	STO1	32
002	Assembly room	POD4	67
003	Machine room	POD8	32
004	Thermoforming room	POD3	32
005	Rectification room	POD2	32
006	WC		7
007	Advanced training court	PTD4	78
008	Fitting room	CLI3	14
009	Exercise room	PTD1	39
010	Staff room		19
011	Assessment room	CLI3	15
012	Casting room	POD1	15
013	Covered sports court – volleyball		
–	Injection room (basement)	POD5	20
	Circulation area		34
	Net floor area (NFA)		**436**

2.1.6 Rakrang (Democratic People's Republic of Korea, 2005)

The ICRC has been providing support for PRCs in the Democratic People's Republic of Korea (DPRK) since 2002.

In close cooperation with the Military Medical Bureau of the Korean People's Army, the ICRC and the DPRK Red Cross have been providing support for Rakrang PRC since 2005. Located in the southern outskirts of Pyongyang, the PRC is easily accessible to beneficiaries.

The PRC treats both military personnel and civilians. The Military Medical Bureau manages patient admission and referrals independently of the ICRC. In addition to services provided for people with physical disabilities, the centre's surgical annex has the capacity to carry out amputations and stump revisions. A total of 128 procedures were performed in 2013 under the guidance of an ICRC surgical team and using ICRC-provided consumables.

Figure 2.1.6.2
View from the south – main entrance, 2005
Michael Rechsteiner/ICRC

The PRC occupies part of a large building designed and built by the DPRK armed forces. The ICRC was consulted only with regard to spatial planning, notably for the P&O activities and engineering services. Construction began in mid-2004 and the building was fully handed over 16 months later, in 2005.

The building has a large central atrium covered by a barrel-shaped roof and surrounded by two storeys of rooms and offices. The atrium serves as a volleyball court and is lit by skylights and one glass pediment. The volleyball court is used by staff members only.

The PRC occupies a portion of the ground floor of the building. Its layout consists of two contiguous suites of adjoining rooms. The lack of corridors limits circulation but leads to cross-flows of service users and staff. The first suite receives light and fresh air from the openings in the facade, whereas the second suite receives only borrowed light and is ventilated from the atrium.

The PRC has a PT department, a P&O department with its store, and a small clinical area. The reception and the waiting room are not included directly in the central space but positioned near the main entrance. An injection room for crutch production is located in the basement.

Lodging and fitting capacity reached its limit in the summer of 2009 and the centre extended its accommodation facilities in order to treat 30 more people (taking the total capacity to 63). The extension included the installation of an outdoor wheelchair exercise area and a gait training path. In addition, the PT department and the rectification room were renovated.

TFA	476 m²
NFA	436 m²
Plot	n/k
Plot ratio	n/k
Clinical area	36 m²
PT department	117 m²
P&O department	178 m²
SU accommodation	0 m²
Administration	19 m²
Storage	32 m²
Services area	n/k
Circulation/NFA	8%

In 2013, the PRC provided services for 542 people with physical disabilities, 498 of whom were given physiotherapy only. It produced and supplied 565 prostheses, 9 orthoses and 258 pairs of crutches. It also provided 41 wheelchairs. The centre was originally planned to provide treatment for up to 400 patients a year. The ratio of members of the military forces to civilians being given physical rehabilitation is 1:1.

To provide the activities, the PRC now has a staff of 28: 7 P&O technicians, 5 benchworkers, 8 PT staff, 3 administration and management staff and 5 general staff.

The total floor area (TFA) of the PRC is 476 m^2. Its net floor area (NFA) is 436 m^2 with 8% dedicated to circulation.

PROS

- The covered indoor hall provides recreation facilities at any time of the year.

CONS

- The absence of corridors creates conflicting flows of service users and staff.

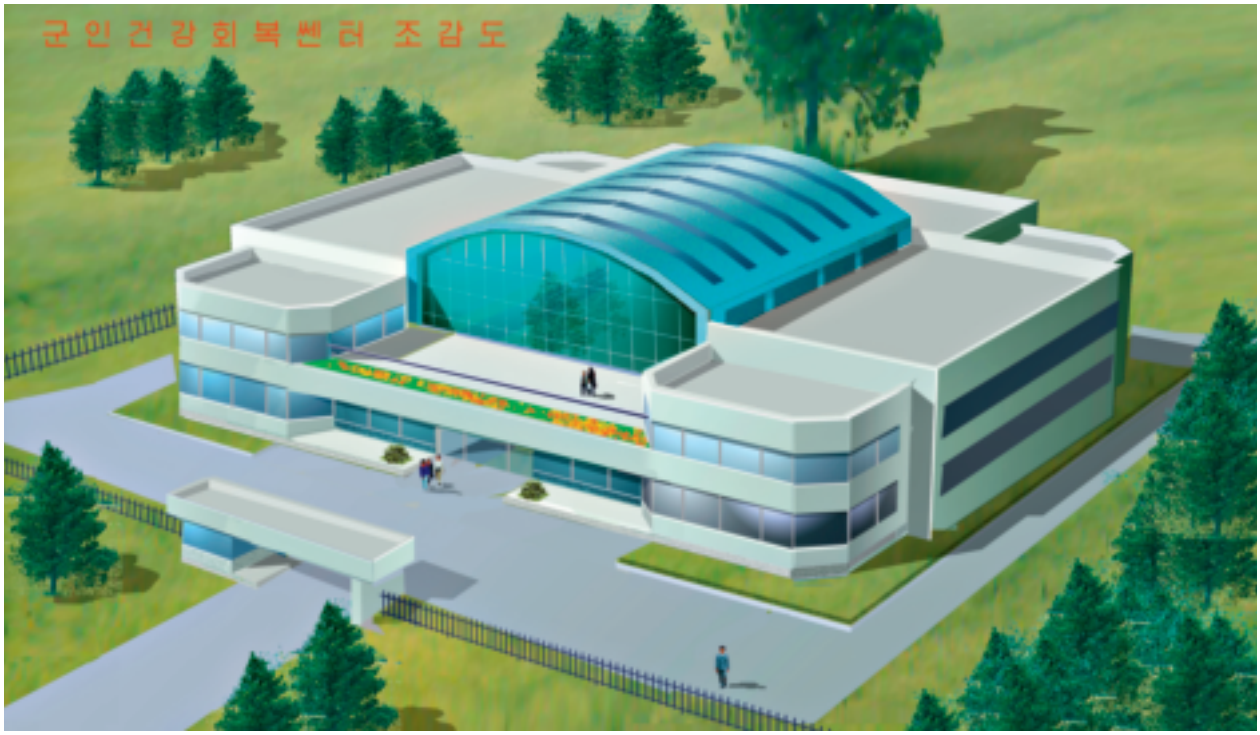

Figure 2.1.6.3
Axonometric projection, 2004
Korean People's Army

Figure 2.1.6.4
PRC entrance signage, 2014
Javier Cordoba/ICRC

Figure 2.1.6.5
PT department – covered sports court, 2014
Javier Cordoba/ICRC

Figure 2.1.6.6
P&O department – rectification room, 2005
Korean People's Army

Figure 2.1.6.7
P&O department – assembly room, 2005
Korean People's Army

Figure 2.1.6.8
PT department – advanced training court, 2005
Korean People's Army

Figure 2.1.7.1
Plan of Muzaffarabad as built in 2007

Key: page 69

2.1.7 Muzaffarabad (Pakistan, 2007)

On 8 October 2005, an earthquake measuring 7.6 on the Richter scale hit Azad Jammu and Kashmir, part of Pakistan-administered Kashmir. Over 70,000 people were killed, tens of thousands were injured and nearly 3.5 million people were left homeless. Many people from severely affected rural areas sought assistance in the regional capital, Muzaffarabad, although the city had also been badly damaged and an estimated 50% of its buildings destroyed.

The ICRC coordinated the response by the International Red Cross and Red Crescent Movement in the area, notably by setting up a field hospital in the Narul Stadium in Muzaffarabad.

Following the emergency, it was decided to build a new PRC in Muzaffarabad in order to ensure that people with physical disabilities in the region had access to physical rehabilitation services. The centre was to be managed by the ICRC.

At the end of 2013, more than six years after the completion of its construction, the Muzaffarabad PRC (MPRC) became an autonomous body by virtue of an act of the Legislative Assembly of Pakistan-administered Kashmir. The ICRC continues to provide the MPRC with financial and technical support.

Figure 2.1.7.2
General view from the south, 2014
Errol Lischman/ICRC

TFA	2,867 m²
NFA	2,598 m²
Plot	5,202 m²
Plot ratio	0.6
Clinical area	120 m²
PT department	215 m²
P&O department	378 m²
SU accommodation	672 m²
Administration	202 m²
Storage	174 m²
Services area	122 m²
Circulation/NFA	24%

The MPRC was designed by the ICRC in six months. It was constructed by a Pakistani contractor under the supervision of the ICRC and was opened on the second anniversary of the earthquake, in October 2007.

The centre is composed of six main buildings designed according to seismic engineering standards. Their dry-mounted structure consists of prefabricated lightweight aluminium frames. This structure is covered internally by plasterboard. Originally, the outer surface was covered by composite cladding.

The prefabricated lightweight frame structure has two main advantages. The first advantage is its very good performance in response to seismic activity. The second advantage is that, at the time, this construction method had been relatively recently introduced into Pakistan. The concrete industry was at

the time totally overwhelmed by the humanitarian reconstruction effort but reputable companies could be mobilized quickly to erect constructions based on lightweight aluminium frames. The construction stage lasted 14 months.

Because the composite cladding was not affixed according to professional standards, cracks appeared on the facades soon after the handover, revealing the presence of asbestos in the panels. After one full meteorological cycle, corrective work was carried out throughout 2009 to remedy these defects and their consequences. The composite panels were replaced by masonry cladding.

The MPRC site is located along a major circulation route in Muzaffarabad, making the centre easily accessible. There is a car park between the street and the centre.

The centre is composed of single-storey buildings arranged in three parallel rows. The building containing the P&O department is located to the right of the main entrance. The building containing the administration and the clinical area, including its reception, is immediately in front of the entrance to the site. Its north-eastern side faces the PT department. The buildings at the back contain service user accommodation. The female and male accommodation blocks are separated by a mosque.

The reception area is spacious and well connected to other buildings. The layout allows for good separation of the different functions. Buildings are connected by covered pathways. In order to comply with local cultural requirements, the flows are gender separated.

In 2013, the 55-bed PRC provided services for 4,878 people with physical disabilities, 1,491 of whom were given physiotherapy only. It produced and supplied 991 prostheses, 745 orthoses and 568 pairs of crutches. It also provided 129 wheelchairs.

To provide these activities, the MPRC now has a staff of 48: 8 P&O technicians, 12 benchworkers, 6 PT staff, 8 administrative and management staff and 14 general staff.

The total floor area (TFA) of the MPRC is 2,867 m^2 on a plot of land measuring 5,202 m^2. Its net floor area (NFA) is 2,598 m^2 with 24% dedicated to circulation.

PROS

- The site provides a good layout for the different services;
- Service user and staff circulations do not cross;
- A network of regularly-shaped buildings, well distanced from each other, is a basic measure which facilitates the integration of seismic engineering standards;
- The use of a lightweight frame structure meant that the construction process was not dependent on the concrete construction industry, which was saturated at the time of construction.

CONS

- Technologies that are relatively new in a country imply the need for closer building site supervision (problems with expansion joints and asbestos cladding);
- The lightweight aluminium frame system does not provide flexibility for future changes because it requires the repositioning of reinforcements in the walls at points where weight has to be hung. For instance, tool boards can be hung only at the points specified at the time of the original design;
- The architectural programme did not allow enough space for female facilities and the service user flow in the female ward is congested;
- The possibility of using external areas as outdoor recreational areas for service users was not considered.

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Dormitory (female)		28
002	Dormitory (female)		28
003	Bathroom (female)		27
004	Dormitory (female)		28
005	Dormitory (female)		28
006	Dormitory (female)		28
007	HVAC		4
008	Fuel store		4
009	Mosque		36
010	Bathroom (male)		27
011	Dormitory (male)		28
012	Dormitory (male)		28
013	Dormitory (male)		28
014	Dormitory (male)		28
015	Dormitory (male)		28
016	Dormitory (male)		28
017	Dormitory (male)		28
018	Dormitory (male)		28
019	Store		11
020	Staff room		17
021	HVAC		4
022	Fuel store		4
023	Maintenance		72
024	WC		7
025	Store		28
026	Kitchen store		24
027	Kitchen		7
028	Kitchen		30
029	Dining room		109
030	WC		6
031	WC		6
032	Laundry		27
033	Ironing room		27
034	Exercise room	PTD1	96
035	Exercise room	PTD1	96
036	WC		11
037	WC		11
038	Cerebral palsy room	PD6	30
039	Assessment room	CLI3	24
040	Reception	CLI1	54
041	Management		22
042	Office		18
043	Meeting/training room	ADM1	27
044	Office		24
045	Office		24
046	IT		2
047	Administration		21
048	WC		6
049	WC		6
050	Bedroom (female staff)		13
051	WC (female staff)		4
052	WC (female staff)		4
053	Bedroom (female staff)		13
054	WC (female staff)		4
055	Bedroom (female staff)		13
056	WC (female staff)		4
057	Bedroom (female staff)		13
058	Kitchen (female staff)		17
059	Guard		4
060	Casting room	POD1	27
061	Casting room	POD1	27
062	Sewing room	POD9	13
063	Rectification room	POD2	40
064	Dressing room (staff)		17
065	WC (staff)		2
066	WC (staff)		2
067	Dressing room (staff)		17
068	Assembly room	POD4	134
069	Main store	STO1	97
070	Store		4
071	Fuel store		4
072	Generator		16
073	Generator		8
074	Machine room	POD8	54
075	Thermoforming room	POD3	36
076	Thermoforming room	POD3	36
077	WC		6
078	WC		6
079	Generator		17
	Circulation area		631
	Net floor area (NFA)		**2,598**

Figure 2.1.7.3
View from the south-west, 2007
Franz Engler/ICRC

Figures 2.1.7.4 and 2.1.7.5
Building site – erection of the lightweight aluminium frame structures, 2007
Franz Engler/ICRC

Figure 2.1.7.6
Internal circulation, 2013
A. Shehzad/ICRC

Figure 2.1.7.7
View from the west – P&O department, 2014
Errol Lischman/ICRC

Figure 2.1.8.1
Plan of Juba PRC in 2014

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Reception	CLI1	36
002	Management		22
003	Administration		13
004	Administration		13
005	Dormitory		91
006	Bathroom		34
007	Maintenance (LGF)		25
008	Maintenance (LGF)		25
009	Bathroom		34
010	Communal area		127
011	Dormitory		68
012	Laundry		22
013	Dining room		41
014	Kitchen		33
015	Dining room		39
016	Advanced training court	PTD4	137
017	Meeting/training room	ADM1	33
018	Rectification room	POD2	42
019	Thermoforming room	POD3	50
020	Assembly room	POD4	64

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
021	Machine room	POD8	31
022	Maintenance		31
023	Main store	STO1	51
024	Office		24
025	Changing room with WC		14
026	Exercise room	PTD1	58
027	Guard		3
028	Assessment room	CLI3	6
029	Assessment room	CLI3	6
030	Fitting room	CLI3	55
031	Casting room	POD1	6
032	Casting room	POD1	6
033	Daily store	STO2	38
034	Generator		38
035	Store		15
036	Wheelchair assembly room		15
037	Water tower		
038	Fuel store + containment bund		8
	Circulation area		391
	Net floor area (NFA)		**1,743**

2.1.8 Juba (South Sudan, 2008)

The second Sudanese civil war was a conflict that lasted from 1983 to 2005 between the central Sudanese government and the Sudan People's Liberation Movement/Army (SPLM/A). The conflict ended with the Comprehensive Peace Agreement in 2006, and in 2011 the population voted for the independence of South Sudan.

During this conflict the demand for physical rehabilitation services increased in the southern region. This demand became more critical in the mid-2000s with the closure of the Lokichokio PRC in Kenya, which used to provide services for some of the people with disabilities affected by the conflict from what was then southern Sudan, while people leaving Khartoum for the new country of South Sudan also needed to have access to services.

In 2006 the ICRC signed an agreement with the Southern Sudan autonomous region concerning the construction of a Physical Rehabilitation Reference Centre (PRRC).

The PRRC was constructed in what was, at the time, the outskirts of Juba. This location is now in the centre of the city. The building is on a large government plot. The ICRC developed the design of the PRRC and supervised its construction by a regional contractor. The construction started at the beginning of 2007 and lasted 22 months. The building was handed over to the authorities at the end of 2008. The PRRC now functions as the referral centre for South Sudan and is still supported by the ICRC.

Figure 2.1.8.2
View from the southern courtyard with the advanced training court on the left, the communal area on the right and the dining area in front, 2011
Javier Curras Paredes/ICRC

The PRRC is a single-storey linear building with two courtyards. It is a plain concrete block masonry structure supporting monopitch metallic trusses for the roofing. The sloping site made it possible to use a small area of space under the ground floor as two technical rooms (007 and 008), rather than filling it in.

The two landscaped courtyards divide the centre into two parts. The first, around the northern courtyard, consists mainly of the P&O department and the central store. It is a restricted area. The second courtyard is at the centre of the clinical area, PT department, service user accommodation and administration. It is a public area.

Both courtyards are surrounded by external corridors leading to the various rooms. As a result, almost all circulation flows are inside the main building enclosure. The idea of turning almost all facilities at the PRRC to its courtyards was intended to isolate the centre from the rest of the site, where other Ministry of Gender, Child and Social Welfare facilities are to be accommodated in the future.

TFA	1,915 m²
NFA	1,743 m²
Plot	3,424 m²
Plot ratio	0.6
Clinical area	103 m²
PT department	195 m²
P&O department	215 m²
SU accommodation	449 m²
Administration	161 m²
Storage	103 m²
Services area	127 m²
Circulation/NFA	22%

The public entrance to the building was initially planned to lead from the road on the west side of the premises through the reception. It has since been transferred and people now enter through the dining area (015).

Many aspects favouring passive cooling have been incorporated into the building design. The courtyards facilitate natural ventilation of the whole building. All rooms are cross-ventilated. The outdoor covered corridors shade the inner facades facing the courtyards. The plenum spaces between the lightweight corrugated bitumen roofing panels and the suspended plasterboard ceilings prevent overheating of rooms. Communal areas such as dining areas are within the building but not enclosed; they open onto the southern courtyard. Despite high external temperatures in Juba, only the thermoforming room, the administration offices, the PT rooms and the training room are fitted with air conditioners.

The southern courtyard comprises the advanced training court and a communal area. Both spaces are outdoor covered spaces surrounding a central garden with mango trees as an additional food source. The garden complements the advanced training court by promoting rehabilitation on soft ground.

Initially, there was no plan for a wheelchair assembly facility. Two 20-foot equivalent prefabricated units were added at a later date under a protective roof (035 and 036).

In 2013, the 60-bed PRRC provided services for 1,416 people with physical disabilities, 708 of whom were given physiotherapy only. It produced and supplied 276 prostheses, 100 orthoses and 423 pairs of crutches. It also provided 77 wheelchairs. The centre was designed to accommodate up to 100 service users at a time.

To provide these activities, the PRRC now has a staff of 35: 14 P&O technicians, 2 benchworkers, 5 PT staff, 2 administrative and management staff and 12 general staff.

The total floor area (TFA) of the PRRC is 1,915 m^2 on a plot of land measuring 3,424 m^2. Its net floor area (NFA) is 1,743 m^2 with 22% dedicated to circulation.

PROS

- The communal area, garden and advanced training court composing the southern courtyard form a lively sequence of outdoor spaces creating the identity of the PRRC;
- The cross-ventilation of rooms associated with the naturally ventilated plenum space promotes passive cooling and dramatically reduces the internal temperature;
- High and low vents have been incorporated into rooms to facilitate natural ventilation;
- Corridors are naturally lit and easily maintainable as they are on the outside of the building.

CONS

- The project brief underestimated some activities, resulting notably in the workshop being too small;
- Sanitary technology (eastern and western toilets) is not adapted to the local habits of service users coming from remote rural areas;
- Floor finishes are not resistant enough, notably in the workshop;
- There is no direct connection between the rectification and thermoforming rooms;
- The physiotherapy assessment room is too small.

Figure 2.1.8.3
View from the south – technical rooms (007 and 008) beneath the ground floor, 2008
Samuel Bonnet/ICRC

Figure 2.1.8.4
PT department – advanced training court, 2011
Javier Curras Paredes/ICRC

Figure 2.1.8.5
PT department – advanced training court, 2011
Jennifer Warren/ICRC

Figure 2.1.8.6
Service user accommodation – loggia, 2013
Jennifer Warren/ICRC

Figure 2.1.8.7
Dining area, 2008
Samuel Bonnet/ICRC

Figure 2.1.8.8
PT department – exercise room, 2013
Samuel Bonnet/ICRC

Figure 2.1.8.9
P&O department – assembly room, 2013
Samuel Bonnet/ICRC

Figure 2.1.8.10
P&O department – thermoforming room, 2013
Marco di Lauro/ICRC

Figure 2.1.8.11
P&O department – thermoforming room, 2013
Samuel Bonnet/ICRC

Figure 2.1.8.12
Service user accommodation – men's dormitory, 2011
Javier Curras Paredes/ICRC

Figure 2.1.8.13
Courtyard, 2013
Marco di Lauro/ICRC

Figure 2.1.9.1
Plan of the Port-au-Prince PRC as built in 2012

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2.1.9 Port-au-Prince (Haiti, 2012)

The devastating earthquake that struck Haiti in January 2010 killed more than 230,000 people and left over one million homeless. It also inflicted heavy damage on Haiti's infrastructure. The orthopaedic and physiotherapy clinic supported by the local foundation Healing Hands for Haiti (HHH) was among the many buildings destroyed.

Before the earthquake, HHH was developing a concept design for a new centre so that it could move its activities to a privately donated plot of land. This new structure was the first phase of a larger plan. Following the earthquake, the Special Fund for Disabled (SFD), which was supporting HHH activities, mobilized the American, Australian, Canadian and Norwegian Red Cross Societies to co-fund this new centre.

With the support of the ICRC in terms of construction project management, in mid-2010 the SFD proposed that the designs of the new centre be finalized by the same non-profit architectural company, Msaada, that initiated them before the earthquake. The construction with a Haitian contractor under the joint supervision of the ICRC and the design team started at the beginning of 2011. The building was handed over to HHH exactly twelve months later and was the first large-scale building completed in Haiti following the earthquake.

Figure 2.1.9.2
View from the south-east – main entrance, clinical area and PT department, 2013
Samuel Bonnet/ICRC

TFA	1,702 m²
NFA	1,518 m²
Plot	16,050 m²
Plot ratio	0.1
Clinical area	143 m²
PT department	302 m²
P&O department	182 m²
SU accommodation	0 m²
Administration	185 m²
Storage	46 m²
Services area	54 m²
Circulation/NFA	40%

The building is located on a large, sloping site planted with palm trees. It has three floors, which are arranged in tiers to blend in with the topography.

The centre is composed of two blocks forming a compact linear entity. The first encloses a covered atrium surrounded by an internal corridor on the upper floors. The atrium draws natural light on all floors. Rooms have borrowed light from the large atrium skylight and daylight from the facades.

The compact design allows fast and easy access to all different services. Ramps connect the three floors making them accessible for people with disabilities. The ramps are located in the smaller block on the west side. The walls of this smaller block are made of screen blocks, which provide natural lighting and ventilation.

The clinical area with its reception is located at the entrance on the south-eastern side of the building. The site slopes steeply, with the entrance on the second of three floors – the ground level – accessed from the higher part of the site. The P&O department and a part of the PT department are also located at ground (entrance) level. PT rooms occupy part of the lower ground level. The first (top) floor is mainly given over to the administrative services, reinforcing clear separation of the different services. The service user flow guides the service user through the rehabilitation procedure without interruption.

The building is compliant with the International Building Code (IBC), which means that its structure resists the effects of earthquake motions, as envisaged by the code.

The bright orange colour of the facades and the louvred windows are both inspired by vernacular Haitian architecture. Louvred windows on the facades are protected by precast concrete sunshades. These elements and the beautiful park make this building of undeniable architectural interest.

In 2013, the PRC provided services for 3,013 people with physical disabilities, 244 of whom were given physiotherapy only. It produced and supplied 90 prostheses, 712 orthoses and 6 pairs of crutches. It also provided 36 wheelchairs.

To provide these activities, the PRC now has a staff of 47: 5 P&O technicians, 2 benchworkers, 3 PT staff, 3 administrative and management staff and 34 general staff.

The total floor area (TFA) of the PRC is 1,702 m^2 on a plot of land measuring 16,050 m^2. Its net floor area (NFA) is 1,518 m^2 with 40% dedicated to circulation.

PROS

- The layout arranged over three floors allows the use of the remaining land for future development;
- The building is well lit;
- Although the PRC is spread over three floors, all activities are accessible by staircases and covered ramps;
- The structure is IBC compliant, incorporating seismic loads;
- Additional civil engineering work was carried out around the building to prevent potential landslides during an earthquake;
- To allow the use of domestic and imported appliances, the electrical network supports 220 V and 110 V.

CONS

- Because the skylight of the atrium cannot be opened, the top floor overheats during the hot season. The exhaust vents at the top of the atrium pediments are not sufficient to cool down the top floor.

Figure 2.1.9.3
Painting of the PRC building site, by Amboise, 2012
Alexander Humbert/ICRC

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Services		9
002	Services		17
003	Store		4
004	Multipurpose room		50
005	Multipurpose room		31
006	Cerebral palsy room	PTD6	29
007	Occupational therapy		36
008	Speech therapy		12
009	Pharmacy		21
010	WC		4
011	WC		4
012	Sewing room	POD9	11
013	Machine room	POD8	33
014	Thermoforming room	POD3	24
015	Assembly room	POD4	78
016	Rectification room	POD2	16
017	Casting room	POD1	15
018	Casting room	POD1	7
019	Main store	STO1	29
020	Dressing room		13
021	Dressing room		13
022	Assessment room	CLI3	15
023	Assessment room	CLI3	15
024	Store		3
025	Reception	CLI1	10
026	WC		4
027	WC		4
028	WC		4
029	Waiting room	CLI2	17
030	Individual treatment cubicle	PTD2	9
031	Individual treatment cubicle	PTD2	9
032	Exercise room	PTD1	84
033	Advanced training court	PTD4	28
034	Fitting room	CLI3	9
035	Fitting room	CLI3	9
036	Fitting room	CLI3	9
037	Staff room		19
038	Meeting/training room	ADM1	20
039	Management		15
040	WC		4
041	Kitchen		6
042	Office		10
043	IT		10
044	Office		10
045	Store		10
046	Medical records		17
047	Social services		16
048	Social services		14
049	WC		5
050	Reception	CLI1	7
051	Atrium (multipurpose area)		131
052	Generator room		17
	Circulation area		523
	Net floor area (NFA)		**1,518**

Figure 2.1.9.4
Concrete pump pouring at night, 2012
Alexander Humbert/ICRC

Figure 2.1.9.5
General view from the north-east – main entrance, clinical area, P&O department, 2013
Samuel Bonnet/ICRC

Figure 2.1.9.6
View from the east – main entrance, 2013
Samuel Bonnet/ICRC

Figure 2.1.9.7
Atrium, 2013
Samuel Bonnet/ICRC

Figure 2.1.9.8
Ramps between floors, 2013
Samuel Bonnet/ICRC

Figures 2.1.9.9 and 2.1.9.10
PT department – exercise room, 2013
Samuel Bonnet/ICRC

Figure 2.1.9.11
P&O department – assembly room
Samuel Bonnet/ICRC

Figure 2.1.9.12
P&O department – metal room with a partition for working protection, 2013
Samuel Bonnet/ICRC

Figure 2.1.9.13
PT department – upper limb workstation, 2012
Allison Shelley/ICRC

Figure 2.1.10.1
Plan of Faizabad PRC as it is to be built

Key: page 87

2.1.10 Faizabad (Afghanistan, building ongoing)

Faizabad is the provincial capital of Badakhshan, a north-eastern province of Afghanistan. Following the collapse of the Republic of Afghanistan in 1992, much of Badakhshan was controlled by forces loyal to the Islamic State of Afghanistan. Between 1996 and 2001 it was the only province in Afghanistan fully ruled by the Northern Alliance and never to fall to the Islamic Emirate of Afghanistan.

In 1996 the ICRC began to ensure access to physical rehabilitation services for people with physical disabilities in Badakhshan by facilitating transport from the province to Kabul, where they received services.

In 2000, the authorities of Badakhshan invited the ICRC to open a PRC in its capital, Faizabad. The ICRC converted a ruined building belonging to the Ministry of Agriculture. It also built a guest house, a PT unit, a store and a kitchen in a new building located on an adjoining site belonging to the Ministry of Finance. With the expiry of the agreements for the use of the sites owned by the Ministries of Agriculture and Finance, the Ministry of Public Health put another site at the ICRC's disposal to build a new, permanent PRC. The ICRC began designing the new PRC at the end of 2010.

Figure 2.1.10.2
View from the west – building site, 2014
Alexander Humbert/ICRC

Construction started at the end of 2011 but has been interrupted many times by the harsh winters, alterations to the structural design and on-site work adaptations. The ICRC is still supervising the construction, which is ongoing and being carried out by a local contractor.

The site provided by the Ministry of Public Health is located on the outskirts of the city and consists of nine buildings. The four central buildings form a single unit which defines the general layout. This central unit contains the reception and the clinical area. PT rooms are replicated on each side of the clinical area, allowing gender separation. The P&O department faces the reception. The service user accommodation is located at the back of the site. A guest house and a services area are arranged on either side of the main entrance, on the east of the site.

All buildings are one storey high. Their structure is based on reinforced concrete (RC) frames with masonry infill. Hipped roofs are supported by timber trusses anchored to RC slabs. As Faizabad is in an area prone to high seismic activity, seismic engineering parameters were incorporated into the structural design, in accordance with the International Building Code (IBC).

Because of the cold winters in this region, insulation is provided on the outer face of external walls in order to reduce heat loss. Central heating has also been installed. This heating system is more efficient for the size of the building than the "bukhari" heaters traditionally used in the northern belt of Southern Asia and currently used at the Kabul PRC, for example.

TFA	1,801 m²
NFA	1,509 m²
Plot	3,000 m²
Plot ratio	0.6
Clinical area	102 m²
PT department	269 m²
P&O department	111 m²
SU accommodation	319 m²
Administration	159 m²
Storage	227 m²
Services area	106 m²
Guest House	70 m²
Circulation/NFA	100%

In 2013, the existing 50-bed PRC provided services for 7,226 people with physical disabilities, 5,954 of whom were given physiotherapy only. It produced and supplied 177 prostheses, 699 orthoses and 777 crutches. It also provided 43 wheelchairs.

The new 52-bed (35 male, 17 female) PRC was designed for the same level of production and activity.

To provide the current activities, the PRC now has a staff of 54: 9 P&O technicians, 1 benchworker, 13 PT staff, 2 administrative and management staff and 29 general staff.

The new PRC will be staffed to the same level.

The total floor area (TFA) of the new PRC is 1,801 m^2 with a plot ratio of 0.6. Unless the plot of land is extended, any built extension is precluded. The net floor area (NFA) is 1,509 m^2 with 10% dedicated to circulation.

PROS

- Gender separation is taken into account in the layout of the new PRC by duplication of PT rooms along a clinical area/P&O department axis;
- The integration of international seismic engineering standards is achieved using local building techniques to facilitate maintenance in the future;
- A central heating system is integrated into the design to avoid the fire risk from "bukharis" as well as the health risk of fumes from the fuel used to run them. Buildings are insulated.

CONS

- The centre is located outside the city;
- The integration of modern seismic engineering parameters established by international building standards gives rise to the need for high levels of supervision, training and monitoring of local designers and contractors by specialists from the WatHab Unit.

Figure 2.1.10.3
View from the east – guest house, 2014
Nicolas Michaud/ICRC

Figure 2.1.10.4
View from the east – main entrance, 2014
Nicolas Michaud/ICRC

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Kindergarten		13
002	WC		6
003	Dormitory		36
004	WC		5
005	Store		6
006	WC		5
007	Dormitory		52
008	Dining room		55
009	Kitchen store		9
010	Kitchen		16
011	Sterilization		11
012	Laundry		19
013	Dormitory		41
014	WC		5
015	WC		5
016	Store		6
017	Dormitory		61
018	Waste		21
019	Advanced training court	PTD4	47
020	Pharmacy		14
021	Exercise room	PTD1	41
022	Cerebral palsy room	PTD6	14
023	Staff room		11
024	WC		6
025	WC		4
026	Assembly room	POD4	54
027	Machine room	POD8	15
028	Rectification room	POD2	16
029	Casting room	POD1	26
030	Daily store	STO2	16
031	Pharmacy		19
032	Advanced training court	PTD4	67
033	Exercise room	PTD1	41
034	Meeting/training room	ADM1	23
035	Cerebral palsy room	PTD6	14
036	Staff room		11
037	WC		6
038	WC		4
039	Assessment room	CLI3	19
040	WC		5
041	Reception	CLI1	18
042	Social services		9
043	Social services		9
044	Management		9
045	Administration		9
046	Reception	CLI1	20
047	WC		3
048	Assessment room	CLI3	19
049	HVAC		47
050	Generator		27
051	Fuel store		30
052	Main store	STO1	98
053	Store		22
054	Driver		10
055	Guard		10
056	Store		28
057	Store		12
058	WC		6
059	WC		4
060	Bedroom		9
061	Bedroom		11
062	Bedroom		9
063	WC		8
064	Bedroom		11
065	Bedroom		10
066	Bedroom		10
067	Staff room		11
068	Outdoor sports court – volleyball	PTD3	
069	Water tower		
070	Car park / workshop		49
	Circulation area		146
	Net floor area (NFA)		**1,509**

Figure 2.1.10.5
Panoramic view from the west
Alexander Humbert/ICRC

2.2 SURFACE AREAS, SPACE INDICATORS, STAFFING, AND PRODUCTION STATISTICS

To supplement the descriptions of individual PRCs, this section will focus on their comparison, taking data analysis as the basis. The data relative to activities are taken from the 2012 PRP Annual Report and the 2013 ICRC Annual Report.

This section is primarily of concern for construction project managers.

Three different tables allow a comparison of surface areas, area ratios, activities and staffing. Each table reveals some underlying trends or patterns.

Table 1 focuses on surface areas for whole buildings and indicates the plot area, the total floor area (TFA), with its three subdivisions (FECA, PECA and UUCA), and the net floor area (NFA) of each PRC. These values are then computed in two ratios, the NFA/TFA and the plot ratio. Together with the percentages of each TFA subdivision, these ratios illustrate different spatial densities of the PRCs.

Table 2 focuses on the distribution of space within buildings and indicates the total surface area allocated to each service and to circulation. Percentages have been computed and are presented next to surface areas. They illustrate the space devoted to each service and to circulation as a proportion of the NFA.

Table 3 reports on activities. It allows a comparison of the ten PRCs in non-spatial terms. Statistics displayed in this table represent the number of service users admitted, the P&O production, the PT activity, the number of beds in the accommodation facilities, and the number of staff providing the activities.

The three tables help to appraise the PRCs from different angles. At the programming stage, they can also be used to evaluate the overall surface areas of a new project and the necessary size of its plot.

This evaluation of the overall surface areas of a new project starts with a list of rooms. Examples of lists of rooms are appended in Annex 3. A list of rooms indicates all the spaces needed to run the activities of a proposed PRC. It is usually drafted by the project owner at the Vision stage. It is finalized, giving the surface area of each room, during the Feasibility stage.

Using the list of rooms, it is possible to compare the size of the different services included in a project with those in the PRCs presented in this chapter. A study of the surface areas in Table 2 may be useful when considering the appropriateness of the areas devoted to particular services at a proposed PRC. Table 3 completes this evaluation by allowing a comparison of the expected activities of a proposed PRC with the activities of the centres presented in this chapter.

The percentages in Table 2 may also help to evaluate or to cross-check the areas devoted to circulation and services in the project. To select the most appropriate percentages, it is important to compare the layout of the proposed PRC with those studied in this chapter. Climate must be taken into consideration. Other factors may also affect the percentages, such as the number of storeys.

The sum of usable surface areas of rooms and outdoor spaces, circulation and services gives an estimated NFA. The NFA is obtained from the internal dimensions within enclosing walls or partitions. For a room, for instance, it is the surface area excluding external walls and the area of any internal columns, partitions and walls. The overall NFA of a building comprises the usable areas (UA) in each room and the total of services areas (SA) and circulation areas (CA).[27]

27 Usable areas are the floor areas used for the activities for which the building was intended. The services areas are floor areas housing technical installations which service the building. The circulation areas are the floor areas used for circulation within the building. The exact definition of net floor area (NFA) used in this handbook complies with that established in ISO 9836:2011, pp. 4-7.

The NFA/TFA ratio allows the TFA to be approximated from the list of rooms. The TFA is determined by the external dimensions of the enclosing elements. For a room, for instance, it is the surface area of the space including external walls and any internal columns, partitions and walls.[28] The TFA is the total area of all floors. It includes fully enclosed and covered areas (FECA), partially enclosed and covered areas (PECA), and unenclosed, uncovered and contained areas (UUCA),[29] as presented in Table 1. Here again, to select the most appropriate ratio, the proposed PRC has to be compared with the PRCs presented in this chapter.

The plot ratios in Table 1 allow the minimum size acceptable for the plot to be determined from the TFA.

2.2.1 TFA, NFA, NFA/TFA ratio and plot ratio

Primarily, Table 1 shows the total floor area (TFA), the net floor area (NFA) and the plot area (PA) taken from the plans for each of the PRCs studied in section 2.1 and presented here in alphabetical order. The surface areas are computed into two proportion ratios: the plot ratio and the NFA/TFA ratio.

	Battambang	Beira	Faizabad	Hpa-An	Juba	Kabul	Kampong Speu	Muzaffarabad	Port-au-Prince	Rakrang
Fully enclosed and covered area (FECA) (m²)	1,938	597	1,731	1,106	1,217	7,121	937	2,441	1,657	476
FECA/TFA percentage	64%	64%	96%	55%	64%	96%	60%	85%	97%	100%
Partially enclosed and covered area (PECA) (m²)	1,068	304	70	913	665	280	615	426	14	–
PECA/TFA percentage	36%	33%	4%	45%	35%	4%	40%	15%	1%	–
Unenclosed, uncovered and contained area (UUCA) (m²)	–	27	–	–	33	–	–	–	31	–
UUCA/TFA percentage	–	3%	–	–	2%	–	–	–	2%	–
Total floor area (TFA) (m²)	**3,006**	**928**	**1,801**	**2,019**	**1,915**	**7,401**	**1,552**	**2,867**	**1,702**	**476**
Net floor area (NFA) (m²)	**2,755**	**852**	**1,509**	**1,906**	**1,743**	**6,498**	**1,483**	**2,598**	**1,518**	**436**
NFA/TFA ratio	0.92	0.92	0.84	0.94	0.91	0.88	0.96	0.91	0.89	0.92
Plot area (PA) (m²)	**11,916**	**–**	**3,000**	**6,785**	**3,424**	**16,080**	**3,250**	**5,202**	**16,050**	**–**
Plot ratio (PR) = TFA/PA	0.3	–	0.6	0.3	0.6	0.5	0.5	0.6	0.1	–

Table 1
TFA, NFA, NFA/TFA ratio and plot ratio

The TFA is the sum of all fully enclosed and covered areas (FECA), partially enclosed and covered areas (PECA) and unenclosed, uncovered and contained areas (UUCA) composing a building. Percentages detailing variations of the TFA subdivisions of the ten PRCs are shown in Table 1.

The FECA, PECA and UUCA are determined in this study by the external dimensions of the enclosing or containing elements. They include all usable areas (UA), the services areas (SA) and the circulation areas (CA) composing the building. In other words, the TFA is derived from the NFA and the area occupied by its facades, structural elements and internal partitions.

The NFA/TFA ratio is the ratio of the net floor area (NFA) to the total floor area (TFA) of a building.

The NFA/TFA ratio shows the proportion of built surface that can be used for activities, services and circulation. It is a useful ratio but one that is also complex to appreciate. It has to be interpreted together with other information, such as, *inter alia*, the FECA percentage of the TFA, the number of storeys or the type of insulation. Theoretically, this ratio may range from 0 (an inaccessible space, entirely filled with its structure) to 1 (a totally open space without any buildings).

28 The total floor area (TFA) may also be referred to as the gross floor area. The exact definition of TFA used in this handbook complies with that established in ISO 9836:2011, pp. 3-4.

29 Fully enclosed and covered areas (FECA) are floor areas enclosed and covered on all sides. Partially enclosed and covered areas (PECA) are floor areas which are not enclosed on all sides up to their full height but which are covered. Unenclosed, uncovered and contained areas (UUCA) are floor areas which are contained within components but not covered. FECA, PECA and UUCA are the three subdivisions of the TFA based on section 5.1.3.1 of ISO 9836:2011, p. 3.

The NFA/TFA ratio enables the TFA to be calculated when only the usable areas, services areas and circulation areas are known.

The NFA/TFA ratio shows substantial variations of up to 12% in this study, thus ranging from 0.84 to 0.96. As already mentioned, care must be taken when using this ratio to obtain approximate values at the programming stage. Its use must be preceded by fundamental consideration of some project characteristics. Building techniques and the percentage of the activities and the circulation located outside the centre are two major factors that can affect the NFA/TFA ratio.

For instance, in the case of PRCs with outdoor activities and circulation in tropical climates (Battambang, Hpa-an, Juba and Kampong Speu), NFA/TFA ratios average 0.93. These high ratios are the result of minimizing walls, which, in turn, is the outcome of limiting the number of fully enclosed spaces. This limitation of FECA was both possible and suitable because of the climate; local temperatures allow outdoor activities. Tropical climates also make outside circulation more suitable than internal corridors, which are difficult to keep cool and naturally ventilated. FECA percentages average just under 61% for these four PRCs.

However, a high NFA/TFA ratio can also be achieved in very different climatic conditions. The Muzaffarabad PRC, for example, has a ratio of 0.91. This is partly because of the use of covered pathways for circulation, although its FECA/TFA percentage of 85% is quite high. The other reason for the high NFA/TFA ratio is the use of a lightweight aluminium frame structure. The structure with its incorporated insulation takes up little space compared to masonry walls and RC structures.

At this juncture it is interesting to make a comparison with the PRC in Faizabad. Faizabad is located at no great distance from Muzaffarabad and in the same climatic region. The PRC in Faizabad nevertheless has a much higher percentage of external to internal spaces than the one in Muzaffarabad. Its FECA percentage of TFA is 96%. This results in a NFA/TFA ratio of the PRC in Faizabad that is substantially lower (0.84) than that of the PRC in Muzaffarabad. This difference in NFA/TFA ratios is also accentuated by the different structure and insulation of Faizabad. The PRC in Faizabad has an RC frame structure with masonry infill and external insulation.

Comparing centres on the basis of the NFA/TFA ratio allows the designer to understand the repercussions of a construction technique on TFA. A correct interpretation of this ratio is based on consideration of the FECA, PECA and UUCA percentages of the TFA.

The plot ratio[30] is the ratio of the building's total floor area (TFA) to the area of the plot on which it is built.

The plot ratio indicates the construction density on a plot of land. Given a specific TFA, the lower the plot ratio, the larger the external spaces. In some countries, the limits of the plot ratio are established by law.

Once the TFA has been estimated on the basis of the NFA, the plot ratio can be used to calculate the approximate the size needed for the plot of land.

For a single-storey building, its TFA is derived from only one floor. That is the case for almost all PRCs studied in this handbook. In this case, the plot ratio illustrates directly the ground area occupied by the building, which is also referred to as the covered area.[31]

An analysis of the different plot ratios in Table 1 shows very clearly that some PRCs have been more densely built than others.

30 Depending on the country concerned, the plot ratio is also known as the floor area ratio (FAR), the floor space ratio (FSR), the floor space index (FSI), the site ratio or the "*Coefficient d'Occupation des Sols (COS)*" in French. The precise definitions of the ratio vary from one country to another.

31 The covered area is the area of ground covered by a building. The exact definition of "covered area" used in this handbook complies with that established in ISO 9836:2011, p. 3.

That is the case of the PRCs in Faizabad, Kabul, Kampong Speu, Juba and Muzaffarabad, where there is almost no capacity for future extensions. They have plot ratios above 0.5.

At the ICRC, the possibility of building future extensions is always the main requirement presented by project owners to construction project managers. It is therefore very important to consider the plot ratio implications at the time of the feasibility study. Plot ratios above 0.4 do not allow any real possibility of extending a PRC over time.

When comparing plot ratios, however, particular attention is required. With the exception of the PRCs in Port-au-Prince and Kampong Speu, all centres presented in this chapter, are single-storey buildings. Single-storey buildings are usually preferred in order to simplify accessibility. Nevertheless, the topography of the site or the need to allow space for future extensions sometimes imposes the need for a multi-storey building. The plot ratio cannot be used directly to compare the space occupied on a plot by a multi-storey building with the space occupied by a single-storey building. The plot ratio is the ratio of the TFA to the plot area and the TFA applies to all storeys. To enable a comparison to be made, a derivative of the plot ratio thus has to be computed. This derivative considers the TFA at ground floor only, i.e. the covered area, as part of the ratio for the plot area. In the case of Port-au-Prince, for instance, this method yields a 0.05 derivative ratio only (882 m^2 covered area) instead of the 0.1 plot ratio shown in Table 1.

Whenever possible, sites with a maximum plot ratio of 0.4 are favoured for single-storey projects.

Today, it is increasingly necessary for PRC projects in urban areas to incorporate car parks for service users and staff members. If a car park is to be built, plot ratios must be around 0.3.

2.2.2 NFA breakdown by service

Table 2 presents a breakdown of the NFA of the PRCs studied in section 2.1 and presented here in alphabetical order. It covers usable areas in each service, the services areas and the circulation areas.

	Battambang	Beira	Faizabad	Hpa-An	Juba	Kabul	Kampong Speu	Muzaffarabad	Port-au-Prince	Rakrang
Circulation area	562	402	146	460	359	662	79	631	606	34
CIR (m^2)	20%	47%	10%	24%	22%	10%	5%	24%	40%	8%
Clinical area	118	31	102	41	103	437	52	120	143	36
CLI (m^2)	4%	4%	7%	2%	6%	7%	4%	5%	9%	8%
PT department	634	74	269	284	195	1,674	324	215	302	117
PTD (m^2)	23%	9%	18%	15%	11%	26%	22%	8%	20%	27%
P&O department	322	254	111	296	215	1,536	237	378	182	178
POD (m^2)	12%	30%	7%	16%	12%	24%	16%	15%	12%	41%
Service user accommodation	656	–	319	503	449	798	429	672	–	–
SUA (m^2)	24%	–	21%	26%	26%	12%	29%	26%	–	–
Administration	110	55	159	184	161	357	196	202	185	19
ADM (m^2)	4%	6%	11%	10%	9%	6%	13%	8%	12%	4%
Storage	209	36	227	88	103	812	138	174	46	32
STO (m^2)	8%	4%	15%	5%	6%	12%	9%	7%	3%	7%
Services area	144	–	106	50	127	221	27	122	54	–
SER (m^2)	5%	–	7%	3%	7%	3%	2%	5%	4%	–
Guest house	–	–	70	–	–	–	–	–	–	–
GUE (m^2)	–	–	5%	–	–	–	–	–	–	–

Table 2
NFA breakdown by service

The table shows that there are no meaningful averages. The PT department is sometimes one-third the size of the P&O department and sometimes two and a half times bigger. Storage ranges from 3% to 15% of the NFA, service user accommodation from 12% to 29%, and the circulation area from 5% to 47%!

These percentage variations are caused by the diversity of contexts. They may be the result of the replication of rooms for the purpose of gender separation as required by the social context, constraints related to the refurbishment of an existing building, and requirements related to climatic conditions such as the positioning of the circulation.

When carrying out a feasibility study, Table 2 can nevertheless be used to compare the Vision document for a proposed PRC with existing PRCs. A comparison of that kind helps to calculate or to cross-check the areas allocated to the circulation and the services.

2.2.3 Activities and staffing

Table 3 presents statistics on activities and staffing in 2013 for each PRC studied in section 2.1 and presented here in alphabetical order.

		Battambang	Beira	Faizabad	Hpa-An	Juba	Kabul	Kampong Speu	Muzaffarabad	Port-au-Prince	Rakrang
Total service users per annum		**7,747**	**–**	**7,226**	**2,548**	**1,416**	**31,922**	**3,316**	**4,878**	**3,013**	**542**
Devices produced per annum	**Prostheses**	1,162	173	177	1,030	276	1,173	435	991	90	565
	Orthoses	614	121	699	16	100	5,325	552	745	712	9
	Walking aids (pairs of crutches)	1,263	–	777	660	423	2,553	316	568	6	258
	Wheelchairs	352	–	43	15	77	471	228	129	36	41
SU for PT only, per annum		**4,200**	**–**	**5,954**	**898**	**708**	**22,268**	**1,462**	**1,491**	**244**	**498**
Beds		**94**	**20**	**50**	**52**	**60**	**150**	**40**	**55**	**–**	**(63)**
Staff	**P&O technicians**	9	6	9	8	14	26	6	8	5	7
	Benchworkers	15	3	1	7	2	108	7	12	2	5
	PT	9	0	13	4	5	46	5	6	3	8
	General staff	20	4	29	18	12	80	17	14	34	5
	Admin. and management	4	2	2	6	2	8	3	8	3	3
	Total	**57**	**15**	**54**	**43**	**35**	**268**	**38**	**48**	**47**	**28**

Table 3
Activities and staffing

3.
ARCHITECTURAL PROGRAMMING TOOLS

This chapter presents three sets of architectural programming tools (bubble diagrams, space cards and component cards) which establish a framework for the development of the architectural programme and its transition to concept design. These architectural programming tools illustrate the future building in terms of activities and flows of building users.

The three sets of graphical documents were developed using three different scales or abstraction levels of an architectural programme: one for the services, one for the rooms and outdoor spaces, and one for the equipment and furniture. These three abstraction levels of a PRC have been transcribed into bubble diagrams, layouts of the main spaces and a list of the main equipment and furniture. They extend from the most abstract level of a centre, its organizational structure, to less abstract notions such as the services to be provided.

One of the sets, the bubble diagrams, incorporates another layer of abstraction, that of building user flows. "Flows" are movements of people between rooms and services through sequences of activities, such as the progression from the reception to the assessment room and from there to the casting room.

The graphical documents presented in this chapter constitute the core of this handbook. They are intended for practical use.

By rationalizing the requirements for the construction of a PRC, the documents establish a framework that enables construction project managers to understand project owners' wishes, constraints and needs. They therefore provide support for both the project owner and the construction project manager during the development and finalization of the architectural programme.

A significant contribution to the development of these architectural programming tools came from a study published by the World Health Organization (WHO) in the late 1970s.[32] The study proposes a "systematic functional programming" methodology and identifies the existence of a hierarchy of six functional levels at any health-care facility. These functional levels consist of activities of decreasing scale nesting into each other rather like a set of Russian "matryoshka" dolls.

The innermost functional level comprises the activity units ("Level 1"). An activity unit is one of the numerous nuclear activities taking place at a PRC. It is usually an activity that evolves around a piece or a set of equipment or furniture, for instance exercises done with parallel bars or work carried out on a plaster rectification table. The basic "requirements in terms of space, services, and environment"[33] are defined for each activity unit.

Interrelated activity units are grouped into activity sets ("Level 2"). These interrelated activities have "at least mutual, spatial and environmental compatibility that require to be or may be located in the same room."[34] An activity set can take place in a room or in an outdoor space. At an ICRC PRC, for instance, the activities taking place in the rectification room or on the outdoor advanced training court are separate activity sets. Activity sets constitute the second functional level.

Activity sets are grouped into activity sections ("Level 3"), which constitute the third functional level. They encompass groups of interconnected rooms or spaces used for an identifiable chain of activities. An activity set at a PRC can be the whole series of spaces devoted, for instance, to the production line of devices (prostheses and/or orthoses), wheelchair assembly or the treatment of clubfoot.

Activity sections are grouped into activity organizations ("Level 4"), which are part of the activity subsystems ("Level 5") and the activity system ("Level 6"). The fourth, fifth and sixth functional levels are the equivalent of the outer layers of Russian "matryoshka" dolls. At a PRC, the PT department or the P&O department can constitute an activity organization.

32 Jan Delrue, "Rationalization of planning and construction of medical care facilities in developing countries," in B. M. Kleczkowski & R. Pibouleau (eds), *Approaches to planning and design of health care facilities in developing areas*, Volume 1 (WHO Offset Publication No. 29), World Health Organization, Geneva, 1976, pp. 53–113.
33 *Ibid.*, p. 65.
34 *Ibid.*, p. 65.

The two higher hierarchical functional levels 5 and 6 do not always have to be taken into account for a PRC. If the PRC is part of a larger entity such as a district hospital, it is itself an activity subsystem ("Level 5"). If it is an independent entity, it is the activity system ("Level 6").

In accordance with this "systematic functional programming," a comprehensive architectural programme can thus be summarized as the following functional levels:
Level 1: Activity unit
Level 2: Activity set
Level 3: Activity section
Level 4: Activity organization
Level 5: Activity subsystem
Level 6: Activity system[35]

This schematization was developed to describe the functioning of any health-care facilities – from the smallest in size to district hospitals. It can be applied to very complex facilities providing a very wide range of treatments. The range of services provided at a PRC is not as extensive as that of a district hospital. Nor does a PRC have an organizational structure as complex as at a district hospital. Only three of the six functional levels are therefore required to cover the complexity of a PRC. The levels to be considered are:
- equipment and furniture;
- rooms and outdoor spaces;
- departments.

The first level of equipment and furniture corresponds to "Level 1: Activity units" identified by WHO. The second level of rooms and outdoor spaces corresponds to "Level 2: Activity sets." The third level of departments corresponds to "Level 4: Activity organizations." The parallel between the levels and Russian "matryoshka" dolls nonetheless remains valid for PRCs. The three levels are also nested into each other.

To complete the schematization, this handbook takes into consideration another important abstraction criterion of a health-care facility – building user flows. "The term flow describes the progressive movement of products, information and people through a sequence of processes. […] In healthcare flow is the movement of patients, information or equipment between departments, staff groups or organisations as part of their care pathway."[36] At a PRC, the main flows considered are service user flows, P&O flows and PT flows.

The flows form the link between the three hierarchical functional levels but are not part of the hierarchy. They are neither a smaller nor a bigger Russian doll but constitute an extra layer of unifying elements.

The three hierarchical functional levels of a PRC and the layer of its flows are represented on the following pages by **bubble diagrams, space cards and component cards**.

The bubble diagrams feature the rooms, outdoor spaces and departments that may constitute a PRC. They also illustrate the main flows between rooms.

Each space card illustrates one room or one outdoor space. A space card exists only for rooms and outdoor spaces supporting core activities.

Each component card illustrates one of the main items of equipment or furniture.

The use of bubble diagrams, space cards and component cards became standard practice in programming in the 1980s. They are still widely used today, albeit with some variations.

35 *Ibid.*, p. 65.
36 NHS Modernisation Agency, *Improving flow*, Department of Health, London, 2005, p. 5.

One example of this programming approach familiar to humanitarian practitioners is described in the "Programming guide for the setting up of a rehabilitation centre" published by Handicap International at the beginning of the 2000s. It schematizes and analyses a hypothetical NGO-operated centre with the help of a bubble diagram[37] and space cards.[38] Although this guide undoubtedly contains interesting information, it could not be used as a programming tool by the ICRC; the working approaches and technologies used by the PRP and the SFD are substantially different from those in the guide. The PRCs operated by, or with the support of, the ICRC therefore required specific guidelines and programming tools.

The bubble diagrams, space cards and component cards presented in this handbook are programming tools specifically adapted to PRP and SFD working approaches. They were developed from the end of 2011 onwards with the active support of PRP representatives at ICRC headquarters. **They constitute three different sets of interdependent graphical documents and are only fully understandable when consulted together.**

These graphical documents always have to be considered together because they are complementary. For instance, a rectification room without the appropriate plaster rectification table would obviously be hardly functional even if it is perfectly positioned next to the thermoforming room.

A first version of the documents was submitted to the PRP Technical Commission for guidance in 2013. A corrected version was then used as a support for the feasibility studies for two new centres, in Yemen in 2013 and in Myanmar in 2014. The two studies can be therefore considered as field tests. The programming tools presented here incorporate the latest feedback from those field tests. In view of their significance for this handbook, documentation on the centres in Yemen and Myanmar is provided in Annex 3.

Bubble diagrams, space cards and component cards have been developed on the basis of a hypothetical PRC, which, however, should not be considered as a model centre. It is merely a working hypothesis with the following characteristics.

The centre provides rehabilitation for lower and upper extremity amputees, people suffering from post-poliomyelitis syndrome and other people with disabilities, such as people with spinal cord injuries and children with clubfoot or cerebral palsy.

It manufactures prosthetic and orthotic devices as well as walking aids (crutches) and assembles wheelchairs. It receives a total of 1,200 service users a year, 600 of whom are given physiotherapy only. The production level of prostheses and orthoses is envisaged as being up to 600 devices per annum. The centre offers dormitory accommodation with a total of 35 beds, thus catering for 75% of service users and relatives.

The activities are provided by 3 orthopaedic technicians, 6 benchworkers,* 3 physiotherapists/physiotherapist assistants and 3 administrative staff.

* This is the equivalent of two orthopaedic technicians for six benchworkers and one P&O department head. The ratio between technicians and benchworkers follows ISPO recommendations, which indicate a technician/benchworker ratio of 1:3 for provincial centres. According to the same recommendations, a team of one technician and three benchworkers can produce 250 orthopaedic devices per annum. Source: ISPO & WHO (eds), *Guidelines for Training Personnel in Developing Countries for Prosthetics and Orthotics Services*, World Health Organization, Geneva, 2005, p. 17.

The table presented below (Table 4) summarizes the main factors leading to the determination of the number of beds.

37 John Mejia Rios, *Programming guide for the setting up of a rehabilitation centre*, Handicap International, Lyons, 2001, p. 18. The guide refers to a bubble diagram as an "organisation chart."
38 *Ibid.*, pp. 37 – 55. The guide refers to space cards as "programme cards."

Total SU	1,200	
Percentage of women	20	%
Percentage of children	30	%
P&O devices supplied	600	
New SU fitted with P&O device	17	% of P&O devices delivered
SU receiving PT only	600	
SU accommodated	75	% of total SU
Percentage of relatives accommodated	50	% of SU accommodated
Overnight stays for first visit	12	
Overnight stays for next visit	4	
Overnight stays of new SU fitted with P&O devices	924	
Overnight stays of SU returning for P&O	1,492	
Overnight stays of SU receiving PT only	1,800	
Overnight stays of relatives	2,108	
Total of overnight stays per annum	**6,324**	
Working weeks per annum	52	
Workdays per week	5	
Average public holidays falling on weekdays	8.65	Days per annum
Total days open	**251**	
Months with occupancy rate at 100%	2	
Average vacancy rate when occupancy rate < 100%	20	%
Contingency	+15	%
Total beds	**35**	
Female beds	12	
Male beds	23	

Figures are given per annum. Cells in light blue are inputs; cells in blue are results.

Table 4
Number of beds computed for the hypothetical PRC

The architectural programming tools featured on the following pages give further details of the hypothetical centre.

They can be used as a benchmark to measure various aspects of a project at the Vision stage or as a planning aid during the Feasibility and the Design stages. In other words, **graphical documents, and notably plans, presented in this handbook are not to be considered as standard designs to be replicated at will. They are presented as an aid to projecting the functional, spatial and technical aspects of future buildings.**

The general point already made about this handbook is particularly true for this chapter, i.e. the main communication language in this chapter is non-verbal, through graphics. The verbal communication is intended only to introduce and facilitate comprehension of the graphical documents.

A very careful and robust notation system ensures that the diagrams and plans are unambiguous, interconnected and easy to understand.

3.1 BUBBLE DIAGRAMS

As already mentioned, the PRC functional levels and flows have been synthesized into three types of graphical documents: bubble diagrams, space cards and component cards. We begin with the bubble diagrams.

It is worth noting again that the terminology used for the different rooms, outdoor spaces and departments has been elaborated in conjunction with PRP representatives and was approved by the PRP Technical Commission in 2013.

The development of this standard terminology is a significant achievement because a common vocabulary considerably improves the dialogue between stakeholders involved in architectural programme development. One of the main difficulties in the field was to understand which entity was being referred to when different terms were used for the same entity. A consensus on terminology was therefore crucial to facilitate comprehension. The harmonization of terms concerns the names of rooms and outdoor spaces as well as the names of departments. For instance, a gait path is consistently referred to as an "advanced training court," a first fitting room is a "fitting room" and the workshop is the "prosthetic and orthotic department" (P&O department).

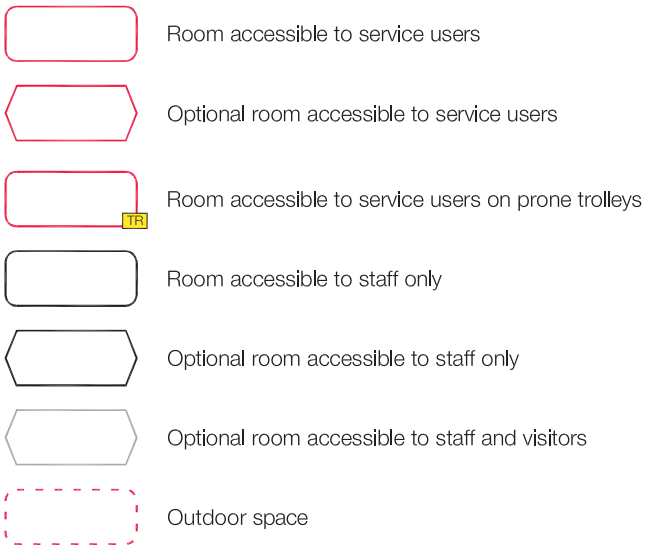
The bubble diagrams show two functional levels and the main flows.

The two hierarchical functional levels presented are:
1. rooms or outdoor spaces;
2. departments.

The main flows presented are the main movements between the rooms, the outdoor spaces and the departments providing core activities.

Five bubble diagrams are included. The first four diagrams (Figures 3.1.1, 3.1.2, 3.1.3 and 3.1.4) illustrate some of the hypothetical PRC's main activities. The fifth diagram is a general bubble diagram (Figure 3.1.5) which presents the whole PRC with all its proposed rooms, outdoors spaces, departments and main flows. The general bubble diagram incorporates the first four smaller diagrams.

Bubble diagrams: key



The first functional level of the rooms or outdoor spaces is represented by bubbles in the form of small rounded rectangles or hexagons.

Rounded rectangles are used for the main rooms and outdoor spaces, e.g. the reception, the casting room or the outdoor sports court. The hexagons represent optional spaces, of which there are two kinds. The first are spaces that can be isolated as independent rooms or can form part of a larger room, e.g. the metal room or the sewing room. The second type of optional space consists of rooms in which non-core activities are provided, e.g. the wheelchair assembly room or the cerebral palsy room.

Some bubbles have a three-letter, one-number code assigned to their space name, e.g. PTD1 or POD5. They represent the core rooms of the PRC providing its core activities.

The space cards presented in section 3.2 then give details of the rooms shown in the bubble diagrams. They follow the same coding system in order to facilitate reading and understanding.

Some rooms are accessible to staff only, while others can be accessed by staff and service users. The latter are indicated by bubbles with a red border.

In accordance with standards that are discussed in Chapter 4, almost all spaces at a PRC need to be accessible to people with disabilities. Some rooms also need to be accessible to prone trolleys if a centre provides treatment for people with spinal cord injuries. A small yellow "TR" icon identifies these rooms.

It is important to stress once again that the bubble diagrams describe a hypothetical centre. It is not an ideal centre but merely a working hypothesis. Each project must take account of different contexts and priorities, as already discussed in the ten-centre study (Chapter 2). Each project will arrive at different solutions, including some that are not necessarily described here. For instance, one PRC will offer accommodation or have a guest house whereas another will not. In a particular social context, a PRC maybe consider having a kindergarten although this option is not included in the bubble diagrams in this handbook.

The bubble diagrams, as well as the other architectural programming tools, provide a general framework. The set of rooms proposed in bubble diagrams is one of the elements that need to be contextualized.

The second functional level of the departments is represented by large solid-colour surfaces into which bubbles are grouped.

At this level, the rooms (bubbles) are assembled into groups that constitute the PRC's main departments, e.g. the prosthetic and orthotic department, the physiotherapy department or the clinical area.

The main departments are identified by the colour code shown below, which is applied to all plans in this handbook. This colour code is also applied to bubbles.

	Administration	ADM
	Clinical area	CLI
	Guest house	GUE
	Physiotherapy department	PTD
	Prosthetic and orthotic department	POD
	Service user accommodation	SUA
	Services area	SER
	Storage	STO

The main flows in the PRC are represented by lines or arrows between the bubbles.

A flow is a movement of people between rooms through a sequence of activities. The flows represented in the bubble diagrams are the main service user flows, prosthetic and orthotic (P&O) flows, and physiotherapy (PT) flows.

The service user flows comprise the movements generated by the people with physical disabilities receiving services. There is not one service user flow but several distinct flows. These different flows are generated by the sequences of activities of service users in relation to PT treatment and to the production of their prostheses, orthoses, walking aid devices and wheelchairs. The different movements together form all the service user flows.

The P&O flows comprise the different sequences of activities necessary for the P&O staff to produce the prostheses, orthoses, walking aid devices and wheelchairs.

The PT flows are generated by the different sequences of activities that take place during physiotherapy. They include training in the use of prostheses, orthoses, walking aids and wheelchairs as well as the sequences of activities necessary for the treatment of people suffering from post-poliomyelitis syndrome, people with spinal cord injuries, and children with clubfoot or cerebral palsy.

The main flows are shown in the bubble diagrams by lines or arrows. The red lines or arrows represent service user movements and the black ones staff movements. The lines and arrows used are as follows:

- Solid red arrows: service users not accompanied by staff;
- Dotted red arrows: service users accompanied by staff;
- Solid black arrows: staff only, primary flow;
- Dotted black arrows: staff only, secondary flow;
- Solid black lines: constant flow requiring rooms to be in close proximity to each other or interconnected.

The service user flow shown in Figure 3.1.1 is that of people who come to be fitted, or refitted, with a prosthetic or orthotic device.

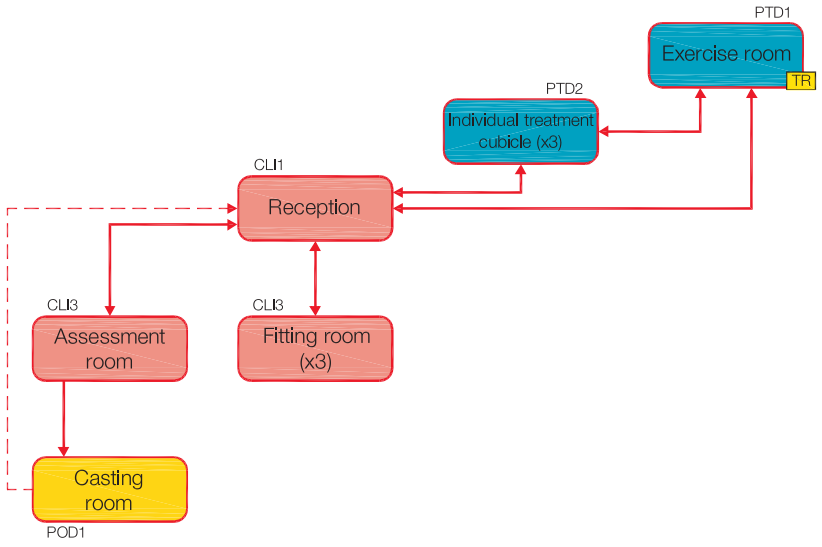


Figure 3.1.1
Service user flow of people coming to the centre to be fitted, or refitted, with a prosthetic or orthotic device

The flow starts at the reception (CLI1), where the service user is registered. If, following the initial evaluation in the assessment room (CLI3), the service user is considered to need a device, he is referred to the casting room (POD1) where a negative mould is made. The service user can then leave the centre or be given accommodation in a dormitory. He is recalled when the prosthetic or orthotic device is ready to be tested, a process that can take several days. Once it has been completed, the service user returns to the fitting room (CLI3) to test his device. The prosthesis or orthosis is then adjusted and corrected according to the service user's specificities. When the device has been fully adapted to the service user, he can start the physiotherapy process that provides training in the use of his device.

This main sequence of activities often includes preparatory physiotherapy before the device is supplied. This treatment consists of assessment and prefitting exercises, such as balance and muscle strengthening/stretching, and takes place in the assessment room (CLI2), the exercise room (PTD1) or one of the treatment cubicles (PTD2).

This sequence of activities is one of the service user flows shown in the general bubble diagram (Figure 3.1.5). It applies to most service users.

Movements to the PT department for treatment for people with spinal cord injuries and children with clubfoot or cerebral palsy are also shown. These movements may sometimes generate very significant service user flows.

The prosthetic and orthotic flows shown in Figures 3.1.2 and 3.1.3 concern the production of prostheses and orthoses as well as wheelchair distribution.

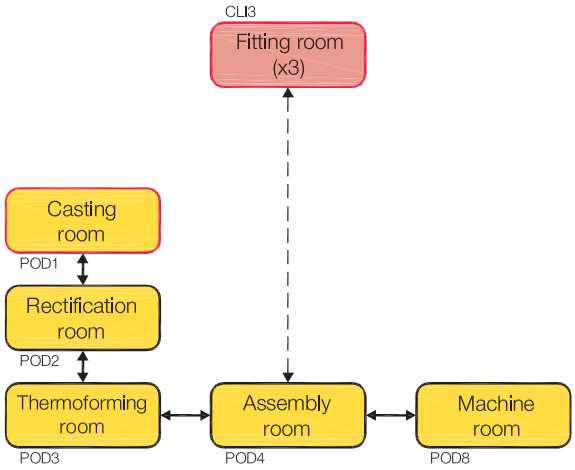


Figure 3.1.2
Prosthetic and orthotic flows for the production of prostheses and orthoses

For the production of prostheses and orthoses, the flow starts from the casting room (POD1) where the negative cast of the service user is made. From there, the mould passes through the rectification room (POD2). After having been filled with plaster and rectified, the positive cast is then sent to the thermoforming room (POD3) where the first steps in the manufacturing process start with the production of the socket in the case of prostheses or the shell in the case of orthoses. Subsequently, the socket or shell passes through several stages, mainly in the assembly room (POD4) and machine room (POD8), until the process is complete and the service user is fitted with the device in the fitting room (CLI3). When planning the production cycle of prostheses and orthoses, the possibility of having to reverse the process at any stage must be borne in mind. The staff can move constantly between different rooms.

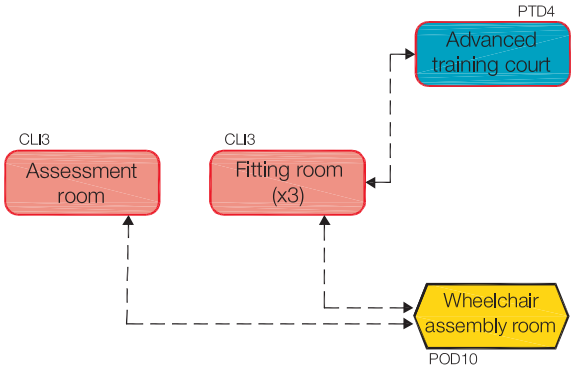


Figure 3.1.3
Wheelchair flow and assembly

For wheelchair distribution, the flow starts from the assessment room (CLI2) where the service user's measurements are taken. The wheelchair is assembled in the wheelchair assembly room (POD10) from prefabricated models. Once complete, the wheelchair is delivered to the service user in the fitting room (CLI3). Tests are done on the advanced training court (PTD4) so that any necessary adjustments of the device can be noted and made.

These sequences of activities consitute two of the P&O flows shown in the general bubble diagram (Figure 3.1.5). Another P&O flow is the walking aids production flow.

The PT flow shown in Figure 3.1.4 is generated during training in the use of a prosthetic or orthotic device.

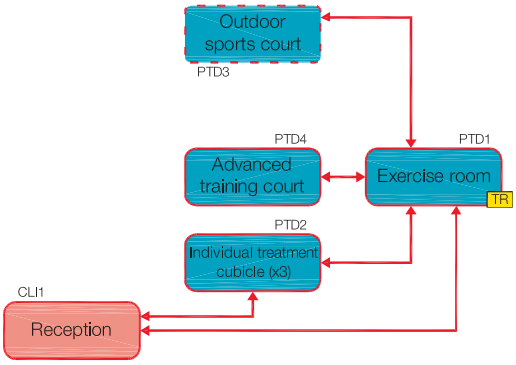


Figure 3.1.4
Physiotherapy flow generated during training in the use of a prosthetic or orthotic device

The sequence of activities follows the delivery of a device to a service user and any preparatory physiotherapy treatment preceding delivery. It starts with registration at the reception (CLI1) of service users who are accommodated at the centre. Treatment is given in the exercise room (PTD1) or in one of the individual treatment cubicles (PTD2), depending on the stage and the specific details of the rehabilitation process. In the exercise room, the service user does physiotherapy exercises and gait training. In some cases, the service user will need to have individual treatment in an individual treatment cubicle. General and individual treatment is interlinked.

Once the service user has gained confidence in wearing the device, he begins treatment on the advanced training court (PTD4) and the outdoor sports court (PTD3), where he will learn how to use his device in a more challenging environment through more complex activities such as climbing stairs and negotiating different types of ground surface. The sequence may, however, be less linear. Some service users may, for instance, go to the advanced training court and the outdoor sports court at an earlier stage, e.g. to learn how to walk using crutches and without a prosthesis.

This sequence of activities is one of the main flows comprising the PT flows shown in the general bubble diagram (Figure 3.1.5). The other PT flows featured are those generated during training in the use of walking aids and wheelchairs and during the treatment of people suffering from post-poliomyelitis syndrome, people with spinal cord injuries, and children with clubfoot or cerebral palsy.

The general bubble diagram (Figure 3.1.5) presents all the rooms, outdoor spaces and departments that can be included in the hypothetical PRC presented at the beginning of this chapter. It shows the main service user flows, P&O flows and PT flows and amalgamates the three bubble diagrams described above.

In order to facilitate the use of this general bubble diagram while consulting the different parts of this handbook, it is reproduced with the colour coding on the front flap. The flap can be unfolded and placed side by side with layouts presented in the ten-centre study or the space cards so as to better understand their structure.

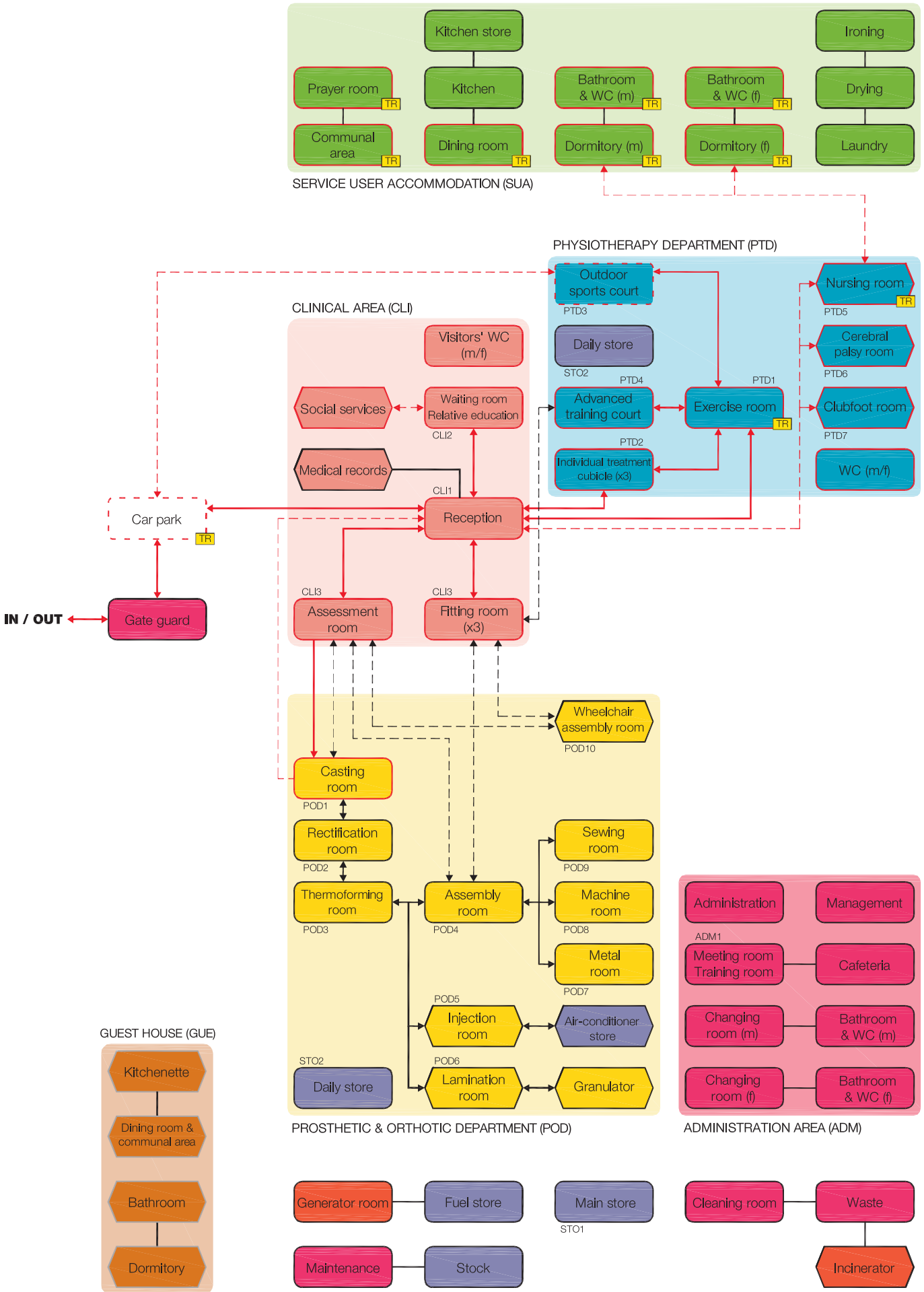


Figure 3.1.5
General bubble diagram

3.2 SPACE CARDS

This chapter of the book describes a PRC on the basis of three functional levels: one for services, one for rooms and outdoor spaces, and the third for equipment and furniture. Three forms of graphical documents are employed to illustrate these three levels: bubble diagrams, space cards and component cards. Bubble diagrams illustrate the relationship between spaces and departments. Space cards describe the spaces. Component cards describe the lower functional level related to equipment and furniture. This section deals with the space cards.

Space cards describe the rooms and outdoor spaces which contain the core activities of the hypothetical PRC presented in section 3.1. They describe them in terms of required furniture, fittings and general design requirements. These rooms and outdoor spaces are therefore featured twice in the architectural programming tools: as elements in a bubble diagram and as space cards.

A bubble, as illustrated in section 3.1, and a space card which refer to the same room or outdoor space have the same reference number. As already mentioned in connection with the bubble diagrams, some spaces presented in this example as separate rooms may be merged.

Each card provides key information about the room or outdoor space as text and as a graphical representation. Each card contains the following written specifications:

Space cards

Code	Room name
ADM1	Meeting room / Training room
CLI1	Reception
CLI2	Waiting room / Relative education
CLI3	Assessment room / Fitting room
POD1	Casting room
POD2	Rectification room
POD2a	Rectification room (variant)
POD3	Thermoforming room
POD4	Assembly room
POD5	Injection room
POD6	Lamination room + Air-conditioned store
POD7	Metal room
POD8	Machine room
POD9	Sewing room
POD10	Wheelchair assembly room
PTD1	Exercise room
PTD2	Individual treatment cubicle
PTD3	Outdoor sports court
PTD4	Advanced training court
PTD5	Nursing room + Sterilization room
PTD6	Cerebral palsy room
PTD7	Clubfoot room
STO1	Main store
STO2	Daily store

1. **Item name**
   Harmonized name of the room or outdoor space as validated by the PRP Technical Commission in 2013

2. **Room code**
   A code made up of three letters followed by one or two numbers identifying the room or the outdoor space on the bubble diagrams and space cards, e.g. CLI1 or POD10

3. **Activities**
   Description of activities that occur in the room or the outdoor space

4. **Update**
   Month and year in which the space card was last updated

5. **Drawing**
   Proposed layout of the room with an arrangement of equipment, furniture and fittings. Plans are always drawn on a 30 × 30 cm green grid. Each item on a drawing has a reference number.

6. **Scale**
   Most plans are drawn to a scale of 1:50. Plans for PTD1, PTD4 and POD4 are drawn to a scale of 1:100 and PTD3 to a scale of 1:200.

7. **Indicative space for the activity**
   Area in m^2 of the proposed layout of the room.

8. **PT staff**
   Suggested number of staff members needed to carry out the activity

9. **P&O staff**
   Suggested number of staff members needed to carry out the activity

10. **Medical staff**
    Suggested number of staff members needed to carry out the activity

11. **Service user(s)**
    Suggested number of service users receiving treatment at the same time

12. Relative(s)

Suggested number of people who may accompany the service user(s)

13. Equipment and furniture checklist

Suggested list of equipment and furniture for the room. A code, a quantity and a description is given for each item or component. The code identifies items as equipment (E) or furniture (F) and refers to a specific component card with the same code. The description is the name of the item as used on the component card.

14. General design requirements

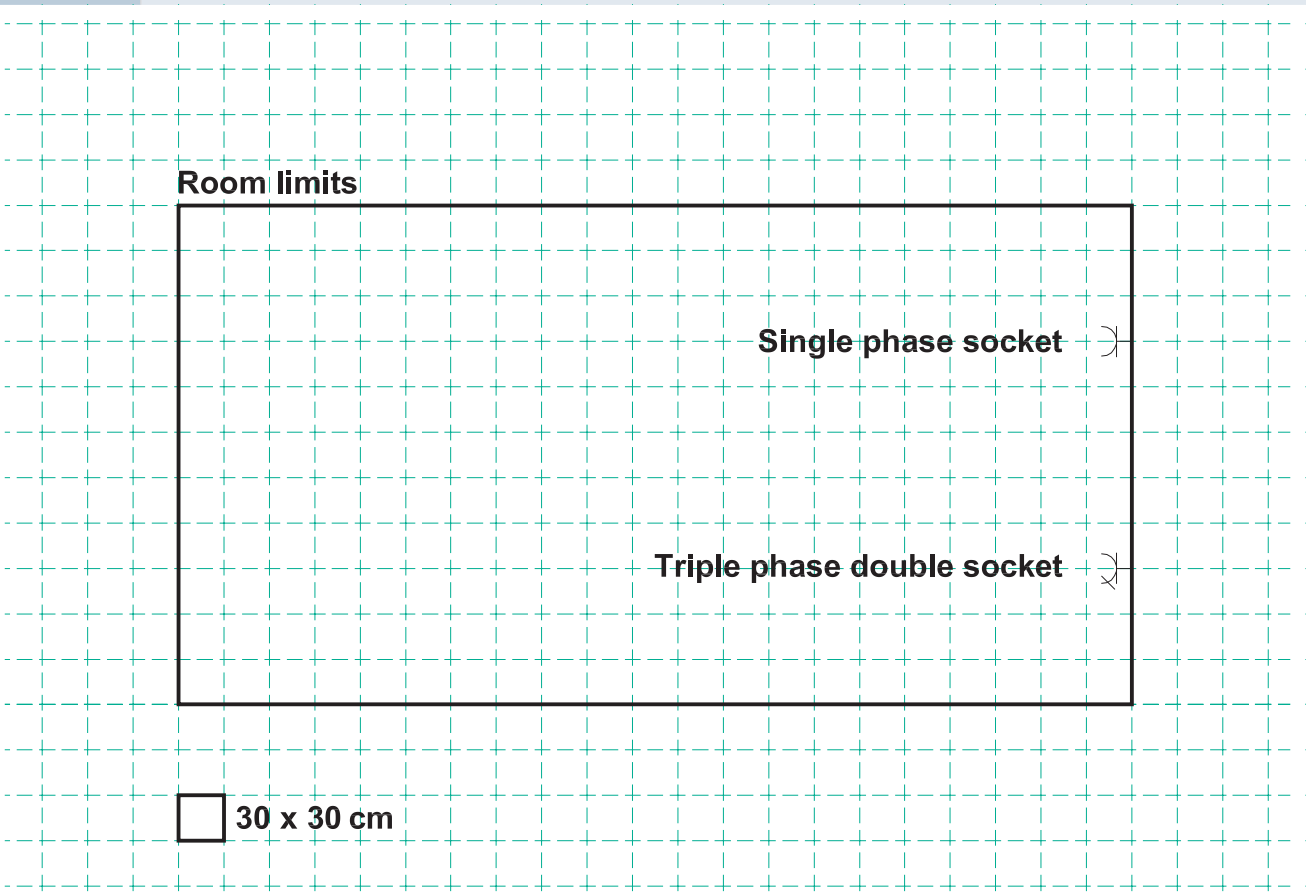
General requirements for the environmental comfort and functionality of each space are divided into four sets (**Finishes & fixtures**, **Plumbing**, **Mechanical (HVAC)**, and **Electrical**) and general comments are made. These are recommendations. When a requirement is not relevant for the room represented it is referred to as not applicable (n/a). **Some requirements are left blank. This means that they are deemed to depend on the context.** For instance, it is impossible to know whether or not there is a need for a heating system without knowing the context. The question of how to respond to these requirements is thus left to the judgement of the project owner and construction project manager.

- **Finishes & fixtures**
- **Door(s)**: number and width
- **Floor**: finishing
- **Walls**: finishing
- **Windows**: suggested percentage of room NFA
- **Plumbing**
- **Water**: volume of cold and/or water
- **Fitting**: number and type
- **Floor drain**: number
- **Mechanical (HVAC)**
- **Temperature**: target temperature of the room, e.g. ambient or controlled 18° C ±2
- **Air changes**: volume per hour required, if any, whether by natural or mechanical means
- **Air conditioner (AC)**: type and number if needed
- **Heating system**: type and number if needed
- **Exhaust fan(s)**: type and number if needed
- **Ceiling fan(s)**: type and number if needed
- **Electrical**
- **General lighting level**: average for the room (in lux)
- **Task lighting level**: localized (in lux), e.g. on workbench or treatment table
- **Sockets**: number of one-phase and/or three-phase
- **MMS/UPS**: number of automatic voltage switchers (recommended if AC) and uninterruptible power supply
- **Phone & IT outlet(s)**: number of registered jack (RJ) wall mounted socket(s) and types, if any
- **Security lighting**: fire safety and/or passive security, number and intensity (in lux)

It is important to bear in mind that all graphical support in this chapter is related to a hypothetical PRC, which is neither an existing example nor a model. It is neither real nor perfect. It is merely a tool for reflection based on a working hypothesis.

Space cards on the following pages need to be adapted to contextual requirements. Size and layout may therefore vary considerably.

Room code **XXX0 / XXX00**	**Room name**	Update **month-yyyy**
Activities	Description of the activities taking place in the room	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)

Equipment and furniture checklist

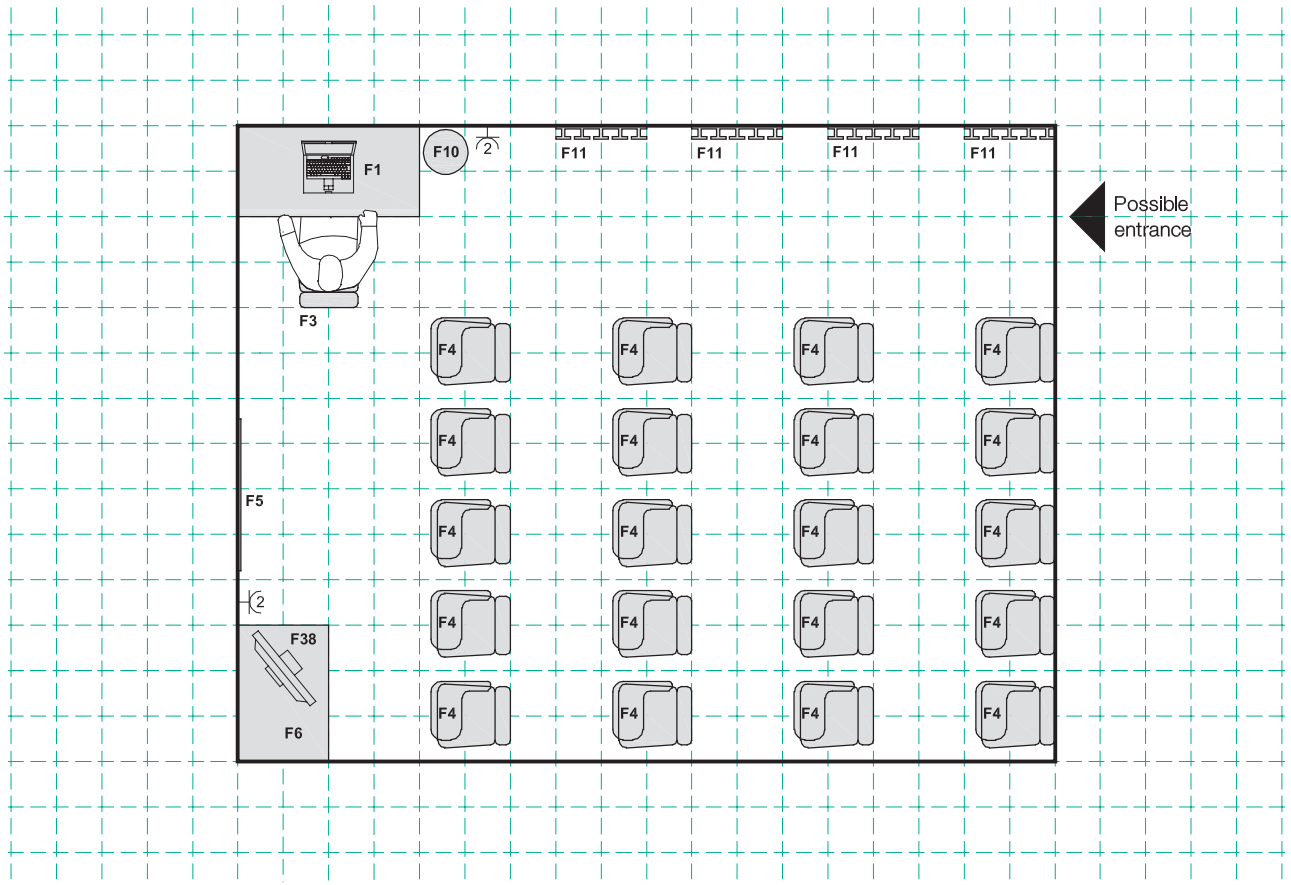
Code	Quantity	Description	Code	Quantity	Description
Item code		Emergency items description			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)		Water	Cold		Temperature			General lighting level		
Floor			Hot		Air changes	Natural		Task lighting level		
Walls		Fitting				Mechanical		Sockets	1 phase	
Windows		Floor drain			AC				3 phases	
General comments					Heating system			MMS / UPS		
					Exhaust fan(s)			Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		

Figure 3.2.1
Space card template

Room code **ADM1**	**Meeting room / Training room**	Update **June 2014**
Activities	Meetings and training.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	23 m²	10	10	1	n/a	n/a

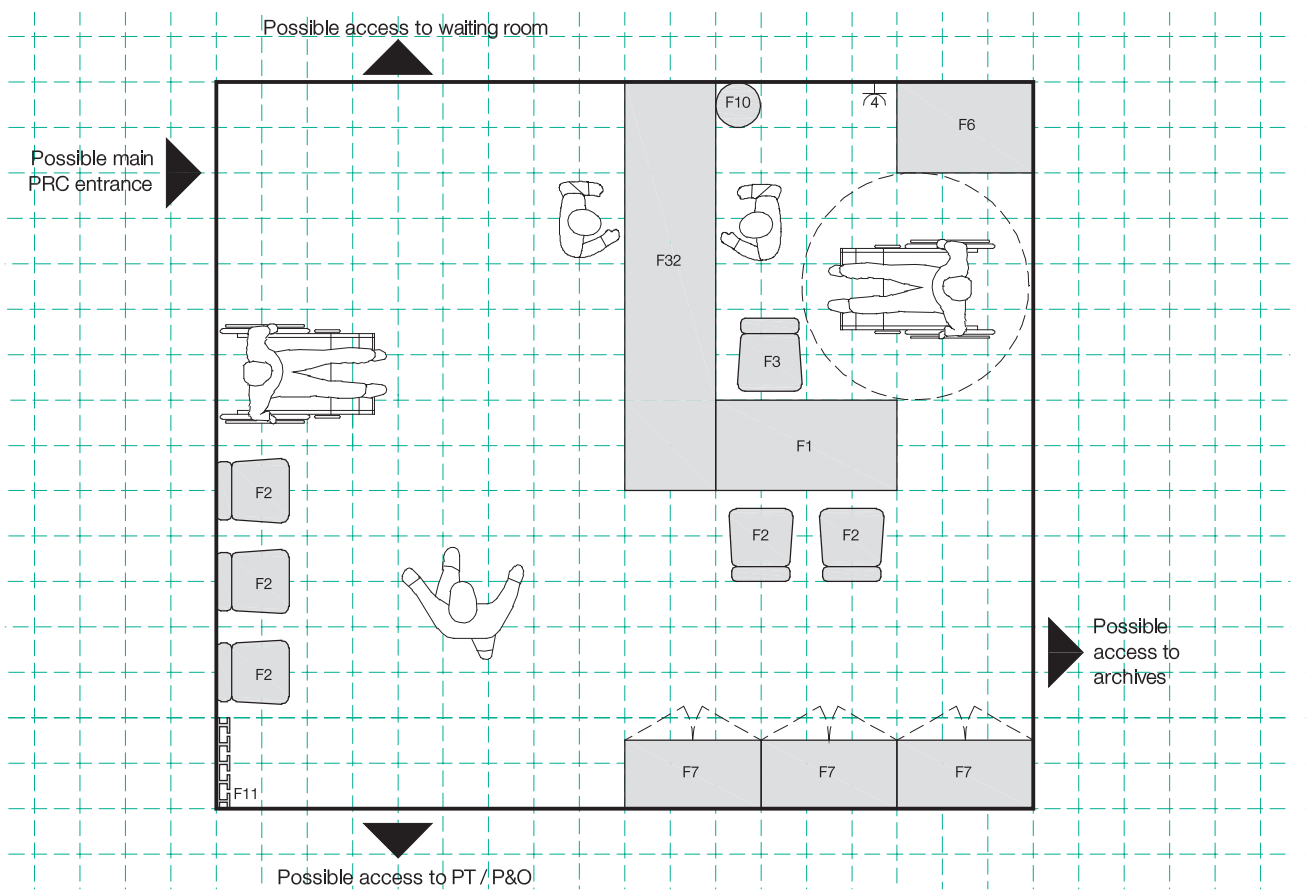
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
F1	1	OFFICE DESK + FILING CABINET			
F3	1	OFFICE CHAIR			
F4	20	CHAIR WITH FOLDABLE TABLE			
F5	1	WHITEBOARD			
F6	1	FILING CABINET WITH LOCK			
F10	1	WASTE BIN			
F11	20	COAT HANGER			
F38	1	TV			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	n/a	Temperature			General lighting level		300 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	4× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Natural light and good ventilation					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		n/a

Room code **CLI1**	**Reception**	Update **June 2014**
Activities	Registration and service users' files.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	30 m²	1	n/a	n/a	3	3

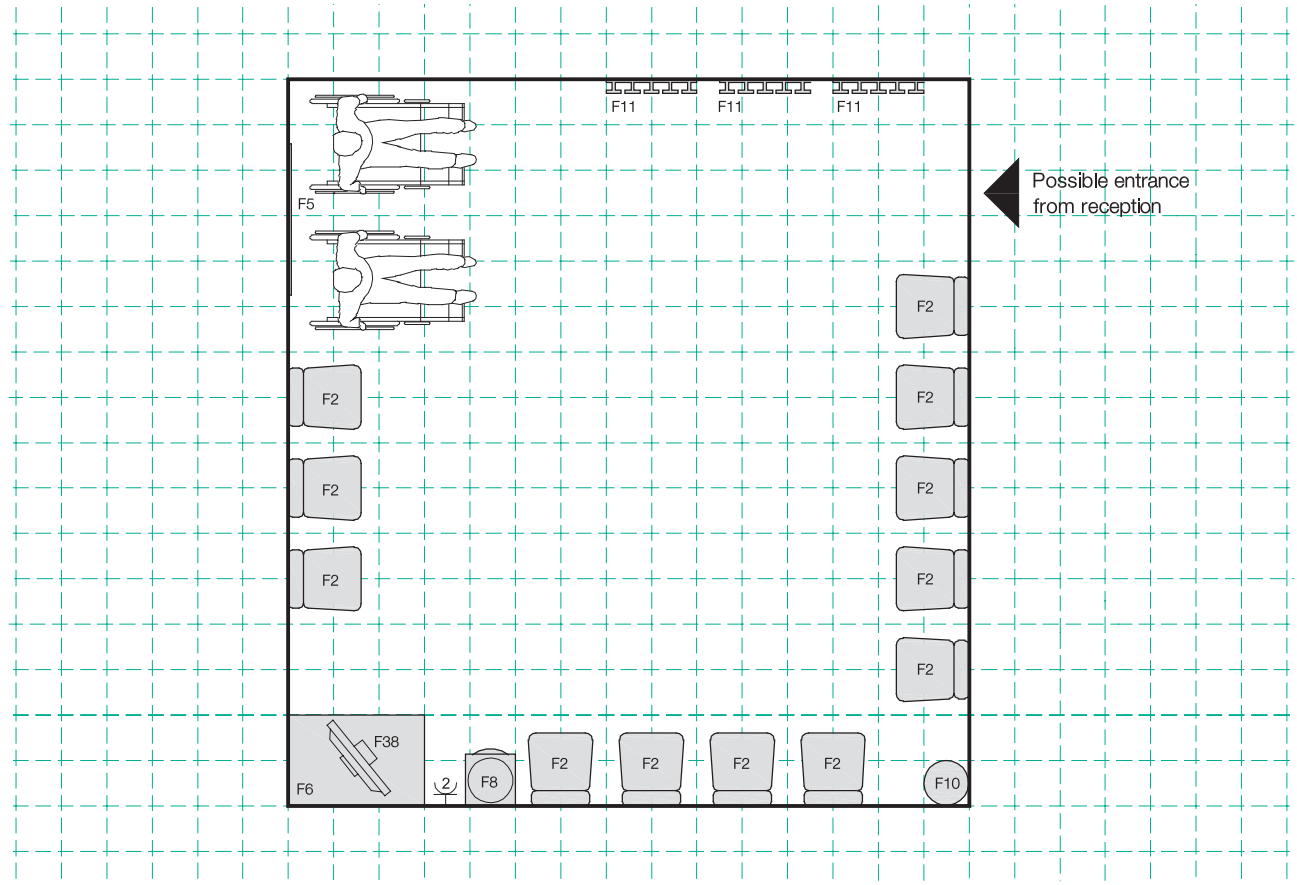
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
F1	1	OFFICE DESK + FILING CABINET			
F2	5	CHAIR			
F3	1	OFFICE CHAIR			
F6	1	FILING CABINET WITH LOCK			
F7	3	CUPBOARD			
F10	1	WASTE BIN			
F11	5	COAT HANGER			
F32	1	RECEPTION DESK			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	2× 90–40	Water	Cold	n/a	Temperature			General lighting level		200 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural		Task lighting level		500 lux
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	4× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Good ventilation system with space for wheelchair users. In some contexts, reception and registration of service users are divided between two rooms. Service users' files are centralized in the archive room (20-25 m²) directly linked to the reception.					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		1×

Room code CLI2	Waiting room / Relative education	Update June 2014
Activities	Waiting and relative education.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	22 m²	1	n/a	n/a	n/a	14

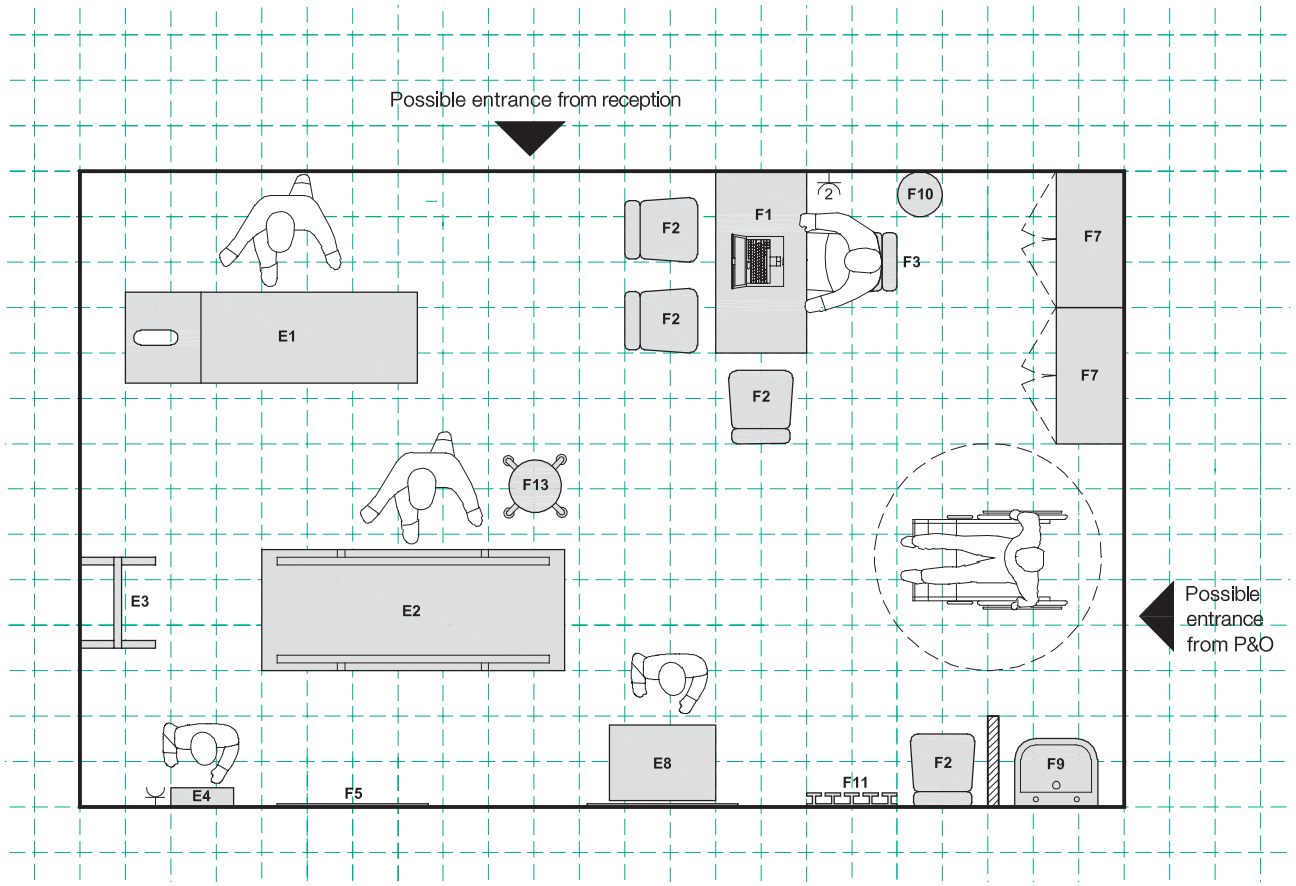
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
F2	12	CHAIR			
F5	1	WHITEBOARD			
F6	1	FILING CABINET WITH LOCK			
F8	1	WATER FOUNTAIN			
F10	1	WASTE BIN			
F11	15	COAT HANGER			
F38	1	TV			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	n/a	Temperature			General lighting level		300 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Good ventilation system and space for wheelchair users					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		1×

Room code **CLI3**	**Assessment room / Fitting room**	Update **June 2014**
Activities	Fitting, including first fitting, of a prosthesis and/or orthosis as part of the interdisciplinary approach.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	29 m²	1	1	1	1	1

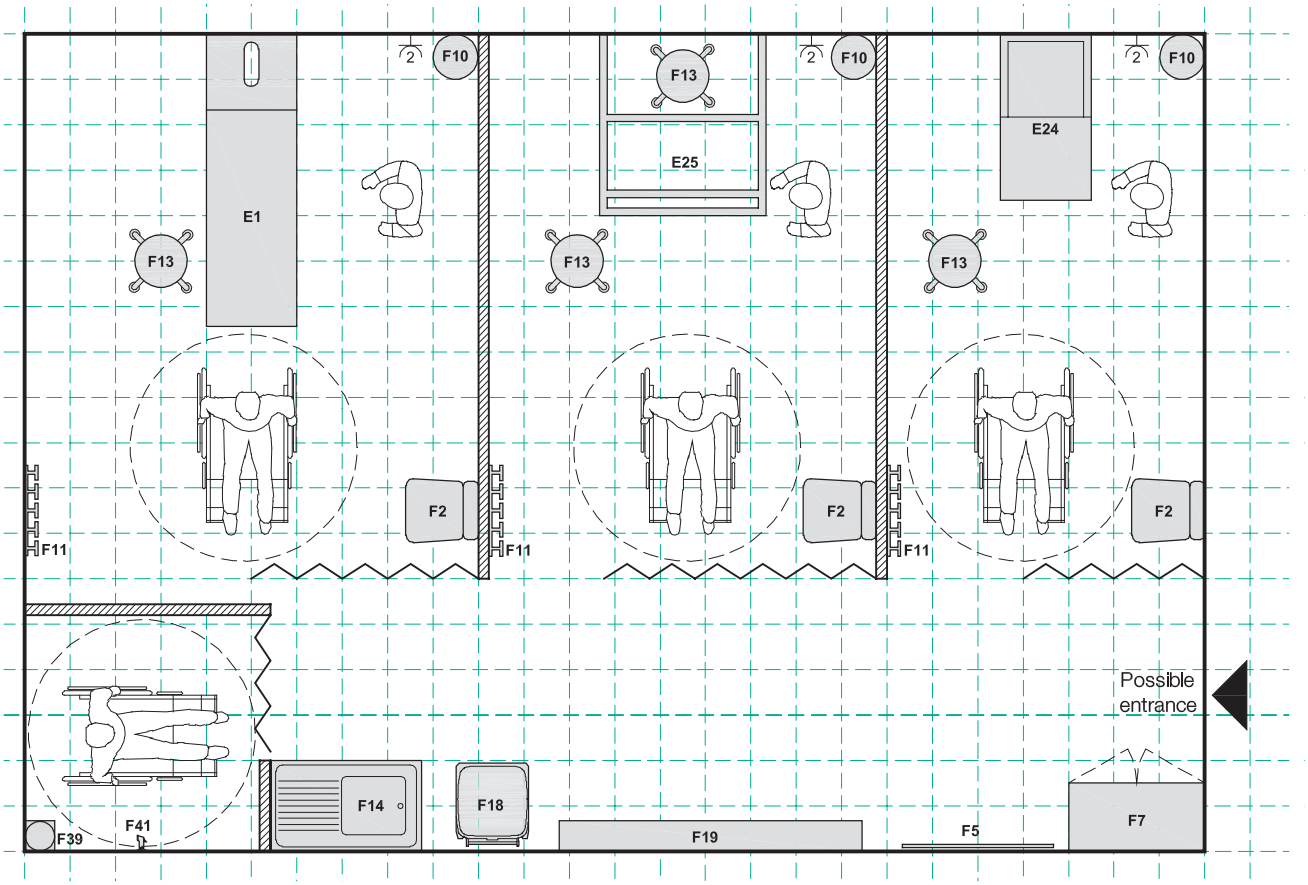
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E1	1	TREATMENT TABLE	F7	2	CUPBOARD
E2	1	PARALLEL BARS (2 m)	F9	1	CERAMIC WASHBASIN
E3	1	MOBILE MIRROR	F10	1	WASTE BIN
E4	1	WALL-MOUNTED X-RAY VIEWER	F11	5	COAT HANGER
E8	1	STANDING WORKSTATION	F13	1	STOOL ON WHEELS
F1	1	OFFICE DESK + FILING CABINET			
F2	4	CHAIR			
F3	1	OFFICE CHAIR			
F5	1	WHITEBOARD			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		300 lux
Floor	Screed (1:2)		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	1× ceramic washbasin			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain			AC				3 phases	n/a
General comments Tiling around washbasin (3 faces, to door height)					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		n/a

Room code	Casting room	Update
POD1		**June 2014**
Activities	Service users are cast for orthopaedic devices.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	42 m²	1	1	1	3	3

Equipment and furniture checklist

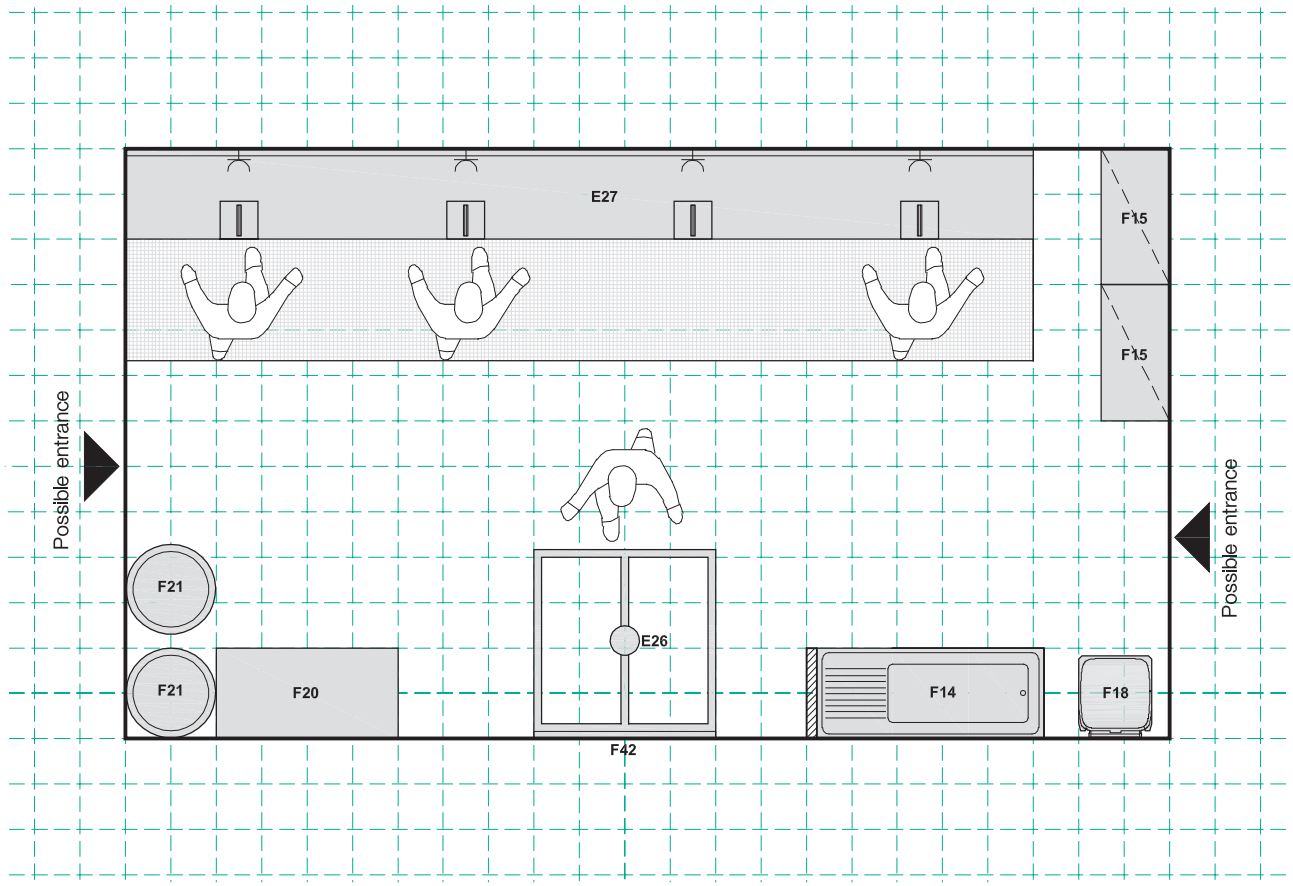
Code	Quantity	Description	Code	Quantity	Description
E1	1	TREATMENT TABLE	F14	1	SINK WITH PLASTER SEPARATION TANK
E24	1	CASTING CHAIR	F18	1	WASTE BIN (120 l)
E25	1	CASTING FRAME	F19	1	CASTING BRIM STAND
F2	3	CHAIR	F39	1	STAINLESS STEEL DRAIN
F5	1	WHITEBOARD (0.1 x 0.2 m)	F41	1	SHOWER HOSE
F7	1	CUPBOARD			
F10	3	WASTE BIN			
F11	15	COAT HANGER			
F13	4	STOOL ON WHEELS			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Tiling or screed (1:2)		Hot	1×	Air changes	Natural		Task lighting level		1000 lux
Walls	Tiling (220cm) + Acrylic	Fitting	1× plaster sink SS/ceramic			Mechanical	n/a	Sockets	1 phase	6× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments					Heating system			MMS / UPS		If AC / n/a
The room should respect the service user's privacy. Easy-to-clean, non-slippery floor. Plaster trap in the sink required. Tiling around plaster sink (3 faces, to door height). The casting frame needs to be fixed to the floor. Socket height: 120 cm.					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code	Rectification room	Update
POD2		**June 2014**

Activities	Negative casts are filled with plaster of Paris (PoP) and rectified. NB: Depending on context, the number of working places may reach 3/4 of the total number of orthopaedic technicians and benchworkers.



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	27 m²	n/a	4	n/a	n/a	n/a

Equipment and furniture checklist

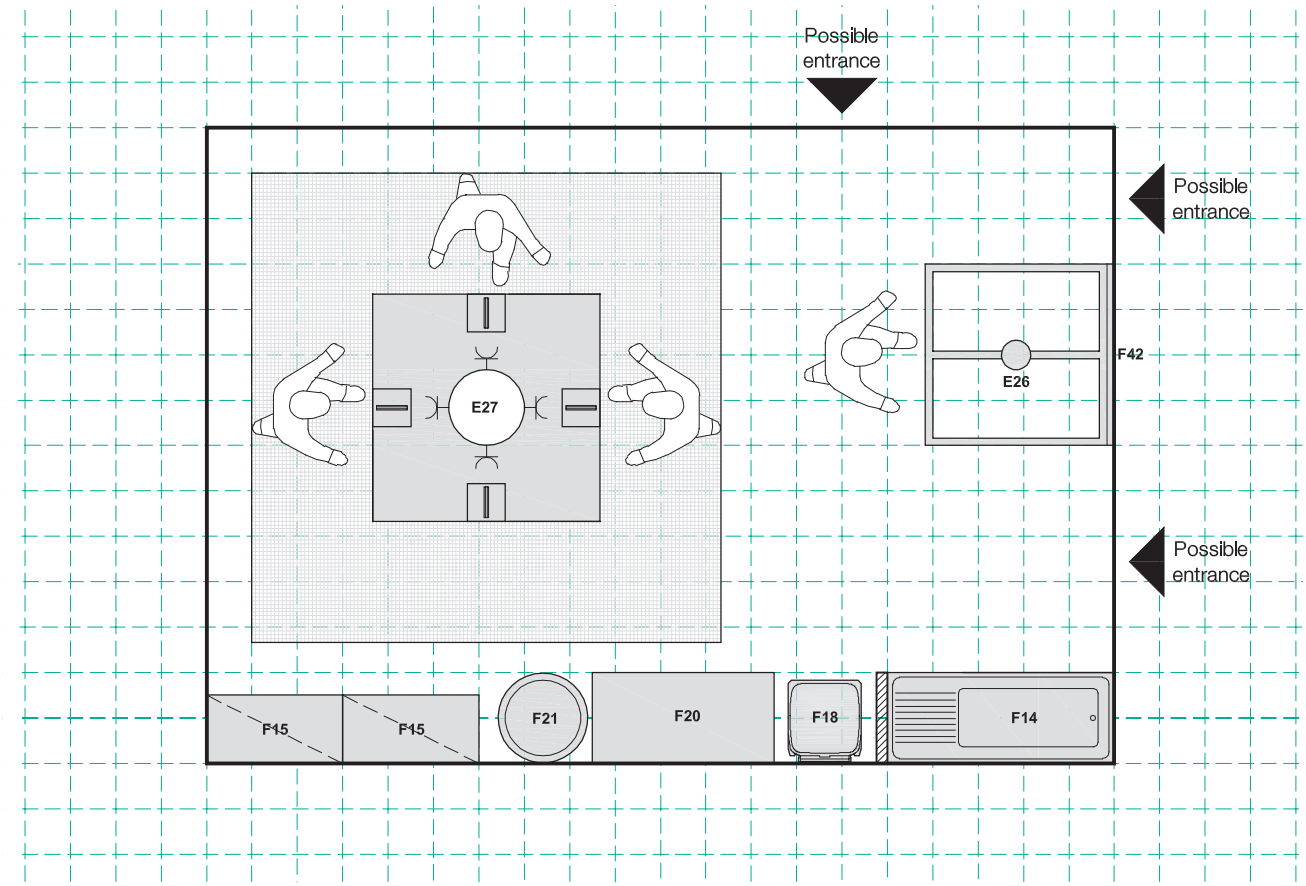
Code	Quantity	Description	Code	Quantity	Description
E26	1	ALIGNMENT JIG	F42	1	MIRROR
E27	1	PLASTER RECTIFICATION TABLE			
F14	1	SINK WITH PLASTER SEPARATION TANK			
F15	2	SHELVES			
F18	1	WASTE BIN (120 l)			
F20	1	SAND BOX			
F21	2	BARREL (FOR POWDER + IRON BARS)			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Tiling or screed (1:2)		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Tiling (220 cm) + Acrylic	Fitting	1× sink tiled and manufactured			Mechanical	n/a	Sockets	1 phase	4× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Metal floor grids should be inserted into the floor over canals to easily collect waste. Tiling floor and walls to door frame height. Heavy-duty sink. To avoid blockage and bad smells, plaster separation tanks are mandatory. Alignment jig can also stand alone, i.e. in the middle of the room. Option to create an opening with thermoforming room for transfer of casts.					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code	Rectification room (variant)	Update
POD2a		**June 2014**

Activities	Negative casts are filled with plaster of Paris (PoP) and rectified. NB: Depending on context, the number of working places may reach 3/4 of the total number of orthopaedic technicians and benchworkers.



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	25 m²	n/a	4	n/a	n/a	n/a

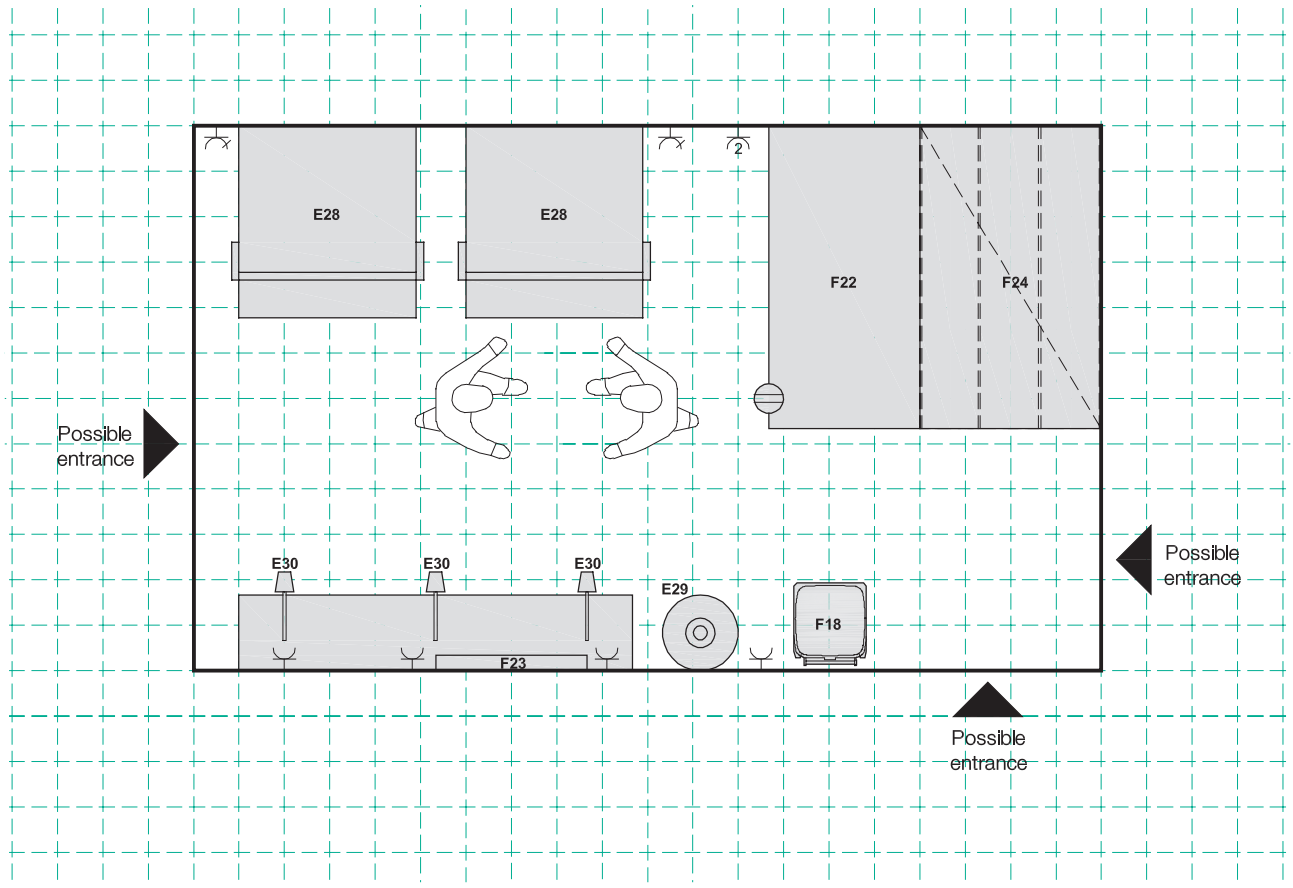
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E26	1	ALIGNMENT JIG			
E27	1	PLASTER RECTIFICATION TABLE			
F14	1	SINK WITH PLASTER SEPARATION TANK			
F15	2	SHELVES			
F18	1	WASTE BIN (120 l)			
F20	1	SAND BOX			
F21	1	BARREL (FOR POWDER)			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Tiling or screed (1:2)		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Tiling (220cm) + Acrylic	Fitting	1× sink tiled, manufactured			Mechanical	n/a	Sockets	1 phase	4× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Metal floor grids should be inserted into the floor over canals to easily collect waste. Tiling floor and walls to door frame height. Heavy-duty sink. To avoid blockage and bad smells, plaster separation tanks are mandatory. Alignment jig can also stand alone, i.e. in the middle of the room. Option to create an opening with thermoforming room for transfer of casts.					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code	Thermoforming room	Update
POD3		**June 2014**
Activities	Thermoforming of prostheses and orthoses.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	22 m²	n/a	2	n/a	n/a	n/a

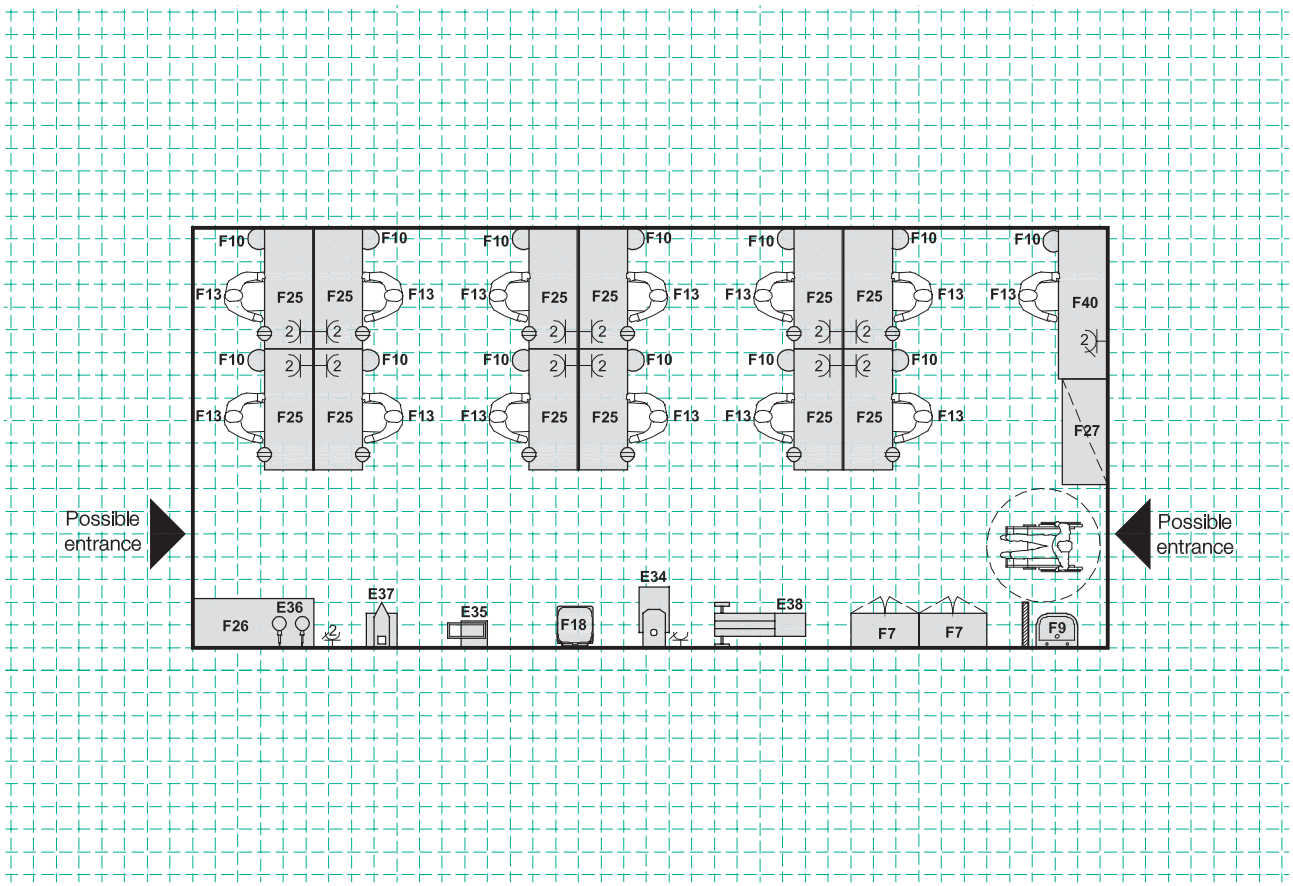
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E28	2	OVEN			
E29	1	VACUUM PUMP			
E30	3	ENVELOPING SUCTION TUBE			
F18	1	WASTE BIN (120 l)			
F22	1	CUTTING TABLE			
F23	1	TOOL BOARD			
F24	1	POLYPROPYLENE / EVA STORAGE			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)		Electrical		
Door(s)	1× 90–40	Water	Cold	n/a	Temperature		General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural	Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	Sockets	1 phase	6× min.
Windows	10-25%	Floor drain		n/a	AC			3 phases	2× min.
General comments The oven(s) produce(s) a lot of heat; good ventilation is consequently important. Exhaust fans might be required. The polypropylene table must be fixed to the floor.					Heating system		MMS / UPS		3× min. / n/a
					Exhaust fan(s)		Phone & IT outlet(s)		n/a
					Ceiling fan(s)		Security lighting		n/a

Room code **POD4**	**Assembly room**	Update **June 2014**
Activities	Fabricating, assembling and modifying orthopaedic devices such as prostheses, orthoses and walking aids. National referral centres usually are bigger and therefore the assembly room might be divided into separate orthoses and a prostheses sections. One workbench per worker with an individual set of tools (e.g. heat gun, hand drill, etc.).	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/100	67 m²	n/a	10	n/a	n/a	n/a

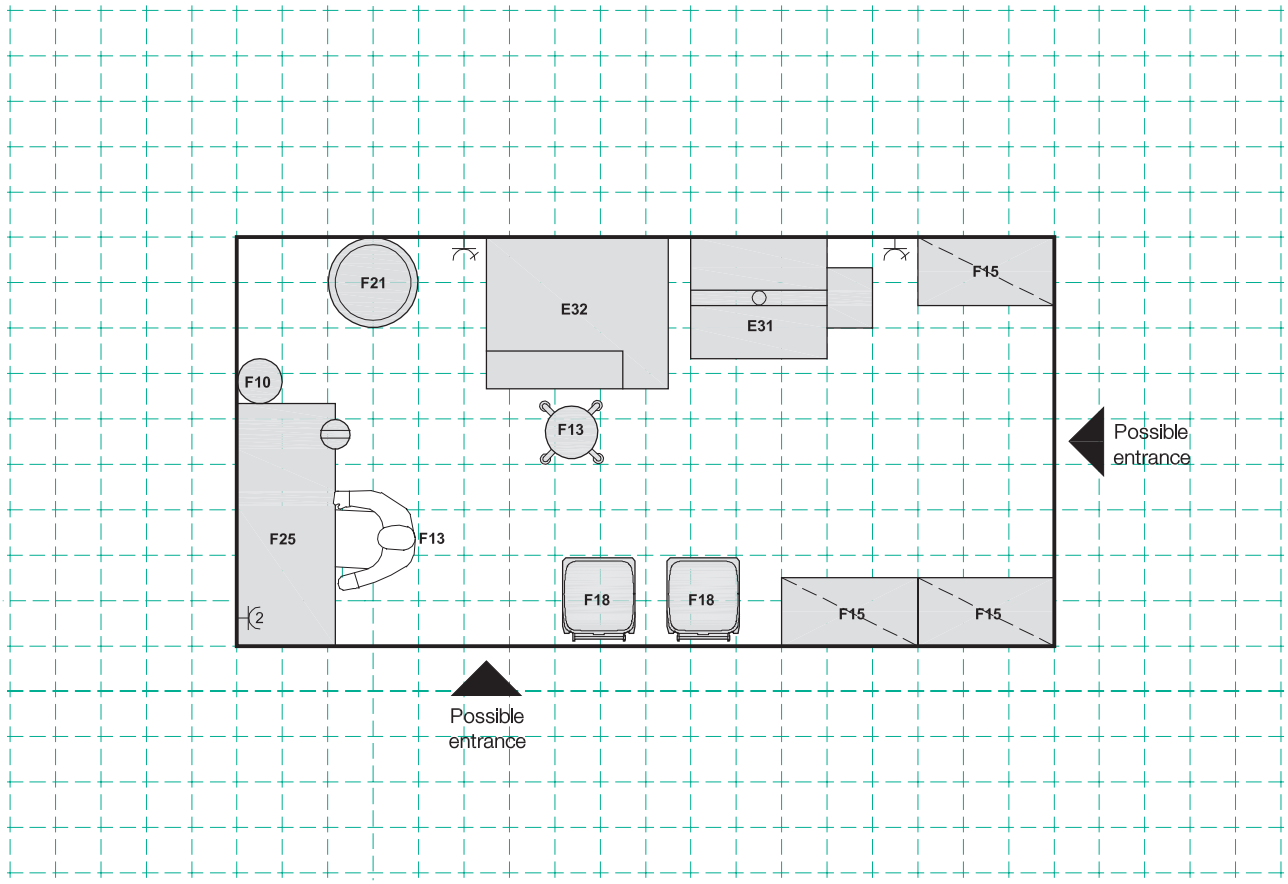
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E34	1	COLUMN DRILL	F18	1	WASTE BIN (120 l)
E35	1	MANUAL ALIGNMENT VICE	F25	12	WORKBENCH
E36	2	WELDING MIRROR	F26	1	WELDING MIRROR TABLE
E37	1	ANVIL	F27	1	DEVICE STORAGE SHELVES
E38	1	CUTTING DEVICE	F40	1	TABLE
F7	2	CUPBOARD			
F9	1	CERAMIC WASHBASIN			
F10	13	WASTE BIN			
F13	13	STOOL ON WHEELS			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90–40	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural		Task lighting level		1000 lux
Walls	Acrylic	Fitting	1× ceramic washbasin			Mechanical	n/a	Sockets	1 phase	24× min.
Windows	10-25%	Floor drain			AC				3 phases	5× min.
General comments					Heating system			MMS / UPS		1× min. / n/a
Heavy-duty flooring. The workbenches, the column drill and the manual alignment vice must be fixed to the floor. Tiling around washbasin (3 faces, to door height). Suspended cable trays above workbenches with power sockets.					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code **POD5**	# Injection room	Update **June 2014**
Activities	Recycling polypropylene from production leftovers by granulating them and then injecting them to produce crutch handles, for example.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	15 m²	n/a	1	n/a	n/a	n/a

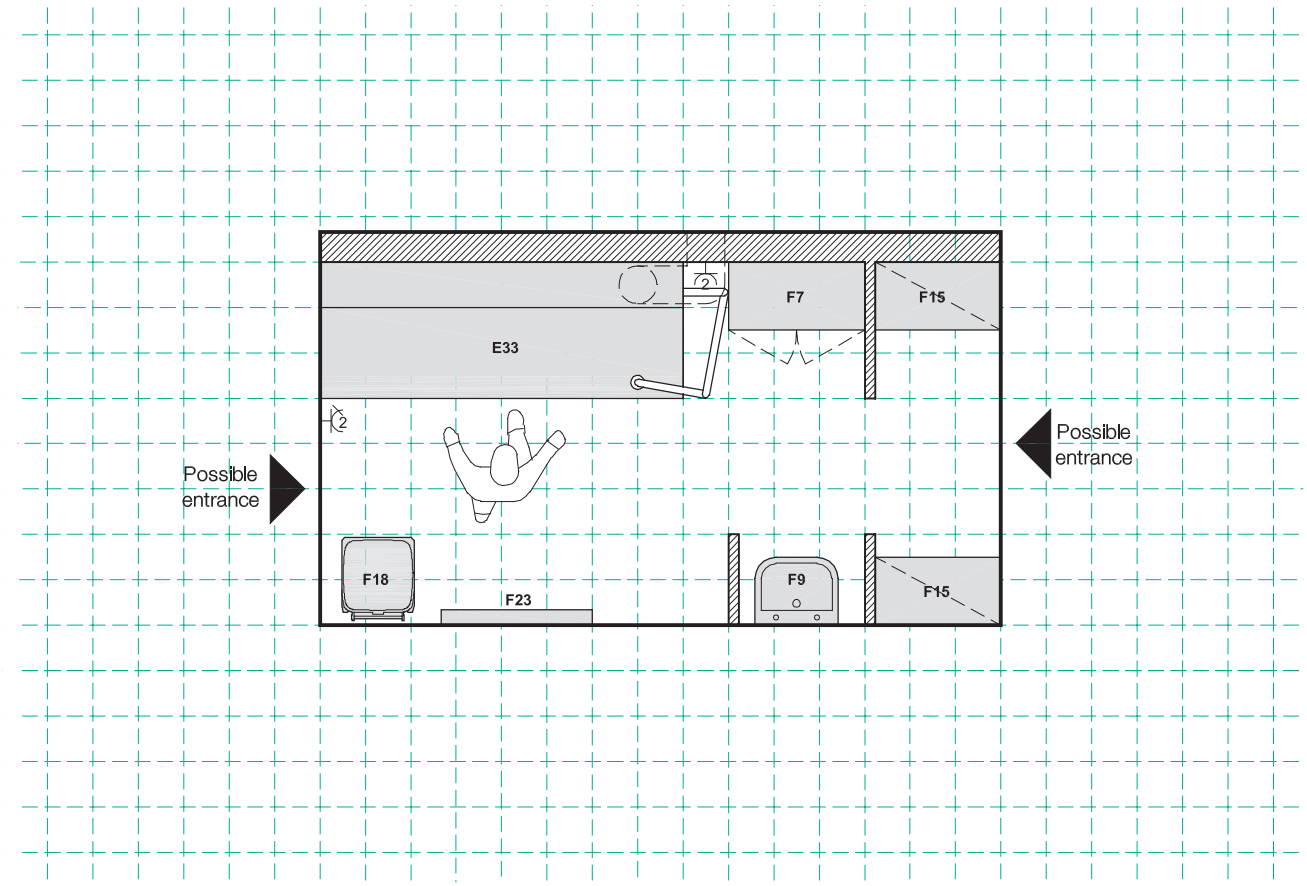
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E31	1	HYDRAULIC INJECTION MACHINE			
E32	1	GRANULATOR			
F10	1	WASTE BIN			
F13	2	STOOL ON WHEELS			
F15	3	SHELVES			
F18	2	WASTE BIN (120 l)			
F21	1	BARREL (FOR IRON BARS)			
F25	1	WORKBENCH			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	n/a	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	2× min.
General comments The granulator is a loud machine; the room should therefore have full walls. The hydraulic injection machine must be fixed to the floor.					Heating system			MMS / UPS		2× min. / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code **POD6**	**Lamination room + Air-conditioned store**	Update **June 2014**
Activities	Lamination is the technique of manufacturing a material in multiple layers, so that the composite material achieves greater strength and stability. It can be used to produce any orthopaedic device.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	11 m²	n/a	1	n/a	n/a	n/a

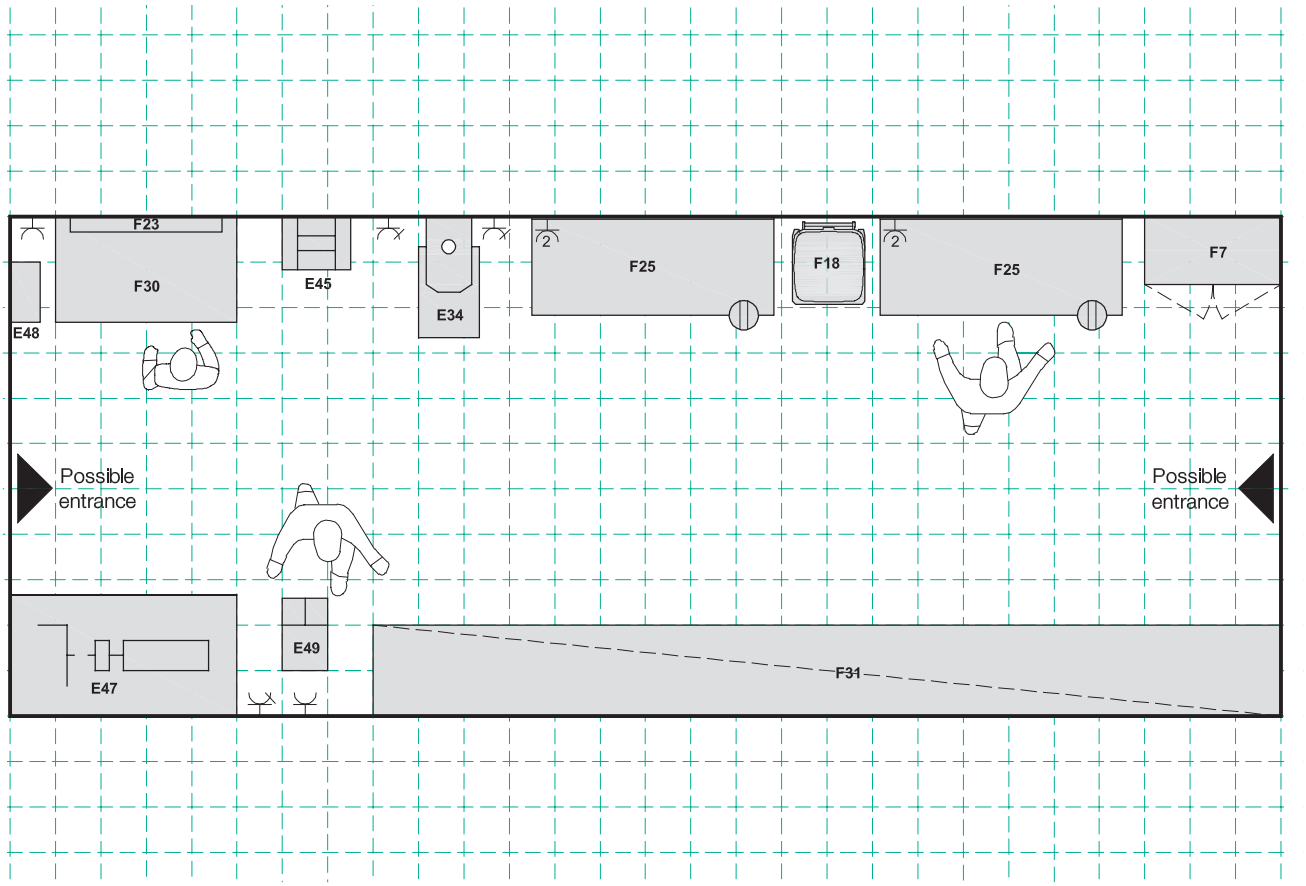
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E33	1	RESIN MACHINE			
F7	1	CUPBOARD			
F9	1	CERAMIC WASHBASIN			
F15	2	SHELVES			
F18	1	WASTE BIN (120 l)			
F23	1	TOOL BOARD			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	1× ceramic washbasin			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain			AC		1×		3 phases	2× min.
General comments The room should have a good suction system to avoid fibres in the air that could place workers' respiratory systems at risk. The stock should have an AC to avoid hardening of the lamination material.					Heating system			MMS / UPS		1× min. / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)		n/a	Security lighting		n/a

Room code **POD7**	**Metal room**	Update **June 2014**
Activities	Production of crutches and repair work on orthopaedic devices as well as maintenance work.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	28 m²	n/a	3	n/a	n/a	n/a

Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E34	1	COLUMN DRILL	F30	1	METAL ELECTRO WELDING TABLE
E45	1	GRINDER	F31	1	PLATES AND TUBES STORAGE
E47	1	LATHE MACHINE			
E48	1	WELDING MACHINE			
E49	1	METAL CUTTING MACHINE			
F7	1	CUPBOARD			
F18	1	WASTE BIN (120 l)			
F23	1	TOOL BOARD			
F25	2	WORKBENCH			

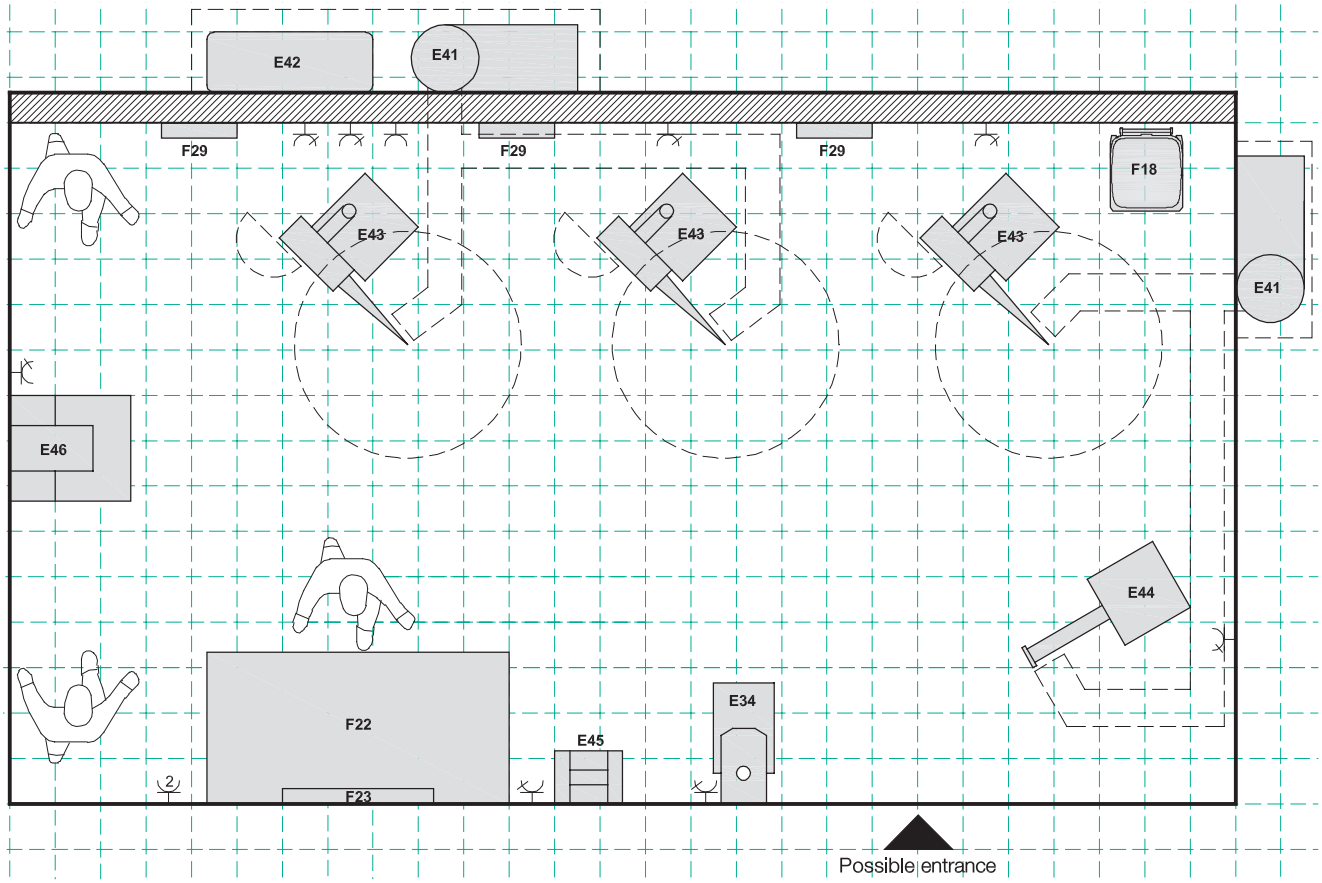
General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90–40	Water	Cold	n/a	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	6× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	3× min.
General comments Welding and painting will produce unhealthy fumes; good ventilation is therefore needed. Heavy-duty floor. The column drill, the bench grinder and the metal cutting table must be fixed to the floor.					Heating system			MMS / UPS		3× min. / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code	Machine room	Update
POD8		**June 2014**

Activities

All orthoses and prostheses are ground along the trim lines. It is advisable to place the dust aspirator and the air compressor outside the building in a roofed iron cage as this will allow cooling of the engines and will keep these loud machines outside. However, it is advisable to place their sockets inside the building.



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	37 m²	n/a	3	n/a	n/a	n/a

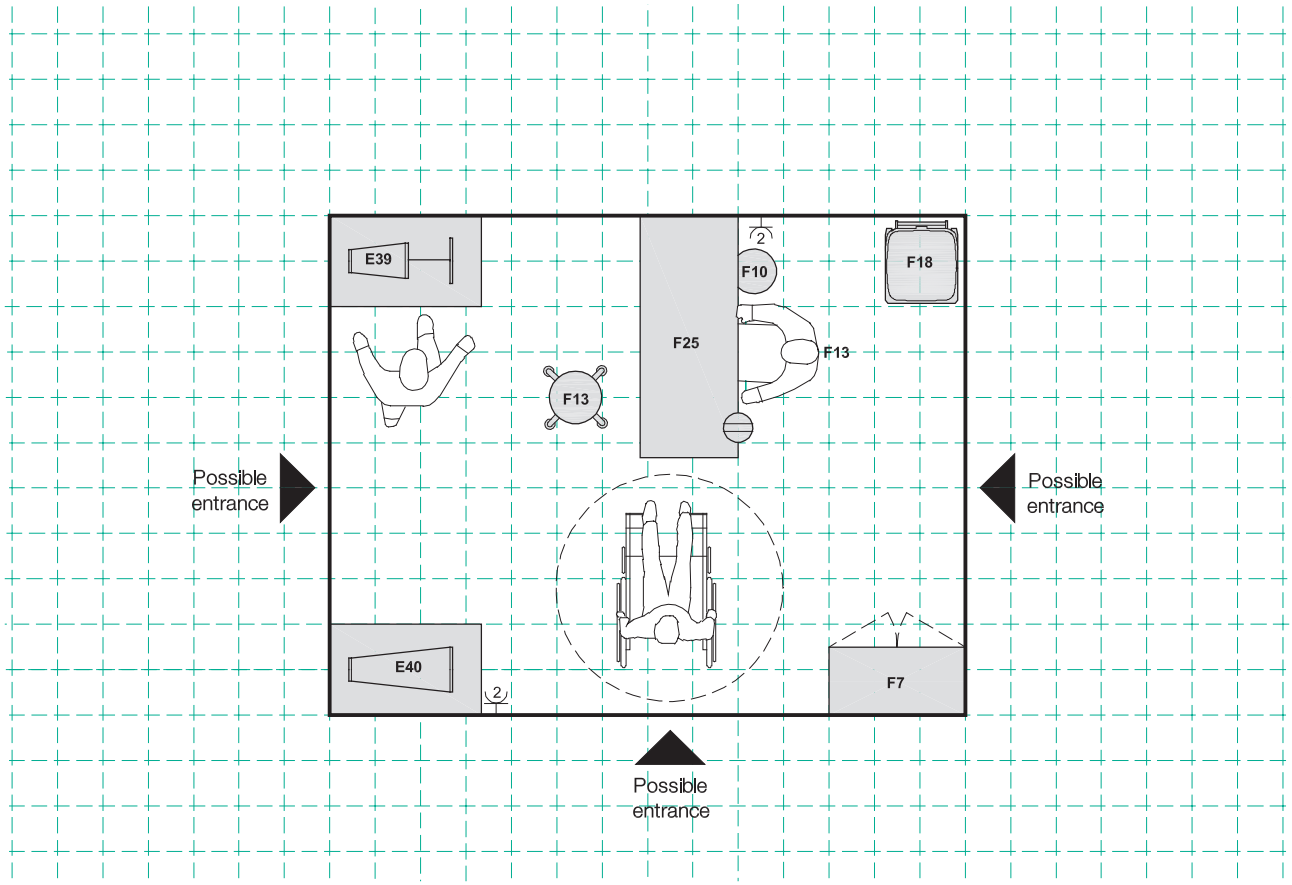
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E34	1	COLUMN DRILL	F22	1	CUTTING TABLE
E41	2	DUST ASPIRATOR	F23	1	TOOL BOARD
E42	1	AIR COMPRESSOR UNIT	F29	3	TOOL BOARD FOR ROUTER
E43	3	SOCKET ROUTER			
E44	1	LARGE BELT GRINDER			
E45	1	GRINDER			
E46	1	BAND SAW			
F18	1	WASTE BIN (120 l)			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90–40	Water	Cold	n/a	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	3× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	8× min.
General comments Reinforced floor for heavy machines (over 200 kg). Window in the door. The column drill, the socket routers, the large belt grinder, the bench grinder and the band saw must be fixed to the floor. Note: E44 Large belt grinder may not be used in tropical climates.					Heating system			MMS / UPS		10× min. / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)		n/a	Security lighting		n/a

Room code	Sewing room	Update
POD9		**June 2014**
Activities	Belts for prostheses, pillows for wheelchairs, straps for orthoses are manufactured.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	14 m²	n/a	2	n/a	n/a	n/a

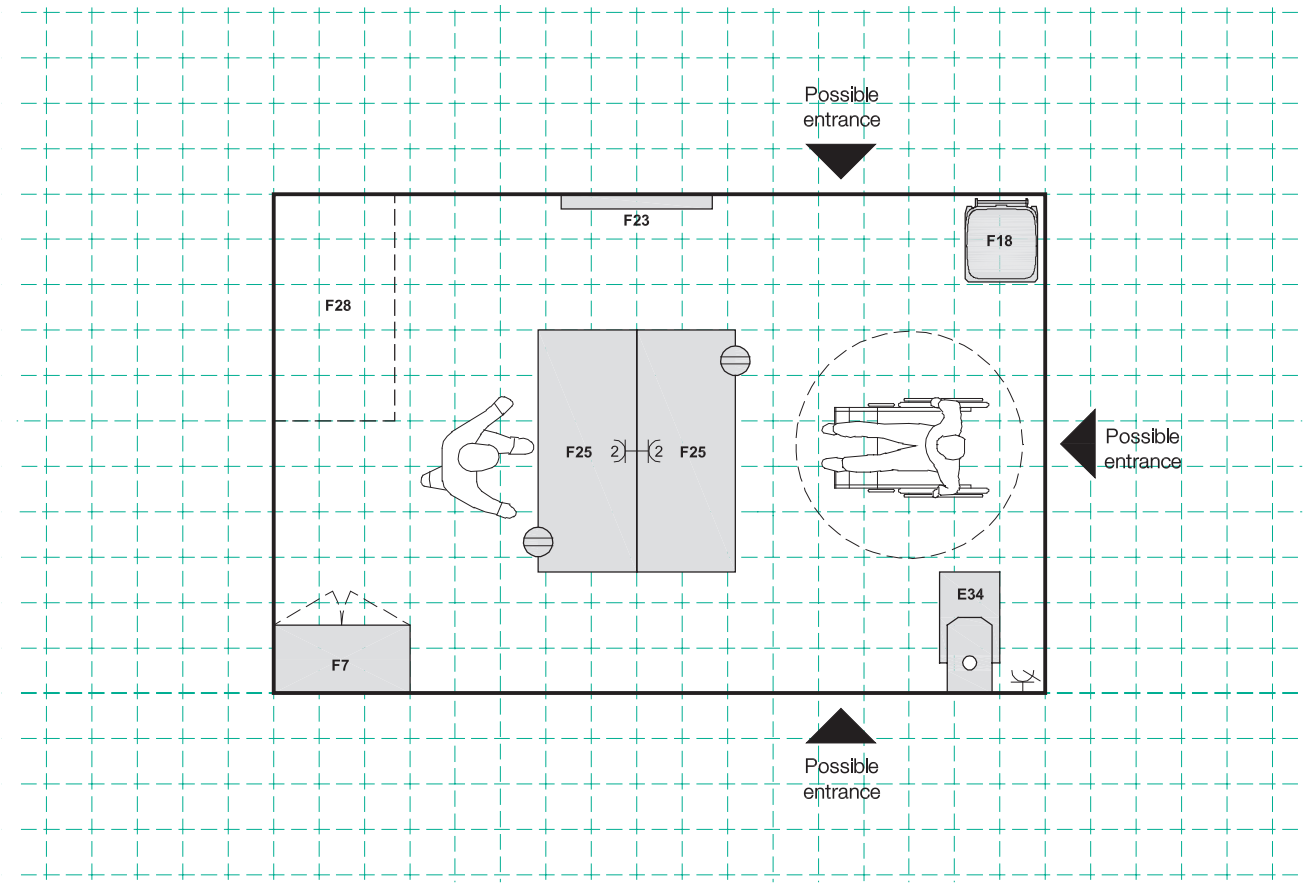
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E39	1	SEWING MACHINE			
E40	1	SEWING MACHINE, ZIGZAG			
F7	1	CUPBOARD			
F10	1	WASTE BIN			
F13	2	STOOL ON WHEELS			
F18	1	WASTE BIN (120 l)			
F25	1	WORKBENCH			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	n/a	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural		Task lighting level		1000 lux
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	5× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Good light is important for this work to be carried out.					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code **POD10**	**Wheelchair assembly room**	Update **June 2014**
Activities	Wheelchairs are assembled in accordance wtih the assessment of the service users.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	17 m²	n/a	1	n/a	n/a	n/a

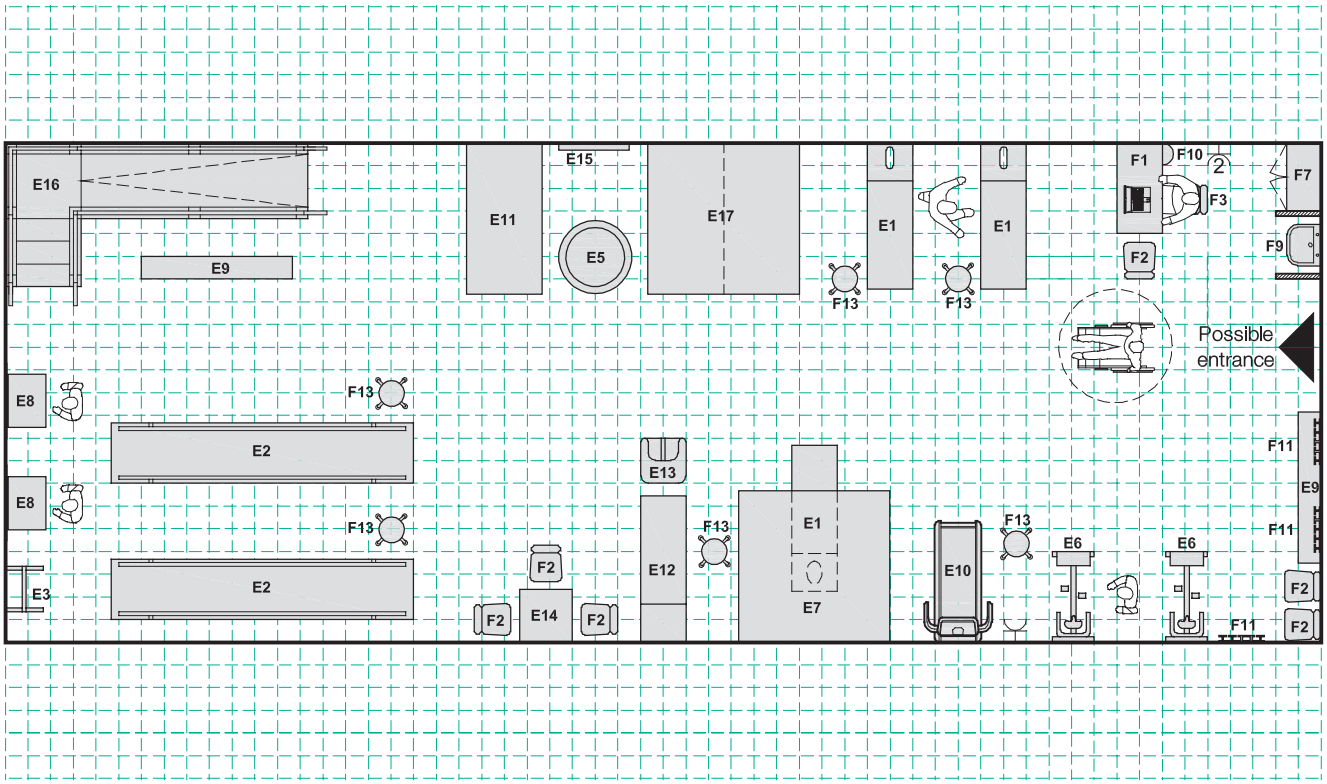
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E34	1	COLUMN DRILL			
F7	1	CUPBOARD			
F18	1	WASTE BIN (120 l)			
F23	1	TOOL BOARD			
F25	2	WORKBENCH			
F28	1	WHEELCHAIR BOXES STORAGE AREA			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90–40	Water	Cold	n/a	Temperature			General lighting level		500 lux
Floor	Slab (25N/mm²)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	4× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	1× min.
General comments Storage place for spare parts. The workbenches and the column drill must be fixed to the floor. Suspended cable trays above workbenches with power sockets.					Heating system			MMS / UPS		1× min. / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		n/a

Room code **PTD1**	**Exercise room**	Update **June 2014**
Activities	Full range of rehabilitation exercises and gait training. Space for a fully equipped gymnastic room accommodating a wide range of rehabilitation material and with enough space for small group therapy sessions. Different treatment areas such as gait training, balance training, pulley therapy and cardio-vascular exercises.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/100	115 m²	3	n/a	n/a	10 max	n/a

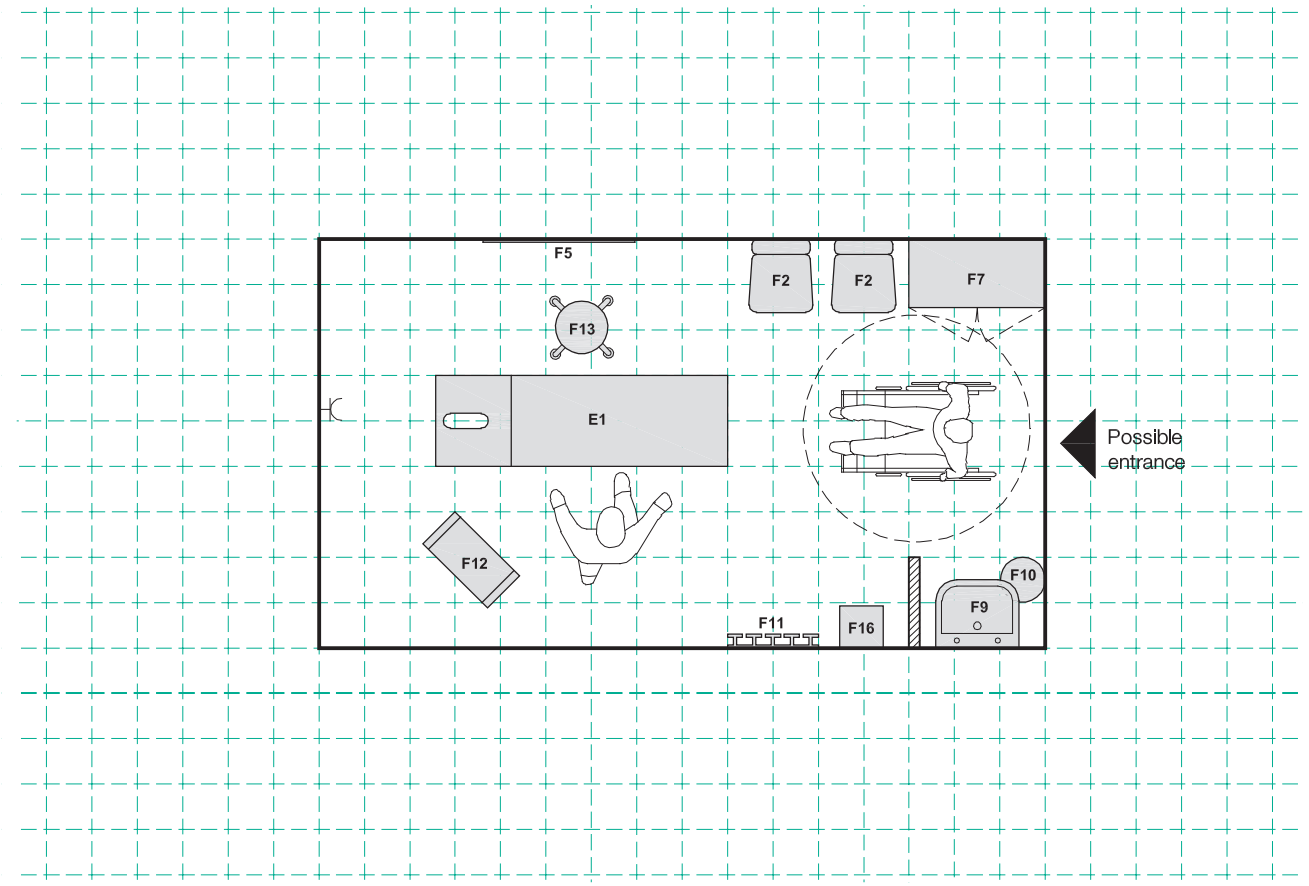
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E1	3	TREATMENT TABLE	E14	1	UPPER-LIMB WORKSTATION
E2	2	PARALLEL BARS (4 m)	E15	1	WALL BARS
E3	1	MOBILE MIRROR	E16	1	GAIT TRAINING SLOPE
E5	1	TRAMPOLINE	E17	1	NEUROLOGIC TABLE
E6	2	BICYCLE	F1	1	OFFICE DESK + FILING CABINET
E7	1	PULLEY THERAPY	F2	6	CHAIR
E8	2	STANDING WORKSTATION	F3	1	OFFICE CHAIR
E9	2	SWEDISH WOODEN BENCH	F7	1	CUPBOARD
E10	1	TREADMILL	F9	1	CERAMIC WASHBASIN
E11	9	GYMNASTIC MAT	F10	1	WASTE BIN
E12	1	TILT TABLE	F11	15	COAT HANGER
E13	1	STANDING FRAME	F13	6	STOOL ON WHEELS

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 110–20	Water	Cold	1×	Temperature			General lighting level		300 lux
Floor	Parquet/linoleum/plastic		Hot	1×	Air changes	Natural		Task lighting level		500 lux
Walls	Acrylic	Fitting	1× ceramic washbasin			Mechanical	n/a	Sockets	1 phase	3× min.
Windows	10-25%	Floor drain			AC				3 phases	n/a
General comments Window height 200 cm. No internal partitions. Tiling around washbasin (floor + 3 faces, to door height). The room may be gender shared, subject to context.					Heating system			MMS / UPS		1× min. / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		1×

Room code **PTD2**	**Individual treatment cubicle**	Update **June 2014**
Activities	Individual treatment of service users.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	13 m²	1	n/a	n/a	1	1

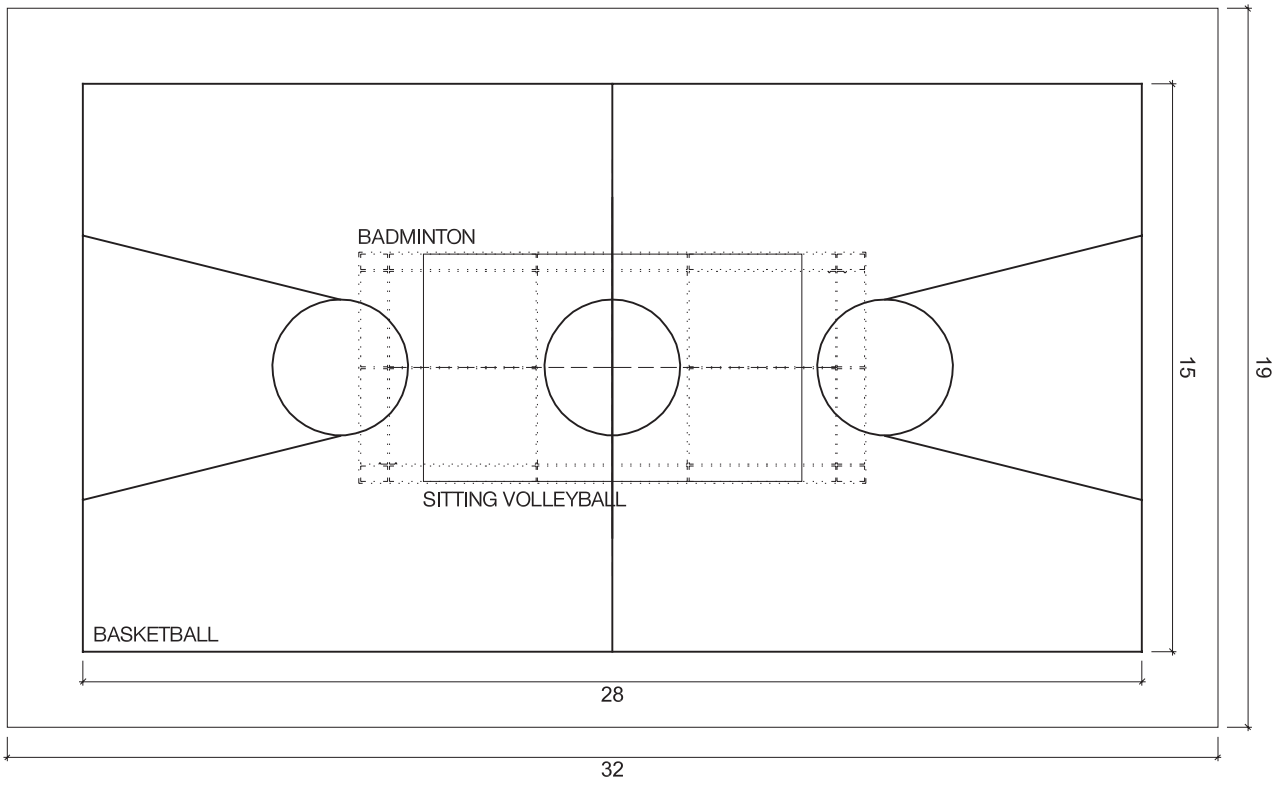
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E1	1	TREATMENT TABLE	F16	1	LAUNDRY BASKET 40 cm × 40 cm
F2	2	CHAIR			
F5	1	WHITEBOARD			
F7	1	CUPBOARD			
F9	1	CERAMIC WASHBASIN			
F10	1	WASTE BIN			
F11	5	COAT HANGER			
F12	1	TROLLEY			
F13	1	STOOL ON WHEELS			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Screed (1:2)		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	1× ceramic washbasin			Mechanical	n/a	Sockets	1 phase	1× min.
Windows	10-25%	Floor drain			AC				3 phases	n/a
General comments A quiet room, away from noisy areas. Tiling around washbasin (3 faces, to door height).					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		n/a

Room code **PTD3**	**Outdoor sports court**	Update **June 2014**
Activities	Multiple sports court for disabled sports (basketball, tennis, sitting volleyball). Important for active rehabilitation to regain self-confidence and moral. Change of air, staff relaxation.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/200	32 m × 19 m	1	n/a	n/a	12	n/a

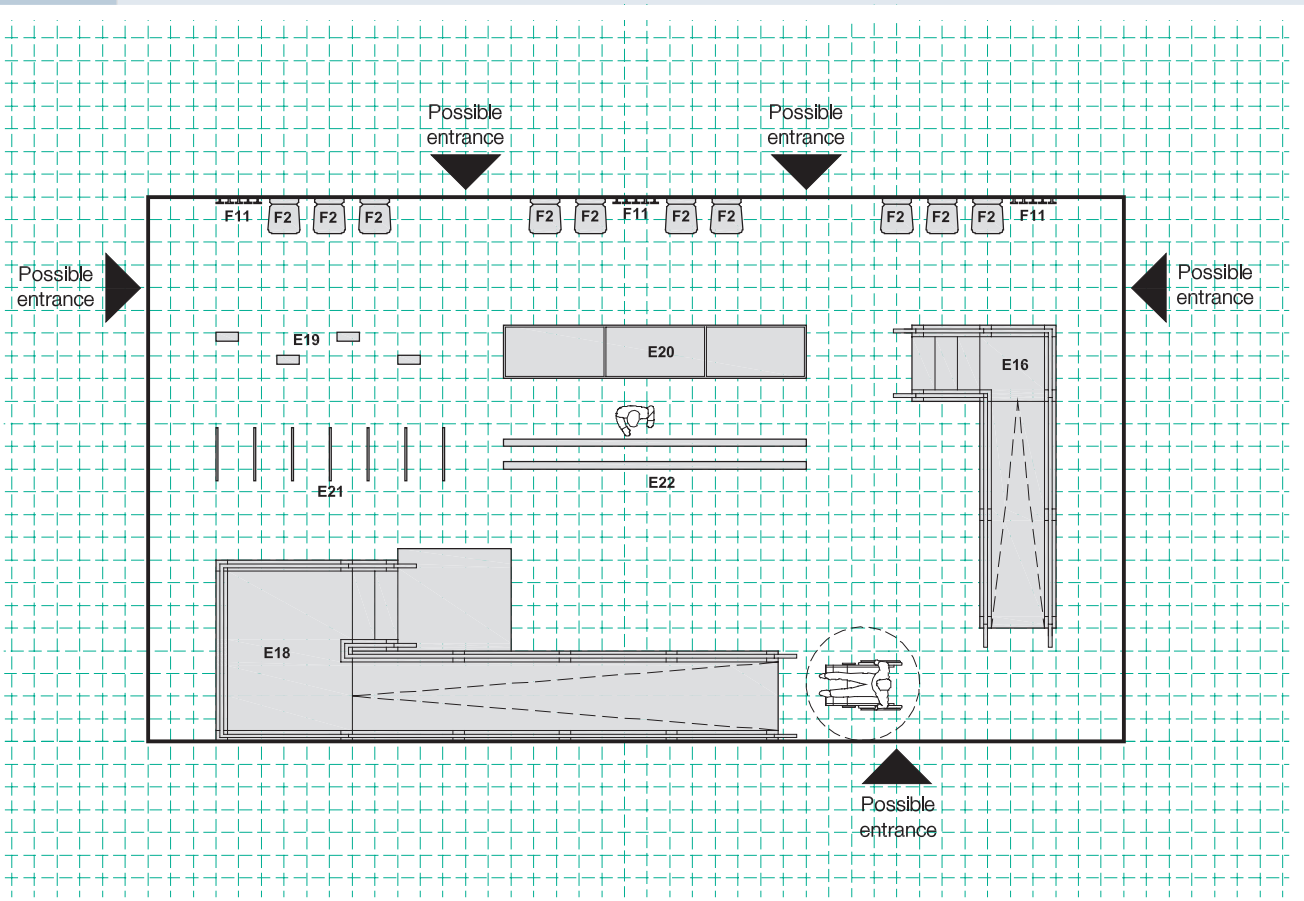
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	n/a	Water	Cold	n/a	Temperature		n/a	General lighting level		300 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural	n/a	Task lighting level		n/a
Walls	n/a	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	n/a
Windows	n/a	Floor drain		n/a	AC		n/a		3 phases	n/a
General comments Access to water somewhere near sports courts for washing and refreshing. If court used by visitors, add changing room. Net usable area: 28 m × 15 m. Obstruction-free gross usable area: 32 m × 19 m.					Heating system		n/a	MMS / UPS		n/a / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)		n/a	Security lighting		n/a

Room code **PTD4**	**Advanced training court**	Update **June 2014**
Activities	Functional training for different groups of service users. Training in safe wheelchair skills, such as travelling in different directions and around obstacles, negotiating different surfaces, going up and down ramps and slopes, climbing small steps, going down steps and getting through doorways. Training in balance and gait skills for amputees and other motor-impaired service users.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/100	93 m²	1	1	n/a	10 max	n/a

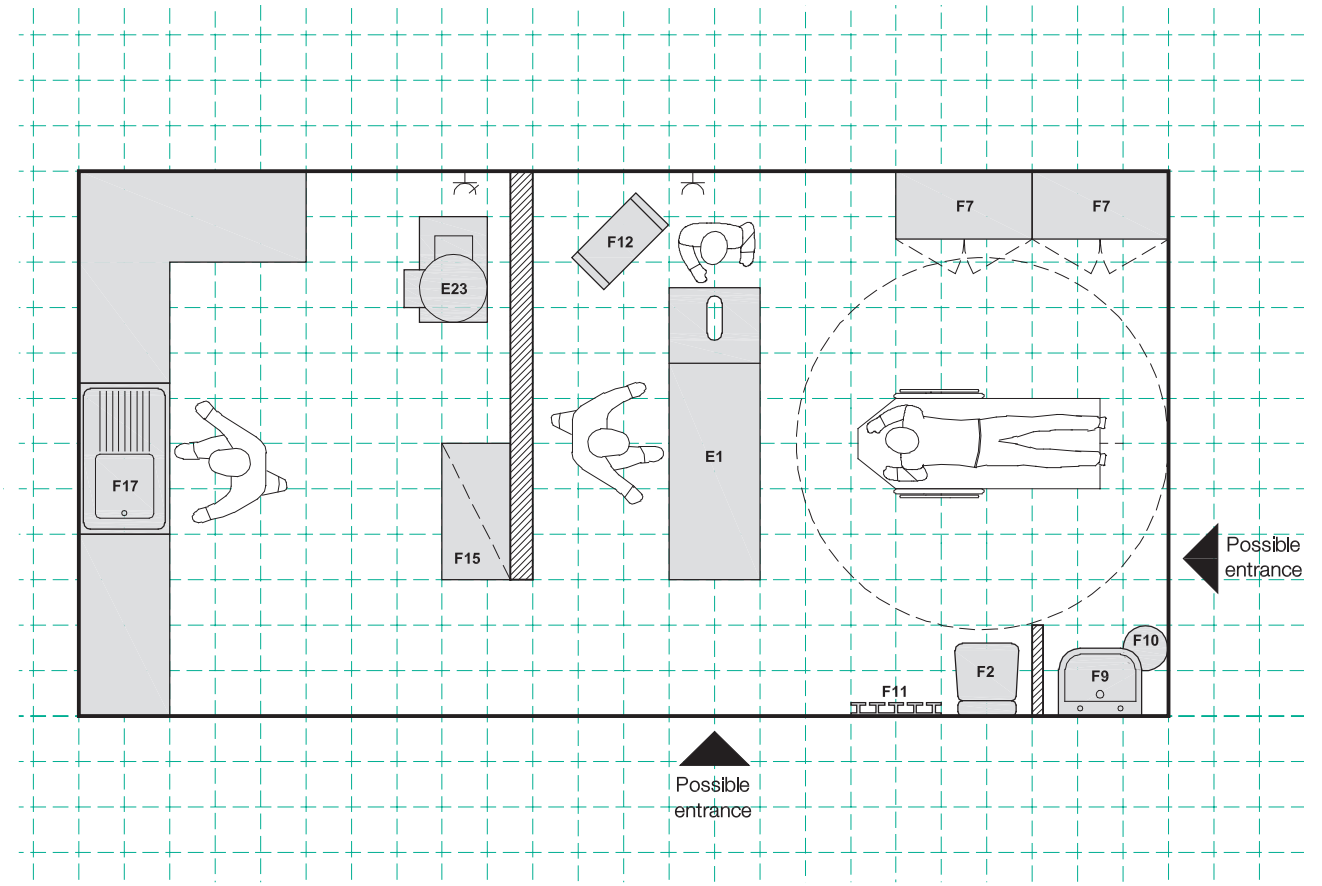
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E16	1	GAIT TRAINING SLOPE			
E18	1	WHEELCHAIR TRAINING SLOPE			
E19	1	JAPANESE STEPS			
E20	1	GRAVEL BOX			
E21	1	HURDLES			
E22	1	DOUBLE BEAMS			
F2	10	CHAIR			
F11	15	COAT HANGER			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 110–20	Water	Cold	n/a	Temperature			General lighting level		300 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	n/a
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Indoor or outdoor: protected from rain and sun and adapted to local standards for temperature. May be gender shared if the context permits. Area range from minimum 80 m² (if PECA) to 130 m² (if FECA).					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		1×

Room code **PTD5**	**Nursing room + Sterilization area**	Update **June 2014**
Activities	More information about sterilization is available on the Health Unit database; voltage needs and ventilation are included in section 3, section 12 and section 13.2.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	26 m²	2	n/a	1	1	1

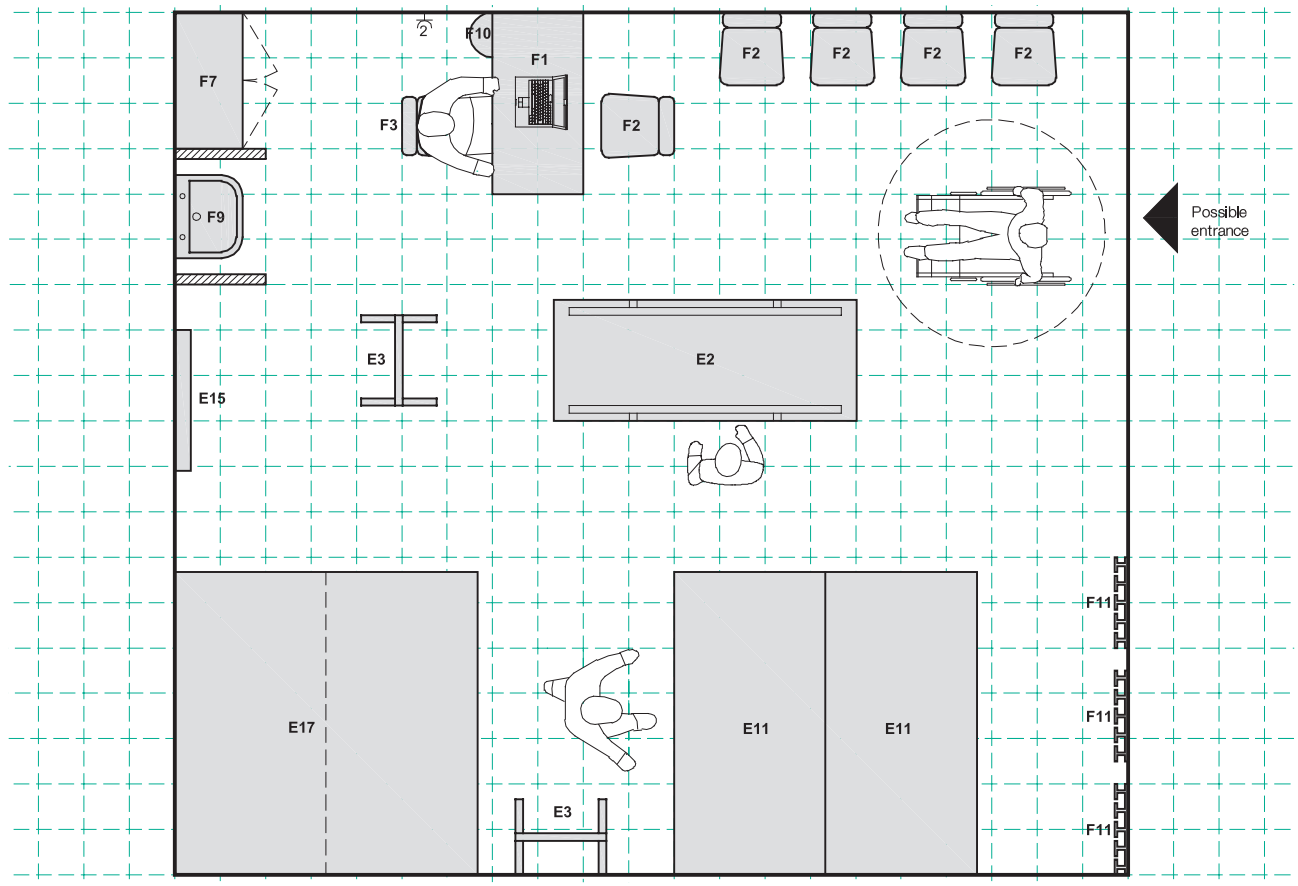
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E1	1	TREATMENT TABLE	F17	1	SINK WITH LABORATORY BENCH
E23	1	AUTOCLAVE			
F2	1	CHAIR			
F7	2	CUPBOARD			
F9	1	CERAMIC WASHBASIN			
F10	1	WASTE BIN			
F11	5	COAT HANGER			
F12	1	TROLLEY			
F15	1	SHELVES			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 110–20, 1× 90	Water	Cold	3×	Temperature			General lighting level		500 lux
Floor	Screed (1:2) + Tiling		Hot	2×	Air changes	Natural		Task lighting level		1000 lux
Walls	Acrylic, Tiling + Acrylic	Fitting	1× ceramic, 1× plaster sink			Mechanical	n/a	Sockets	1 phase	1× min.
Windows	10-25%	Floor drain		1×	AC				3 phases	1× min.
General comments Tiling around washbasin (3 faces, to door height). Tiling for sterilization room (floor, walls to door height). Plaster sink: stainless or ceramic. The room must be accessible to trolley bed users.					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		1×	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		1×

Room code **PTD6**	**Cerebral palsy room**	Update **June 2014**
Activities	Active children's rehabilitation and parent's education. Group activity: peer training and mother education session.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	38 m²	2	n/a	n/a	1	14

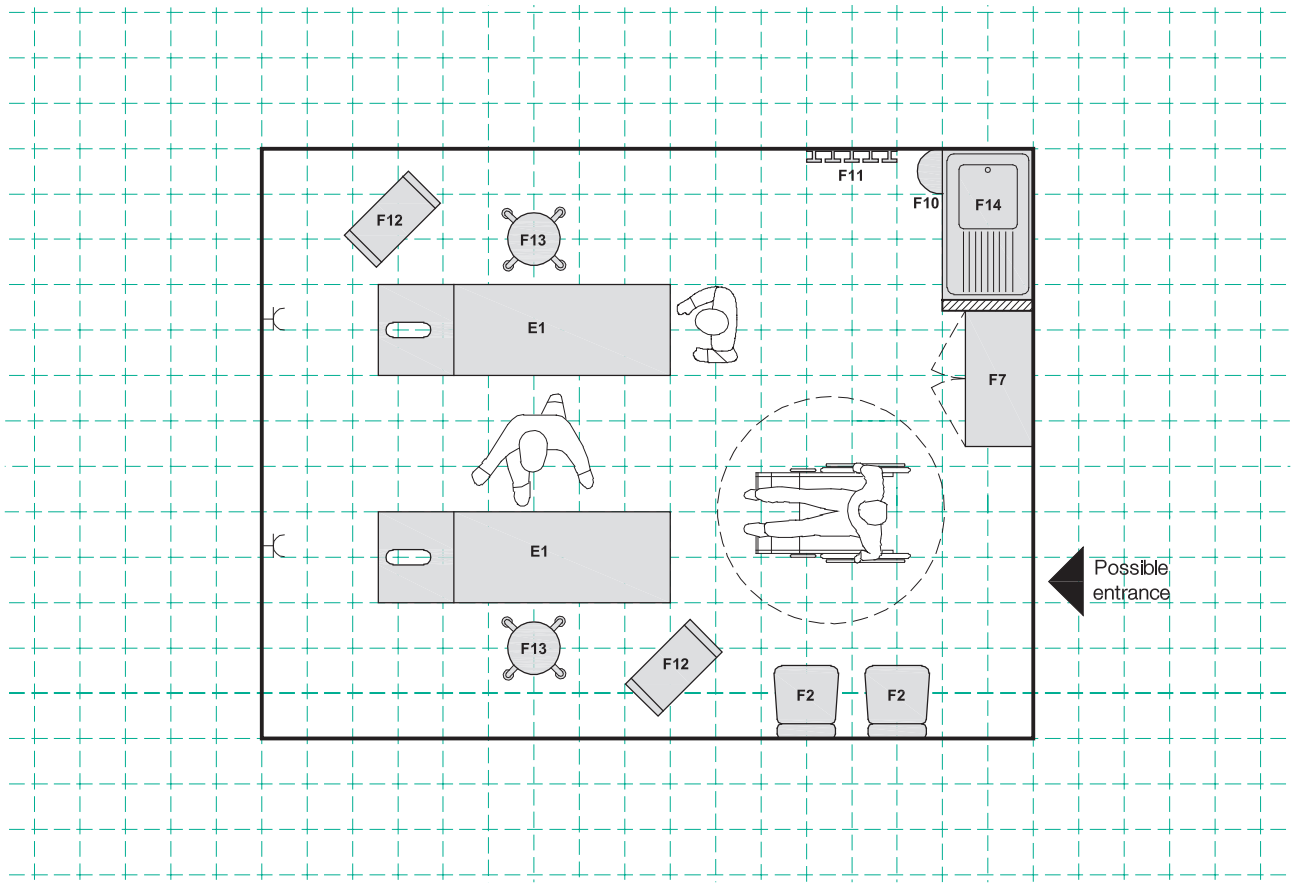
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E2	1	PARALLEL BARS (2 m)	F9	1	CERAMIC WASHBASIN
E3	2	MOBILE MIRROR	F10	1	WASTE BIN
E11	2	GYMNASTIC MAT	F11	15	COAT HANGER
E15	1	WALL BARS			
E17	1	NEUROLOGICAL TABLE			
F1	1	OFFICE DESK + FILING CABINET			
F2	5	CHAIR			
F3	1	OFFICE CHAIR			
F7	1	CUPBOARD			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Parquet or plastic flooring		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	1× ceramic washbasin			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain			AC				3 phases	n/a
General comments A quiet room, away from noisy areas. Tiling around washbasin (3 faces, to door height).					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		n/a

Room code **PTD7**	**Clubfoot room**	Update **June 2014**
Activities	Treatment of children with clubfoot. Manipulation and stretching, serial casting application of abduction brace.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	20 m²	1	n/a	1	1	2

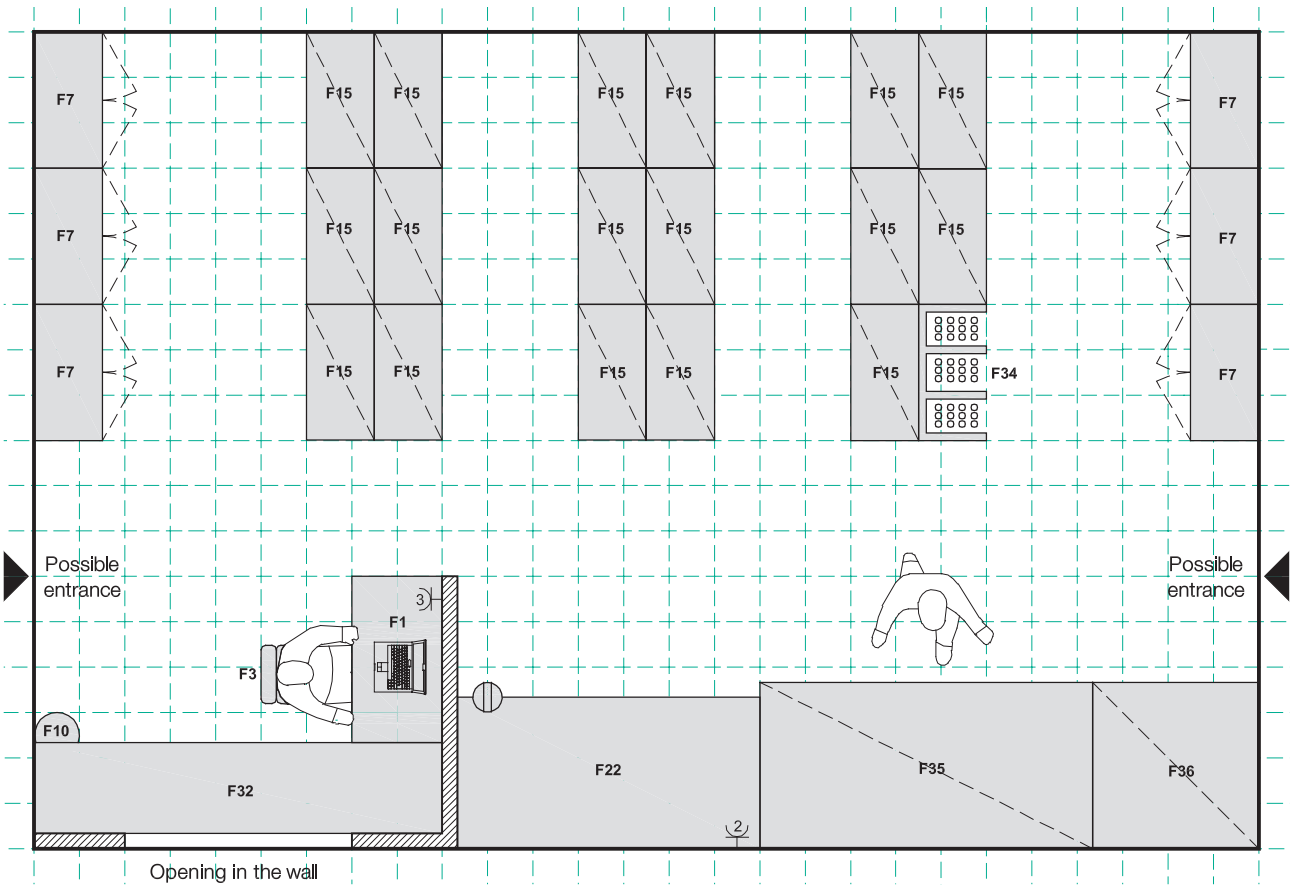
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
E1	2	TREATMENT TABLE			
F2	2	CHAIR			
F7	1	CUPBOARD			
F10	1	WASTE BIN			
F11	5	COAT HANGER			
F12	2	TROLLEY			
F13	2	STOOL ON WHEELS			
F14	1	SINK WITH PLASTER SEPARATION TANK			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90	Water	Cold	1×	Temperature			General lighting level		500 lux
Floor	Tiling or screed (1:2)		Hot	1×	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	1× plaster sink			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Easy to clean, non-slippery floor. Tiling around plaster sink (3 faces, to door height). Plaster sink: stainless or ceramic.					Heating system			MMS / UPS		If AC / n/a
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		
					Ceiling fan(s)			Security lighting		n/a

Room code **ST01**	**Main store**	Update **June 2014**
Activities	Storing annual supply of materials for prosthesis and orthosis production plus wheelchairs.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	44 m²	1	1	n/a	n/a	n/a

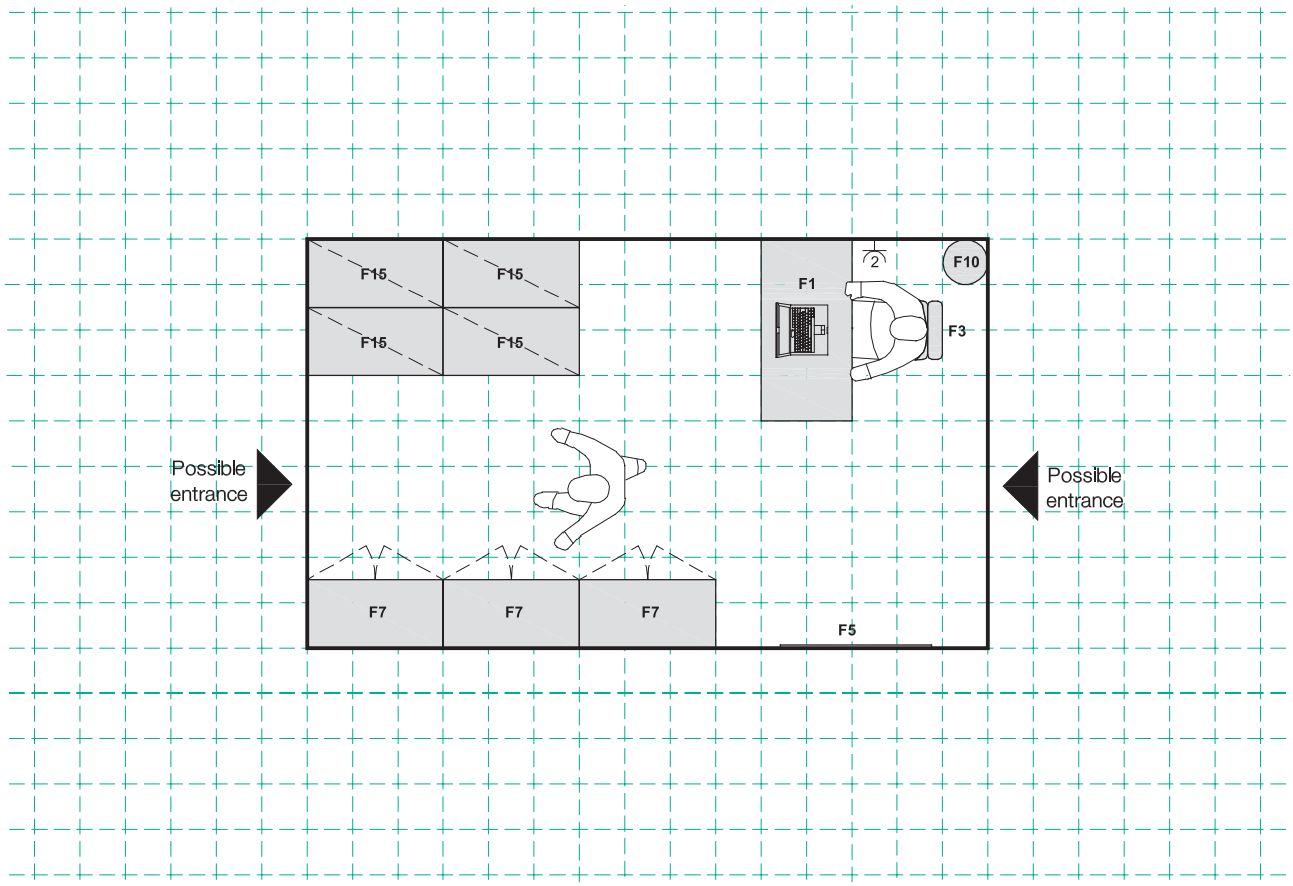
Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
F1	1	OFFICE DESK + FILING CABINET	F36	1	EVA SHEET STORAGE SHELVES
F3	1	OFFICE CHAIR			
F7	6	CUPBOARD			
F10	1	WASTE BIN			
F15	17	SHELVES			
F22	1	CUTTING TABLE			
F32	1	RECEPTION DESK			
F34	1	TUBE STAND			
F35	1	PP SHEET STORAGE SHELVES			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90–40, 1× 90	Water	Cold	n/a	Temperature		≤ 25° C	General lighting level		300 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural		Task lighting level		500 lux
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	5× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments Dry indoor environment must be maintained. There is an opening in the wall above the counter in this configuration.					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		1×

Room code	Daily store	Update
ST02		**June 2014**
Activities	This room should have the capacity to store material for a week's physiotherapy treatment.	



Scale	Indicative space for this activity	PT staff	P&O staff	Medical staff	Service user(s)	Relative(s)
1/50	12 m²	1	n/a	n/a	n/a	n/a

Equipment and furniture checklist

Code	Quantity	Description	Code	Quantity	Description
F1	1	OFFICE DESK + FILING CABINET			
F3	1	OFFICE CHAIR			
F5	1	WHITE BOARD			
F7	3	CUPBOARD			
F10	1	WASTE BIN			
F15	4	SHELVES			

General design requirements

Finishes & fixtures		Plumbing			Mechanical (HVAC)			Electrical		
Door(s)	1× 90–40	Water	Cold	n/a	Temperature		≤ 25° C	General lighting level		300 lux
Floor	Screed (1:2)		Hot	n/a	Air changes	Natural		Task lighting level		n/a
Walls	Acrylic	Fitting	n/a			Mechanical	n/a	Sockets	1 phase	2× min.
Windows	10-25%	Floor drain		n/a	AC				3 phases	n/a
General comments A dry indoor environment must be maintained.					Heating system			MMS / UPS		If AC / If PC
					Exhaust fan(s)		n/a	Phone & IT outlet(s)		n/a
					Ceiling fan(s)			Security lighting		1×

3.3 COMPONENT CARDS

Component cards describe some of the smallest activities taking place in a PRC following its breakdown into three functional levels: one for services, one for rooms and outdoor spaces, and one for equipment and furniture. The cards illustrate the main items of equipment and furniture used. They constitute a database of the main components necessary for the centre to function properly.

The main items of equipment and furniture appear twice in the graphical documents in this handbook: on the space cards and on the component cards. More than 90 elements are shown in the form of component cards. They are the main items of equipment or furniture needed for the core activities of a PRC. Not all components shown on the space cards have a corresponding component card.

These cards enable the reader to visualize items and sets of equipment and furniture in their context. This is particularly important for construction project managers who are not familiar with physical rehabilitation centres. The aim of the cards is also to enable the construction project manager to understand the space needed for, and engineering characteristics of, each item and to provide the project owner with a basis on which to adapt to the context or to exchange views with his internal interlocutors.

Equipment	
E1	Treatment table
E2	Parallel bars
E3	Mobile mirror
E4	Wall-mounted X-ray viewer
E5	Trampoline
E6	Bicycle
E7	Pulley therapy
E8	Standing workstation
E9	Swedish wooden bench
E10	Treadmill
E11	Gymnastic mat
E12	Tilt table
E13	Standing frame
E14	Upper-limb workstation
E15	Wall bars
E16	Gait training slope
E17	Neurological table
E18	Wheelchair training slope
E19	Japanese steps
E20	Gravel box
E21	Hurdles
E22	Double beams
E23	Autoclave
E24	Casting chair
E25	Casting frame
E26	Alignment jig
E27	Plaster rectification table with metal grid
E28	Oven
E29	Vacuum pump
E30	Enveloping suction tube

Equipment	
E31	Hydraulic injection machine
E32	Granulator
E33	Resin machine
E34	Column drill
E35	Manual alignment vice
E36	Welding mirror
E37	Anvil
E38	Cutting device
E39	Sewing machine
E40	Sewing machine, zigzag
E41	Dust aspirator
E42	Air compressor unit
E43	Socket router
E44	Large belt grinder
E45	Grinder
E46	Band saw
E47	Lathe machine
E48	Welding machine
E49	Metal-cutting machine

Furniture	
F1	Office desk with filing cabinet
F2	Chair
F3	Office chair
F4	Chair with foldable table
F5	Whiteboard
F6	Partition
F6	Filing cabinet with lock
F7	Cupboard
F8	Water fountain
F9	Ceramic washbasin
F10	Waste bin
F11	Coat hanger
F12	Trolley
F13	Stool on wheels
F14	Sink with plaster separation tank
F15	Shelves
F16	Laundry basket 40 × 40 cm
F17	Sink with laboratory bench
F18	Waste bin 120 l
F19	Casting brim stand
F20	Sand box
F21	Barrel (for powder + iron bars)
F22	Cutting table
F23	Tool board
F24	PP/EVA sheet storage shelves
F25	Workbench
F26	Welding mirror table
F27	Device storage shelves

Furniture	
F28	Wheelchair boxes storage area
F29	Tool board for router
F30	Metal electro welding table
F31	Plates and tubes storage
F32	Reception desk
F33	Cabinet
F34	Tube stand
F35	PP sheet storage shelves
F36	EVA sheet storage shelves
F37	Tool board for common tools
F38	TV
F39	Stainless steel drain
F40	Table
F41	Shower hose
F42	Mirror

Item code **E0 / F0**	**Item name**	Update **month-yyyy**
Scale	**Activities:** Description of the activities related to the item. **Location:**	

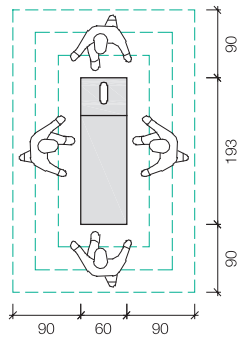
Item design	Item picture	**Quantity** **Reference** Emergency items catalogue code **Weight** **Electricity** **Description**

Figure 3.3.1
Component card template

Each card provides essential information about the component as text and as a graphical representation. Each component card contains the following written specifications:

1. **Item name**
   Name of the component
2. **Item code**
   1-letter, 1-to-2-figure code identifying the component on space cards and component cards, e.g. E4 or F14. The code starts with "E" for equipment and with "F" for furniture.
3. **Scale**
   All plans are drawn to a scale of 1:100.
4. **Activities**
   Description of activities related to the component
5. **Update**
   Month and year on which the component card was last updated
6. **Drawing**
   Proposed space for the use of the component and graphical representation as shown on the space cards. Plans are always drawn on a 30 × 30 cm green grid.
7. **Picture**
   Contextualized image of the component
8. **Quantity**
   Number of items supplied under the reference in the ICRC and Federation "Emergency Items Catalogue," Volume 2.
9. **Reference**
   Code in the ICRC and Federation "Emergency Items Catalogue," Volume 2 (if applicable)
10. **Weight**
    Weight of the component (for structural engineering)
11. **Electricity**
    Specification of voltage, power and phase
12. **Description**
    Main characteristics of the component

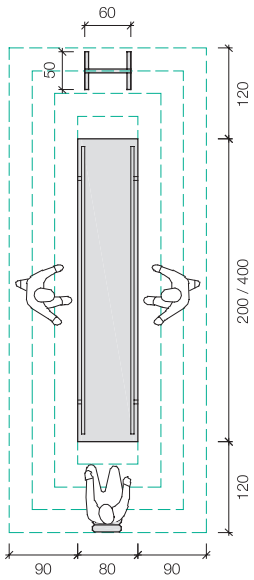
Item code	Treatment table	Update
E1		**June 2014**
Scale **1/100**	**Activities:** Service user examination and physiotherapy exercises. **Location:** CLI3 Assessment room / Fitting room; POD1 Casting room; PTD1 Exercise room; PTD2 Individual treatment cubicle; PTD7 Clubfoot room; PTD5 Nursing room + Sterilization area.	




Jessie J.Fariolen/ICRC

Quantity
1
Reference
OPHEQUITAR
Weight
21.7 kg
Electricity
n/a
Description
EXAMINATION COUCH, 193 × 60 × 80 cm, adjustable head rest, dismountable

Item code	Parallel bars + Mobile mirror	Update
E2 + E3		**June 2014**
Scale **1/100**	**Activities:** Gait training, weight bearing and balance exercises. Postural exercises. **Location:** CLI3 Assessment room / Fitting room; PTD1 Exercise room; PTD6 Cerebral palsy room.	



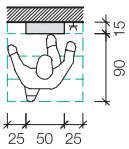

Barbara Rau/ICRC

Quantity
1
Reference
OPHYEQUIPARBA
Weight
60 kg
Electricity
n/a
Description
PARALLEL BARS, 4 m, adjustable height 78–104 cm and length 4 m with walking base


Barbara Rau/ICRC

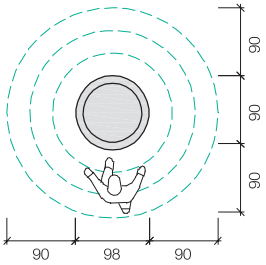
Quantity
1
Reference
OPHYEQUIMIRR
Weight
29.5 kg
Electricity
n/a
Description
MIRROR, mobile on wheels. Square of 5 cm, strong polyurethane support, offers maximum security

Item code	Wall-mounted X-ray viewer	Update
E4		**June 2014**
Scale **1/100**	**Activities:** Service user examination. **Location:** CLI3 Assessment room / Fitting room.	



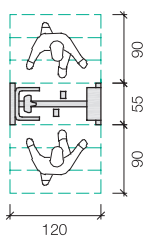
Quantity
1
Reference
XXRAWALV5078
Weight
14 kg
Electricity
230 V/50 Hz
Description
WALL-MOUNTED X-RAY VIEWER, 50 × 78 cm, complete.

Item code	Trampoline	Update
E5		**June 2014**
Scale **1/100**	**Activities:** Balance and proprioception exercises for lower limb and trunk. **Location:** PTD1 Exercise room.	



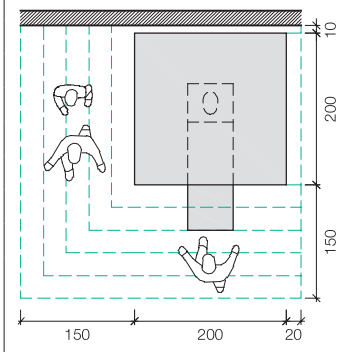
Quantity
1
Reference
OPHYREHATRAM
Weight
According to supplier
Electricity
n/a
Description
TRAMPOLINE, diameter 98 cm.

Item code	Bicycle	Update
E6		**June 2014**
Scale **1/100**	**Activities:** Cardio-respiratory training and mobilization/exercises for knees/ankles. **Location:** PTD1 Exercise room.	



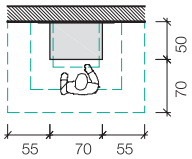
Quantity
1
Reference
OPHYEQUIBICY
Weight
According to supplier
Electricity
N/A
Description
BICYCLE, fixed, mechanical. With manually adjustable resistance.

Item code	Pulley therapy	Update
E7		**June 2014**
Scale **1/100**	**Activities:** Wide range of exercises: postural, muscular strengthening, suspension and mobility. **Location:** PTD1 Exercise room.	



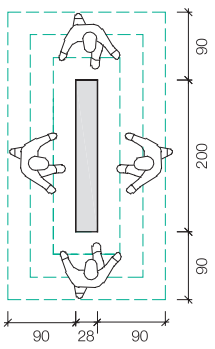
Quantity
1
Reference
OPHYPULYCAGE
Weight
According to supplier
Electricity
n/a
Description
GRID CAGE, pulley therapy. Cage in kit easy to set up. Slings and weights with vinyl cover, easy to clean. Used in combination with treatment table (E1).

Item code	Standing workstation	Update
E8		**June 2014**
Scale **1/100**	**Activities:** Upper limb functional training. **Location:** CLI3 Assessment room / Fitting room; PTD1 Exercise room.	



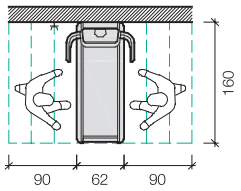
Quantity
1
Reference
To be purchased locally
Weight
Electricity
n/a
Description
Wooden board and bench with manual instruments: door locks, taps, switches.

Item code	Swedish wooden bench	Update
E9		**June 2014**
Scale **1/100**	**Activities:** Exercises for upper and lower limbs and trunk. **Location:** PTD1 Exercise room.	



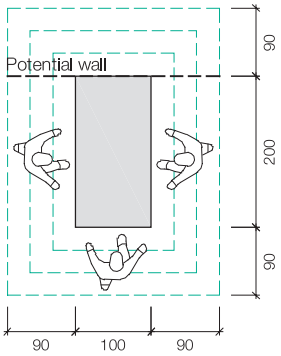
Quantity
1
Reference
OPHYEQUIBESW
Weight
According to supplier
Electricity
n/a
Description
Wooden, size 200 × 24 × 30 cm.

Item code	Treadmill	Update
E10		**June 2014**
Scale **1/100**	**Activities:** Cardio-respiratory training and gait training. **Location:** PTD1 Exercise room.	



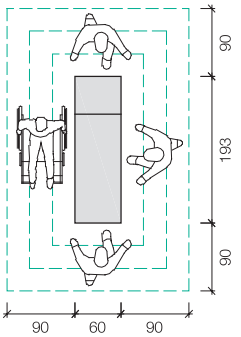
Quantity
1
Reference
To be purchased locally
Weight
According to supplier
Electricity
According to supplier
Description
According to supplier

Item code	Gymnastic mat	Update
E11		**June 2014**
Scale **1/100**	**Activities:** Muscular exercises; thick mats in neurology to ensure perfect support. **Location:** PTD1 Exercise room; PTD6 Cerebral palsy room.	



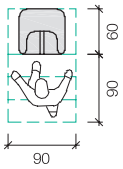
Quantity
1
Reference
OPHYGYMNMAT200
Weight
6.7 kg
Electricity
n/a
Description
GYMNASTIC MAT, 200 × 100 × 2.5 cm. Shock absorbent, homogenous weight distribution, comfortable.

Item code	Tilt table	Update
E12		**June 2014**
Scale **1/100**	**Activities:** Progressive verticalization of service user. Helps to fight against decubitus complications, progressive weight-bearing on the lower limbs. **Location:** PTD1 Exercise room	



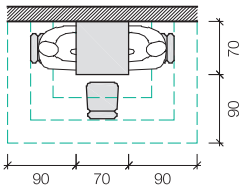
Quantity
1
Reference
OPHYEQUITATI
Weight
According to supplier
Electricity
n/a
Description
TILT TABLE (standing table).

Item code **E13**	**Standing frame**	Update **June 2014**
Scale **1/100**	**Activities:** Provides alternative positioning to sitting by supporting the person in a standing position. **Location:** PTD1 Exercise room.	



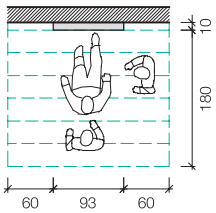
Quantity
1
Reference
OPHYEQUISTFR
Weight
According to supplier
Electricity
n/a
Description
STANDING FRAME,
adjustable height, with table.

Item code **E14**	**Upper-limb workstation**	Update **June 2014**
Scale **1/100**	**Activities:** Rehabilitation of the sensory-motor function of impaired upper limbs. **Location:** PTD1 Exercise room.	



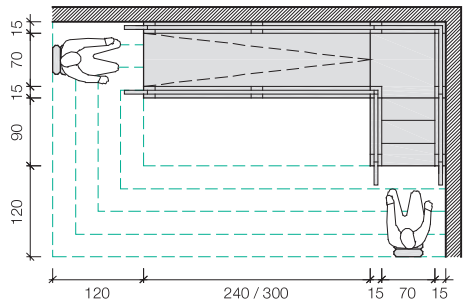
Quantity
1
Reference
To be purchased locally
Weight
According to supplier
Electricity
n/a
Description
According to supplier

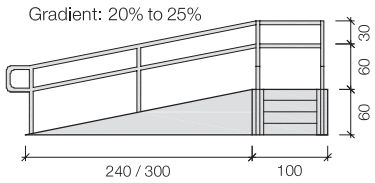
Item code **E15**	**Wall bars**	Update **June 2014**
Scale **1/100**	**Activities:** Muscular exercises, traction, shoulder mobility. **Location:** PTD1 Exercise room; PTD6 Cerebral palsy room.	



Quantity
1
Reference
OPHYEQUIWABA
Weight
According to supplier
Electricity
n/a
Description
WALL BARS, wooden, 16 round bars
for comfortable handling; height: 2.50 m,
width: 0.93 m.

Item code	Gait training slope	Update
E16		**June 2014**
Scale **1/100**	**Activities:** Gait training. **Location:** PTD1 Exercise room, PTD4 Advanced training court.	





Quantity
1

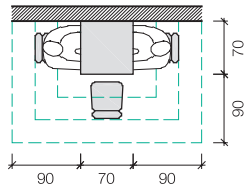
Reference
To be manufactured locally

Weight

Electricity
n/a

Description
35 × 35 mm square steel tube, 35 mm steel tube for hand rails, 15 mm plywood, anti-slip rubber mat on gangway and steps.

Item code	Neurological table	Update
E17		**June 2014**
Scale **1/100**	**Activities:** Rehabilitation of service users diagnosed with various neurological conditions. **Location:** PTD1 Exercise room, PTD6 Cerebral palsy room.	



Quantity
1

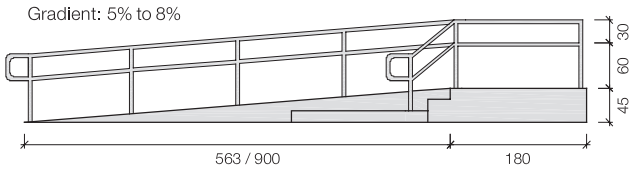
Reference
To be manufactured locally

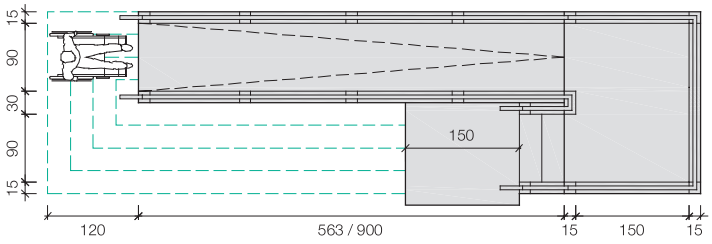
Weight

Electricity
n/a

Description
Each table consists of 2 interconnected units; length: 200 cm, width 100 cm, height 50 cm.

Item code	Wheelchair training slope	Update
E18		**June 2014**
Scale **1/100**	**Activities:** Wheelchair mobility training. **Location:** PTD4 Advanced training court.	





Quantity
1

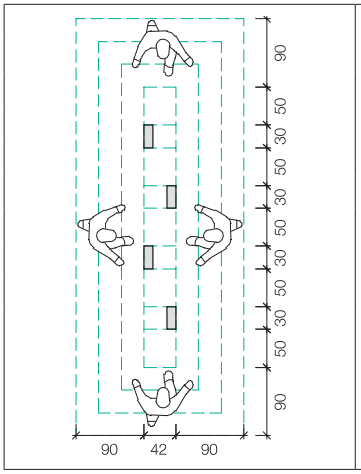
Reference
To be manufactured locally

Weight

Electricity
n/a

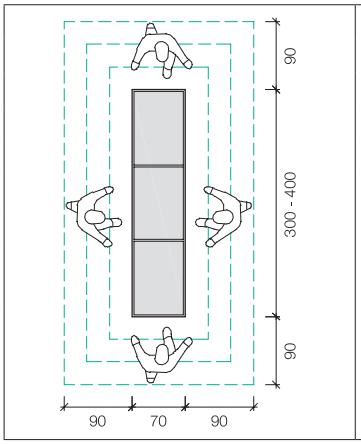
Description

Item code **E19**	**Japanese steps**	Update **June 2014**
Scale **1/100**	**Activities:** Gait training, symmetry of steps. **Location:** PTD4 Advanced training court.	



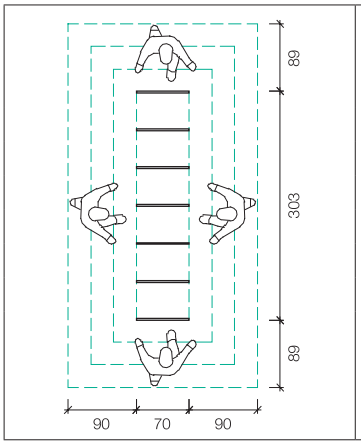
Quantity
1
Reference
To be manufactured locally
Weight
Not significant
Electricity
n/a
Description

Item code **E20**	**Gravel box**	Update **June 2014**
Scale **1/100**	**Activities:** Gait training on various types of uneven ground. **Location:** PTD4 Advanced training court.	



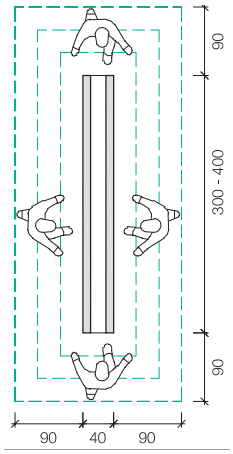
Quantity
1
Reference
To be manufactured locally
Weight
Not significant
Electricity
n/a
Description

Item code **E21**	**Hurdles**	Update **June 2014**
Scale **1/100**	**Activities:** Gait training, balance and coordination exercises for lower limbs. **Location:** PTD4 Advanced training court.	



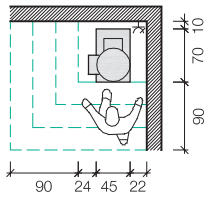
Quantity
1
Reference
To be manufactured locally
Weight
Not significant
Electricity
n/a
Description

Item code **E22**	**Double beams**	Update **June 2014**
Scale **1/100**	**Activities:** Gait training, balance and coordination exercises for lower limbs. **Location:** PTD4 Advanced training court.	



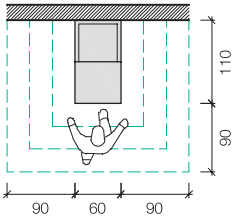
Quantity
1
Reference
To be manufactured locally
Weight
Not significant
Electricity
n/a
Description

Item code **E23**	**Autoclave**	Update **June 2014**
Scale **1/100**	**Activities:** Sterilization of small tools and dressings for sores and wounds of service users with spinal cord injuries. **Location:** PTD5 Nursing room + Sterilization area.	



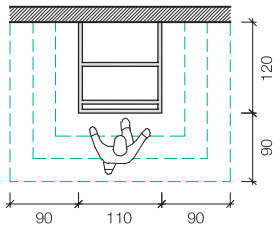
Quantity
Reference
XSTEAUTO90
Weight
240 kg
Electricity
220-380 V
Description
AUTOCLAVE, 90 l, electricity/kerosene, included kerosene burner.

Item code **E24**	**Casting chair**	Update **June 2014**
Scale **1/100**	**Activities:** Casting the patient in a sitting position. **Location:** POD1 Casting room.	



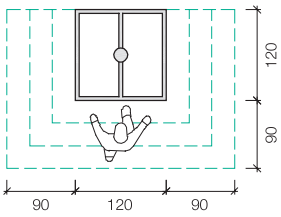
Quantity
1
Reference
To be manufactured locally
Weight
Electricity
n/a
Description
Total height 125 cm, seat height 80 cm, step height 30 cm, side step height 15 cm, arm rest height from seat 22 cm, width 50 cm.

Item code	Casting frame	Update
E25		**June 2014**
Scale **1/100**	**Activities:** Casting the patient in a standing position. **Location:** POD1 Casting room.	



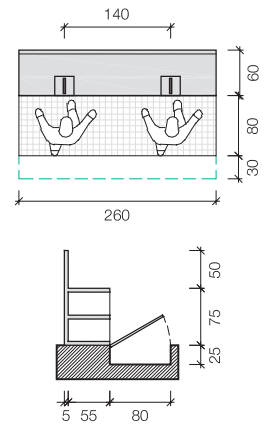
Quantity
1
Reference
To be manufactured locally
Weight
Not significant
Electricity
n/a
Description
See document "The AK casting frame" in the PRP database for more information. This equipment can also stand alone, i.e. in the middle of the room.

Item code	Alignment jig	Update
E26		**June 2014**
Scale **1/100**	**Activities:** Aligning the prosthesis with the distal cup. **Location:** POD2 Rectification room; POD2a Rectification room (variant).	



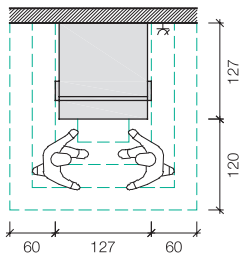
Quantity
1
Reference
OOMAALIGGJ
Weight
77 kg
Electricity
n/a
Description
ALIGNMENT JIG, for prosthesis.

Item code	Plaster rectification table with metal grid	Update
E27		**June 2014**
Scale **1/100**	**Activities:** Rectification of the positive model. **Location:** POD2 Rectification room; POD2a Rectification room (variant).	



Quantity
1
Reference
To be manufactured locally
Weight
Not significant
Electricity
n/a
Description
25 × 25 mm square stainless steel tube and mesh. Flat iron for "hinges" to be welded to grid and bolted to table legs. Hinges allow the grid to be folded up for easy cleaning of floor.

Item code	Oven	Update
E28		**June 2014**
Scale **1/100**	**Activities:** Thermoforming is a manufacturing process in which a PP sheet is heated to a pliable forming temperature and formed to a specific shape around a positive model in plaster of Paris (PoP), using a vacuum pump. **Location:** POD3 Thermoforming room.	




Javier Curras/ICRC

Quantity
2

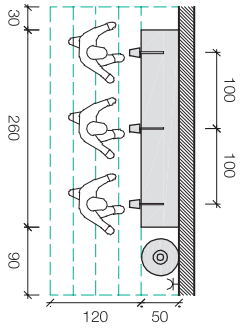
Reference
OOMAOVENCR50G

Weight
360 kg

Electricity
220–380 V, 4600 W

Description
OVEN CR 5000 G 380 V with 2 resistances, Teflon, spare parts. Static heating and tools.

Item code	Vacuum pump + Enveloping suction tube	Update
E29 + E30		**June 2014**
Scale **1/100**	**Activities:** Thermoforming of the orthopaedic device. **Location:** POD3 Thermoforming room.	




Gerald Fitzpatrick/ICRC

Quantity
1

Reference
OOMAVAPUCR10

Weight
115 kg

Electricity
220 V, 750 W

Description
VACUUM PUMP CR 1000 with connection kit and 2 enveloping suction tubes CR8900.

Quantity
3

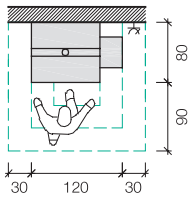
Reference
OOMAVAPUCR101/02/03

Weight
Not significant

Electricity
n/a

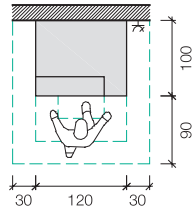
Description
TUBES: big, small or very small.
NB: Maximum of 3 TUBES per OVEN.

Item code **E31**	**Hydraulic injection machine**	Update **June 2014**
Scale **1/100**	**ities:** Production of crutch handles using recycled PP material. **Location:** POD5 Injection room.	



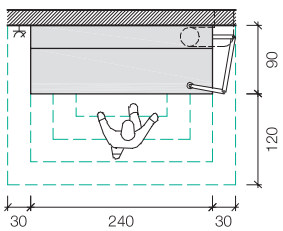
Quantity
1
Reference
OOMAOPRECR75
Weight
462 kg
Electricity
230–400 V, 2100–3700 W
Description
HYDRAULIC INJECTION MACHINE CR7500.

Item code **E32**	**Granulator**	Update **June 2014**
Scale **1/100**	**Activities:** Granulating the polypropylene (PP) leftovers from the orthopaedic device production. **Location:** POD5 Injection room.	



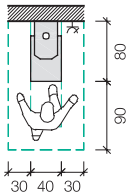
Quantity
1
Reference
OOMAGRAN300
Weight
501 kg
Electricity
400 V
Description
GRANULATOR MACHINE, for PP scraps, type GP 300 R180.

Item code **E33**	**Resin machine**	Update **June 2014**
Scale **1/100**	**Activities:** Lamination of orthopaedic devices. **Location:** POD6 Lamination room + Air-conditioned store.	



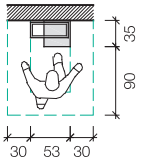
Quantity
1
Reference
–
Weight
137 kg
Electricity
400 V
Description
According to supplier (e.g. Otto Bock catalogue)

Item code	Column drill	Update
E34		**June 2014**
Scale **1/100**	**Activities:** Drilling holes for fixing straps belts and riveting. **Location:** POD4 Assembly room; POD7 Metal room; POD8 Machine room; POD10 Wheelchair assembly room.	



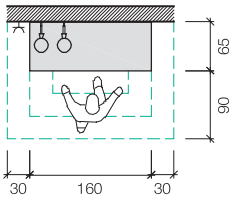
Quantity
1
Reference
EMACDRILC200
Weight
150 kg
Electricity
400 V, 550 W
Description
COLUMN DRILL TYPE, quick chuck 0.3 to 1.6 cm.

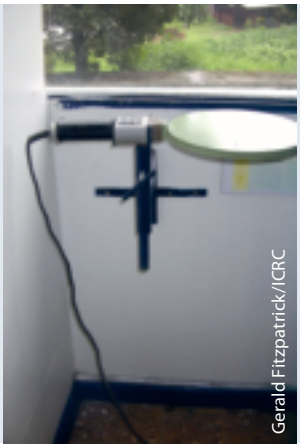
Item code	Manual alignment vice	Update
E35		**June 2014**
Scale **1/100**	**Activities:** Inserting the knee tube into the polypropylene (PP) cast. **Location:** POD4 Assembly room.	



Quantity
1
Reference
OOMAALIGMIM
Weight
90 kg
Electricity
n/a
Description
MANUAL ALIGNMENT VICE, for inserting concave cylinder.

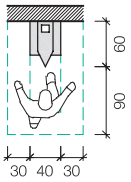
Item code	Welding mirror	Update
E36		**June 2014**
Scale **1/100**	**Activities:** Mirror welding of any polypropylene (PP) components. **Location:** POD4 Assembly room.	





Quantity
2
Reference
OOMAOWELPR28
Weight
4.6 kg
Electricity
220 V, 900 W
Description
WELDING MIRROR, diameter 28 cm.

Item code **E37**	**Anvil**	Update **June 2014**
Scale **1/100**	**Activities:** Riveting or forming metal, aluminium. **Location:** POD4 Assembly room.	



Quantity
1

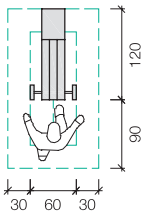
Reference
ETOOANVIL20

Weight
20 kg

Electricity
n/a

Description
ANVIL, with 2 horns.

Item code **E38**	**Cutting device**	Update **June 2014**
Scale **1/100**	**Activities:** Cutting polypropylene (PP), metal or aluminium sheets. **Location:** POD4 Assembly room.	



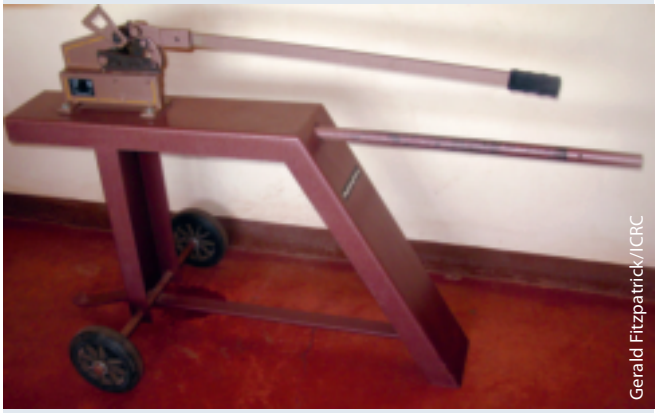
Quantity
1

Reference
EMACCUTTSHE1

Weight
Not significant

Electricity
n/a

Description
CUTTING DEVICE, steel shears
for 0.5 cm sheet, 1.1 cm round bar.



Quantity
1

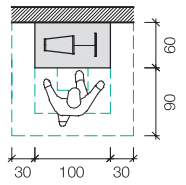
Reference
EMACCUTTSHE2

Weight
Not significant

Electricity
n/a

Description
STEEL STAND with two wheels.

Item code	Sewing machine	Update
E39		**June 2014**
Scale **1/100**	**Activities:** Sewing cushions and pillows for wheelchairs, lumbar jackets, belts, etc. **Location:** POD9 Sewing room.	



Quantity
1

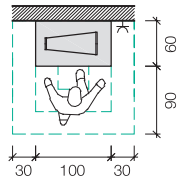
Reference
HMACSEWIL

Weight
Not significant

Electricity
n/a

Description
SEWING MACHINE for leather, foot operated, lower arm 47 cm.

Item code	Sewing machine, zigzag	Update
E40		**June 2014**
Scale **1/100**	**Activities:** Sewing cushions and pillows for wheelchairs, lumbar jackets, straps. **Location:** POD9 Sewing room.	



Quantity
1

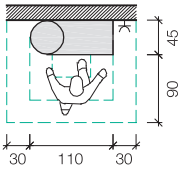
Reference
HMACSEWIZ

Weight
Not significant

Electricity
220 V

Description
SEWING MACHINE, ZIGZAG, electrically operated, light/medium work.

Item code	Dust aspirator	Update
E41		**June 2014**
Scale **1/100**	**Activities:** Collecting dust from the socket router. **Location:** POD8 Machine room.	



Quantity
1

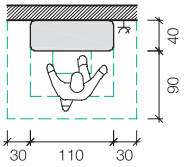
Reference
OOMADUSTAS01

Weight
162 kg

Electricity
230 V, 800–1700 W

Description
DUST ASPIRATOR, for workshop without connecting kit + kit for 3 machines.

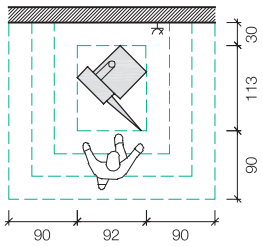
Item code **E42**	**Air compressor unit**	Update **June 2014**
Scale **1/100**	**Activities:** Blowing off dust, inflating tyres for wheelchairs. **Location:** POD8 Machine room.	



Gerald Fitzpatrick/ICRC

Quantity
1
Reference
EMACAIRC0380
Weight
176 kg
Electricity
230–400 V, 2300 W
Description
AIR COMPRESSOR UNIT, 380 l/min, 10 bar, tank 200 l.

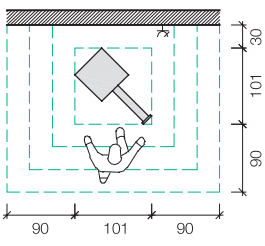
Item code **E43**	**Socket router**	Update **June 2014**
Scale **1/100**	**Activities:** Grinding orthoses and prostheses. **Location:** POD8 Machine room.	




Alessandro GIUSTI/ICRC

Quantity
2
Reference
OOMAMARPOL3500
Weight
Electricity
400 V, 1200–1700 W
Description
GRINDER model 4300 with DISC, diameter 35 cm + LONG AXIS, on stand.

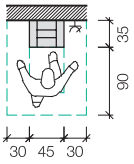
Item code **E44**	**Large belt grinder**	Update **June 2014**
Scale **1/100**	**Activities:** Grinding of orthoses and prostheses. **Location:** POD8 Machine room.	




Gerald Fitzpatrick/ICR

Quantity
1
Reference
OOMAMARPLB25
Weight
Electricity
380 V, 2200–3000 W
Description
LARGE BELT GRINDER model 306, on stand, belt 25 × 200 cm.

Item code **E45**	**Grinder**	Update **June 2014**
Scale **1/100**	**Activities:** Grinding metal. **Location:** POD7 Metal room; POD8 Machine room.	



Quantity
1

Reference
EMACGRINB200

Weight
15 kg

Electricity
220–400 V, 400 W

Description
GRINDER, 2 wheels, diameter 20 cm.

Quantity
1×

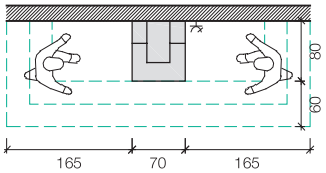
Reference
EMACGRINB20S

Weight

Electricity
n/a

Description
STAND.

Item code **E46**	**Band saw**	Update **June 2014**
Scale **1/100**	**Activities:** Cutting polypropylene (PP), wood and aluminium. **Location:** POD8 Machine room.	



Quantity
1

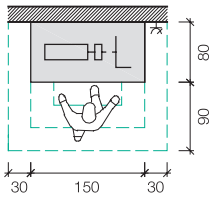
Reference
EMACAIRC0380

Weight

Electricity
380 V, 1900 W

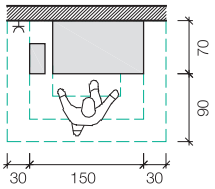
Description
BAND SAW, cutting width 44 cm, height 31 cm, blade 333 cm.

Item code	Lathe machine	Update
E47		**June 2014**
Scale **1/100**	**Activities:** Production of special metal pieces, mainly axes for prostheses and orthoses. **Location:** POD7 Metal room.	



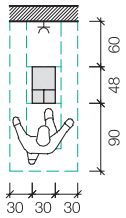
Quantity
1
Reference
Weight
According to supplier
Electricity
380 V
Description
According to supplier

Item code	Welding machine	Update
E48		**June 2014**
Scale **1/100**	**Activities:** Welding metal and aluminium for wheelchairs, prostheses, orthoses. **Location:** POD7 Metal room.	



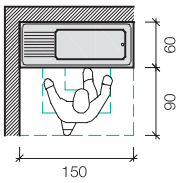
Quantity
1
Reference
OOMAOWELMA01
Weight
50 kg
Electricity
230 V, 440 W
Description
WELDING MACHINE, electric, Primus 210 E.

Item code	Metal-cutting machine	Update
E49		**June 2014**
Scale **1/100**	**Activities:** Cutting metal tubes. **Location:** POD7 Metal room.	



Quantity
1
Reference
EMACSAWSCM01
Weight
Electricity
230 V, 750 W
Description
METAL CUTTING MACHINE, HSS disc, diameter 25 cm, on stand.

Item code **F14**	**Sink with plaster separation tank**	Update **June 2014**
Scale **1/100**	**Activities:** Smoothening the positive plaster model with water and grinding paper, washing hands. **Location:** PTD7 Clubfoot room; POD1 Casting room; POD2 Rectification room; POD2a Rectification room (variant).	



Quantity
1

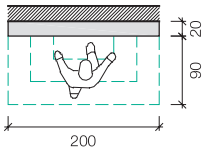
Reference
To be purchased locally

Weight

Electricity
n/a

Description
Plaster separation tank: 0.5 cm, polypropylene sheet 60 × 50 × 50 cm, height matching hand sink, 3 sedimentation sections, lid on top.

Item code **F19**	**Casting brim stand**	Update **June 2014**
Scale **1/100**	**Activities:** Collecting plaster of Paris (PoP) leftovers during rectification. **Location:** POD1 Casting room.	



Quantity
1

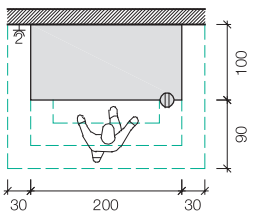
Reference
To be manufactured locally

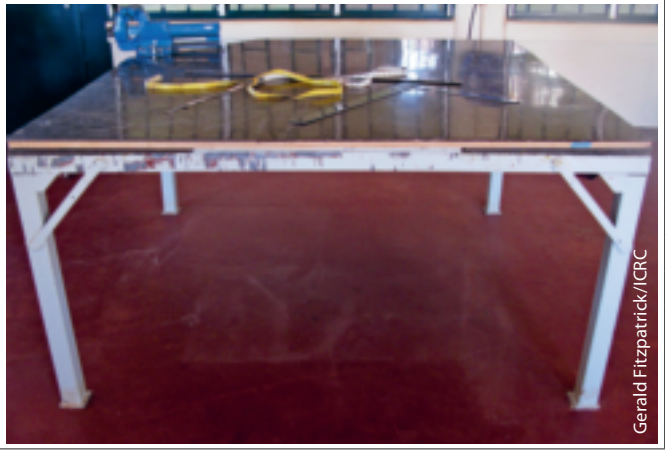
Weight

Electricity
n/a

Description
Wooden piece fixed to lower back of tool board to achieve angulations, fixed to the wall with sturdy screws, washers and plugs.

Item code **F22**	**Cutting table**	Update **June 2014**
Scale **1/100**	**Activities:** Preparing polypropylene (PP) sheets for the thermoforming process. **Location:** POD3 Thermoforming room; POD8 Machine room; ST01 Main store.	





Quantity
1

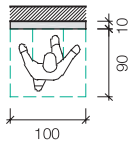
Reference
To be manufactured locally

Weight

Electricity
2× 220 V

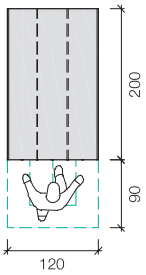
Description
Length 200 cm, width 100 cm, height 80 cm.

Item code **F23**	**Tool board**	Update **June 2014**
Scale **1/100**	**Avities:** Storing tools. **Location:** POD3 Thermoforming room; POD6 Lamination room; POD7 Metal room; POD8 Machine room; POD10 Wheelchair assembly room.	



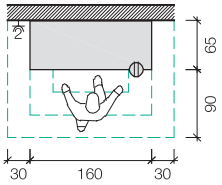
Quantity
1
Reference
To be manufactured locally
Weight
Electricity
n/a
Description
Plywood 1.5 cm, wood 50 × 100 cm × width of tool board, wall plugs, screws for fixation.

Item code **F24**	**PP/EVA sheet storage shelves**	Update **June 2014**
Scale **1/100**	**Activities:** Storing polypropylene (PP) and ethylene vinyl acetate (EVA) sheets. **Location:** POD3 Thermoforming room.	



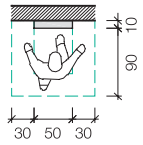
Quantity
1
Reference
To be manufactured locally
Weight
Electricity
n/a
Description

Item code **F25**	**Workbench**	Update **June 2014**
Scale **1/100**	**Activities:** Assembling orthoses and prostheses. **Location:** POD5 Injection room; POD7 Metal room; POD8 Machine room; POD9 Sewing room; POD10 Wheelchair assembly room.	



Quantity
1
Reference
To be manufactured locally
Weight
Electricity
2 × 220 V
Description
Width 160 cm, depth 65 cm, height 80 cm, tool board 60 cm high.

Item code **F29**	**Tool board for router**	Update **June 2014**
Scale **1/100**	**Activities:** Storing tools for router. **Location:** POD8 Machine room.	



Quantity
1

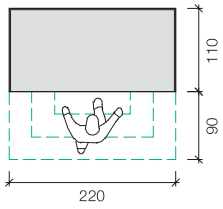
Reference
To be manufactured locally

Weight

Electricity
n/a

Description
Wooden piece fixed to lower back of 1.5 cm plywood tool board to achieve angulations. Wood 50 × 50 cm × width of tool board, wall plugs.

Item code **F35**	**PP sheet storage shelves**	Update **June 2014**
Scale **1/100**	**Activities:** Storing polypropylene (PP) sheets. **Location:** STO1 Main store.	



Quantity
1

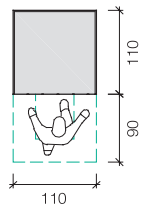
Reference
To be manufactured locally

Weight

Electricity
n/a

Description
35 mm square steel tube, 10 mm plywood, wooden “legs” 5 × 10 × 110 cm.

Item code **F36**	**EVA sheet storage shelves**	Update **June 2014**
Scale **1/100**	**Activities:** Storing EVA sheets. **Location:** STO1 Main store.	



Quantity
1

Reference
To be manufactured locally

Weight

Electricity
n/a

Description
35 mm square steel tube, 10 mm plywood, wooden “legs” 5 × 10 × 110 cm.

4.
ACCESSIBILITY

In its broadest sense, accessibility is generally understood as the possibility to access something, somewhere. For people with disabilities, the concept also implies access to active participation in community life. Community life usually takes place in a physical environment. Inaccessible objects and buildings therefore remain the main obstacle to participation in community life by people with disabilities. Such obstacles can lead to their marginalization and exclusion.

The term "environment" implies more than a physical environment. It can also refer, *inter alia*, to an information and communication environment, a political and legal environment, an institutional environment and an economic environment. Accessibility thus also means the provision of access to this larger environment. Nevertheless, without access to the physical environment, people with disabilities are often unable to access the larger environments.

Access to physical environment lays the foundation for broader accessibility.

In operational contexts, accessibility starts for the ICRC with physical rehabilitation. "[Physical] 'rehabilitation' refers to a process aimed at removing – or reducing as far as possible – restrictions on the activities of people with disabilities and at enabling them to become more independent and enjoy the highest possible quality of life."[39]

Apparatus and physiotherapy treatment provided at a Physical Rehabilitation Centre (PRC) are the first steps to remedying impairments. They restore and enhance functional ability.

The architecture of a PRC also supports this. Because a PRC is conceived as a barrier-free environment, it can be used by service users independently and thus promotes the recovery of their autonomy. In that sense, the architecture of the PRC complements physical rehabilitation. It fosters self-confidence among the service users.

The architecture of a PRC contributes to the removal or reduction of restrictions on the activities of people with disabilities.

In another, less direct, manner, the architecture of a PRC also contributes to the removal or reduction of restrictions on the activities of people with disabilities. In many countries PRP projects have heightened the awareness of accessibility issues at government level and at institutions. They sometimes have even served as a basis for establishing a national rehabilitation service.

As part of the ICRC's rehabilitation strategy, a PRC can also be used to sensitize authorities in some countries to accessibility issues. A PRC can be a leading example. It can show realistic and contextualized solutions for the removal or reduction of obstacles and barriers.

Of all the requirements that need to be met by a PRC, the accessibility of its indoor and outdoor facilities is thus paramount, which is why this handbook devotes a full chapter to that issue. The objective of this chapter is to provide guidance in defining the accessibility requirements for a PRC.

That definition is particularly important for the ICRC because it operates in countries which have very different understandings of accessibility. Some countries have clear definitions, rules and/or regulations, while others have poor standards or even none at all. The specification of a general approach to accessibility is therefore essential to ensure a universal approach on the part of the ICRC. The definition will provide support for project owners and construction project managers. It is among the objectives that they will need to establish at the time of the Vision and Feasibility stages.

39 PRP (ed.), *op. cit.*, p. 4.

What definition of accessibility is applicable to a PRC?

An authoritative interpretation of accessibility that has received attention is "providing flexibility to accommodate each user's needs and preferences."[40] More specifically, "when used with reference to persons with disabilities, any place, space, item or service, whether physical or virtual, that is easily approached, reached, entered, exited, interacted with, understood or otherwise used by persons of varying disabilities, is determined to be accessible."[41]

These two definitions take account of all kinds of disabilities. A disability is an impairment of a person's ability to function. Impairments can be physiological, psychological or anatomical and the degree of impairment may range from mild to severe.

The PRP focuses predominantly on mobility impairments. A PRC building therefore has to incorporate, as a minimum criterion, accessibility requirements addressing mobility impairments.

The incorporation of these requirements does not automatically ensure that the premises are accessible to people with very extensive and complex disabilities, who need more complex arrangements. Nevertheless, their incorporation into the general design enables a large majority of service users to enter, utilize and egress the facilities independently.

Accessibility definition and requirements for new buildings depend largely on national regulations.

Regulations are specified in standards and/or building codes. They can differ substantially from one country to another.

What is the difference between a standard and a building code?

A standard is a document that establishes uniform engineering or technical specifications, criteria, methods, processes or practices. A standard may, for instance, cover specifications for concrete structures or best practices for mechanical ventilation. A standard can also address cross-cutting issues in architecture and engineering, such as accessibility or fire safety. Depending on the country, standards may be *de jure*, i.e. mandatory, or *de facto*, i.e. voluntary.

A building code is a set of minimum specifications, often based on standards, which must be met in the construction of buildings and sometimes in their maintenance. It is rarely one single document. It often consists of a series of documents regulating different aspects of a construction project such as accessibility and fire safety. A building code is mandatory only if it is enforced by a government. When that is the case, checking compliance with a building code can differ widely from one country to another.

In the case of *de jure* standards or an enforced building code, a building has to be compliant with the standards or the code and its compliance has to be checked. How these checks are conducted can differ widely from a country to another. In some countries, the checking of compliance is the responsibility of the design team itself, i.e. the checks are carried out by registered or licensed architects and/or engineers. In other countries, the checking is done by peer or chartered reviewers mandated by the project owner. The latter is the case in the United Kingdom, where the responsibility lies with building control surveyors, or in France with its *bureaux de contrôle*. In some other countries compliance is checked by representatives of national and/or local government authorities.

40 Leo Valdes, *Accessibility on the Internet*, version 1.23, report to the United Nations, 2004 (retrieved in May 2014 from http://www.un.org/esa/socdev/enable/disacc00.htm).

41 UN-DESA (ed.), *Accessibility and Development*, United Nations, New York, 2012 (retrieved in May 2014 from http://www.un.org/disabilities/documents/accessibility_and_development.pdf).

The existence of *de jure* or *de facto* accessibility standards, as well as of an enforced building code including accessibility provisions, must always be checked in order to determine whether there are accessibility requirements applicable to a PRC in a specific country.

Some standards or building codes in a given country may prove to be incomplete or out of date in terms of accessibility. In order to understand how to proceed in such cases, it is necessary to consider the international attention that has been given to the concept of accessibility since the mid-2000s and its outcome.

Accessibility has gained momentum in recent years as a result of the United Nations Convention on the Rights of Persons with Disabilities (CRPD). The CRPD is an international human rights instrument intended to protect the rights and dignity of persons with disabilities. It was adopted in December 2006 during the 61st session of the United Nations General Assembly. It entered into force with an Optional Protocol[42] in May 2008, i.e. it became an international legal instrument. At the time of publication, 158 States and regional integration organizations were signatories and 147 were party[43] to the CRPD (92 States were signatories and 83 party to its Optional Protocol).[44]

By virtue of its Article 1, the States party to the CRPD enter into a commitment "to promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with

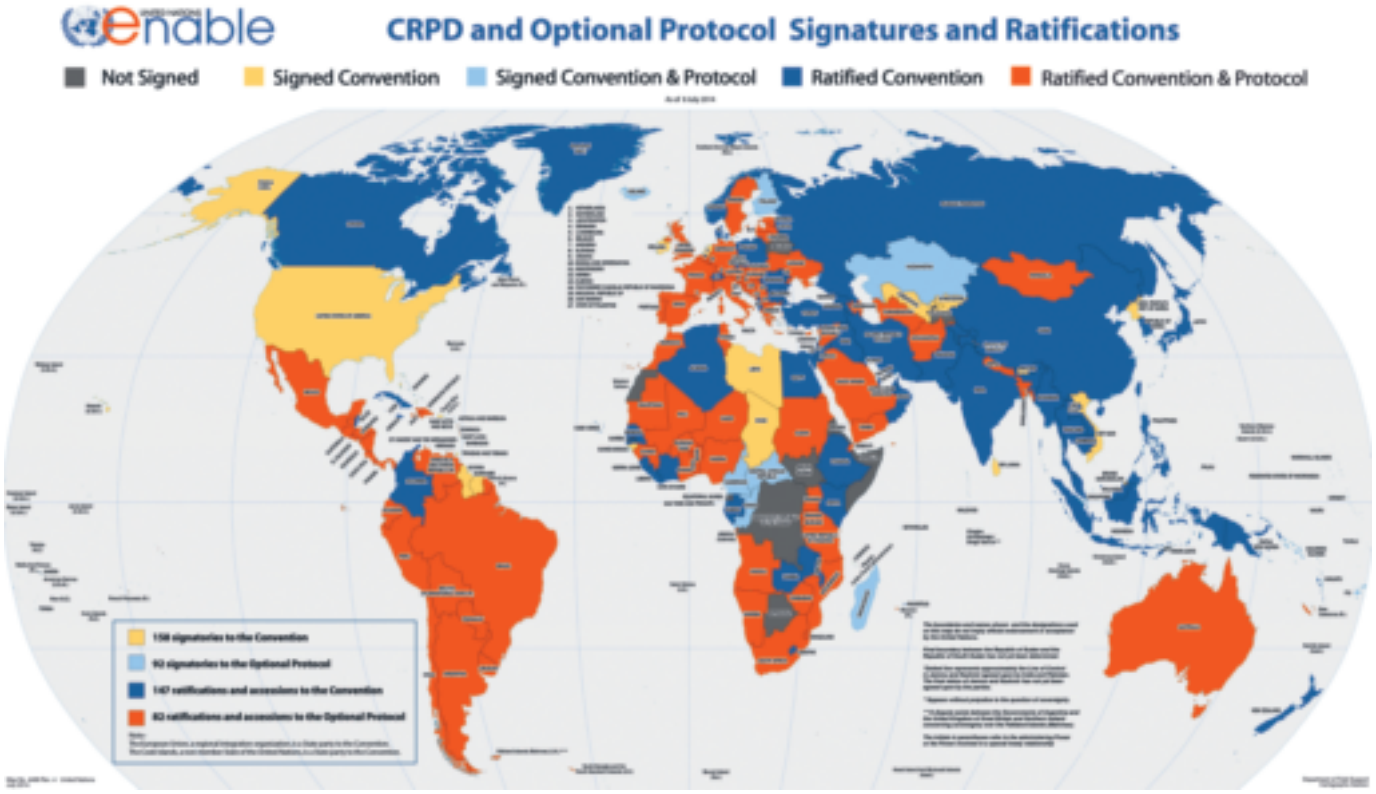


Figure 4.1
CRPD and Optional Protocol Signatures and Ratifications, Map No. 4496, Rev. 3, 2013.
Source: UN Enable.

42 The Optional Protocol gives the Committee on the Rights of Persons with Disabilities, a treaty-based body enabled by the CRPD, competence to examine complaints made by individuals or groups of individuals about alleged violations of the CRPD by States party to the Optional Protocol.

43 UN-DESA *et al.* (eds), *From Exclusion to Equality: Realizing the rights of persons with disabilities, Handbook for Parliamentarians on the Convention on the Rights of Persons with Disabilities and its Optional Protocol*, United Nations, Geneva, 2007, pp. 39-41: "The first step in the process of becoming a party to a treaty is signing the treaty. States and regional integration organizations, such as the European Union, may sign the Convention. […] The Convention and Optional Protocol provide for a simple signing procedure. That means that there are no legal obligations imposed on a signatory State or regional integration organization immediately after the treaty is signed. […] In order to become a party to the Convention and the Optional Protocol, a State must demonstrate, through a concrete act, its willingness to undertake the legal rights and obligations contained in these two instruments. In other words, it must express its consent to be bound by the Convention and the Optional Protocol. […] The Convention and the Optional Protocol both provide for States to express their consent to be bound by signature, subject to ratification. Upon ratification at the international level, the State becomes legally bound by the treaty."

44 The ratification status of the CRPD and its Optional Protocol is regularly updated and can be consulted on the UN Treaty Collection website (retrieved in May 2014 from http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-15&chapter=4&lang=en and http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-15-a&chapter=4&lang=en).

disabilities, and to promote respect for their inherent dignity."[45] In ratifying the CRPD, States Parties undertake to enact laws and other measures to improve disability rights and to abolish legislation, customs and practices that discriminate against people with disabilities.

The CRPD specifically addresses the issue of accessibility of infrastructures. By virtue of its Article 9, States Parties are required to "take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment […] and to other facilities and services open or provided to the public, both in urban and in rural areas. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to, *inter alia:* (a) Buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces […].

States Parties shall also take appropriate measures to:

(a) Develop, promulgate and monitor the implementation of minimum standards and guidelines for the accessibility of facilities and services open or provided to the public;

(b) Ensure that private entities that offer facilities and services which are open or provided to the public take into account all aspects of accessibility for persons with disabilities;

[…]

(d) Provide in buildings and other facilities open to the public signage in Braille and in easy to read and understand forms."[46]

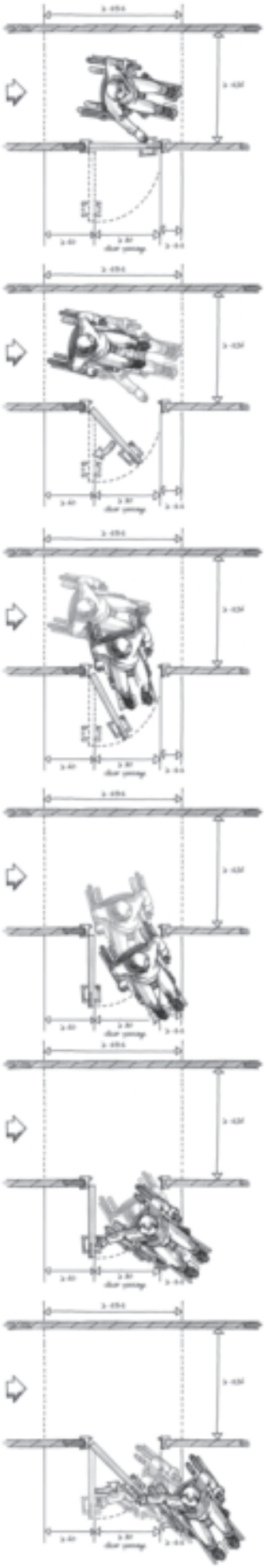
According to Article 11, in situations of risk and humanitarian emergencies, "States Parties shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters."[47]

Following the entry into force of the CRPD, at the end of 2011 the International Organization for Standardization (ISO) published ISO 21542:2011, "Building Construction – Accessibility and usability of the built environment." The Preamble (g) and Articles 9, 10 and 11 of the CRPD are in explicit support of this ISO document.

The ISO is an international standard-setting body founded in 1947. It promulgates international standards known as ISO standards. The organization is composed of members from the national standards bodies of 163 countries, 118 of which are ISO member bodies.[48] ISO standards are considered to be developed by consensus. Once the need for a standard has been established, a vote is cast among ISO member bodies for approval and publication.

Once issued, an international standard may be either used directly or embedded into national regulations, either directly or with modifications to suit the local context. The adoption of an international standard generally results in the creation of an equivalent national standard which refers to the initial international standard.

"ISO 21542:2011 specifies a range of requirements and recommendations for many of the elements of construction, assemblies, components and fittings which comprise the built environment. These



45 Convention on the Rights of Persons with Disabilities (CRPD), adopted on 13 December 2006, entered into force on 3 May 2008. Available in United Nations, *Treaty Series*, Vol. 2515, United Nations, New York, 2011, pp. 3-192, p. 72.
46 *Ibid.*, pp. 76-77.
47 *Ibid.*, p. 78.
48 A list of ISO members, ISO correspondents and ISO subscribers is available on the ISO website at http://www.iso.org/iso/home/about/iso_members.htm.

Figure 4.2 (previous page)
ICRC recommended dimensions for doors based on ISO 21542:2011: lateral access, opening by pushing
Pierre-Antoine Thierry/MEDDE

requirements relate to the constructional aspects of access to buildings, to circulation within buildings, to egress from buildings in the normal course of events and evacuation in the event of an emergency."[49]

This standard is a comprehensive document that has been developed to incorporate hearing, vision, mobility, cognitive and hidden impairments.

Because of the attention given to the CRPD, many national standards bodies have adopted a position on ISO 21542:2011. As stated in its introduction, "in some countries a higher level of technical specifications has been achieved due to their long history in developing accessible building standards and regulations. The requirements of this International Standard are not intended to replace more demanding requirements defined in those national standards or national regulations."[50] At the same time, some less demanding elements have been incorporated into the international standard so that developing countries can avoid inappropriate specifications.

As a result, some countries have adopted, or are in the process of adopting, ISO 21542:2011. Others have considered but not adopted it because their standards already established higher levels of recommendations and guidance. In both cases, ISO 21542:2011 nevertheless constitutes a minimum level of requirements.

The definition of accessibility requirements applicable to a PRC depends largely on national regulations. When there are no regulations or regulations are incomplete, the minimal accessibility standards for a PRC must encompass requirements relating to mobility impairments.

Taking note of the importance of the CRPD and its relation to international humanitarian law, "the ICRC promoted a resolution which specifically 'enhances the protection of persons with disabilities during armed conflict'"[51] at the 31st International Conference of the Red Cross and Red Crescent in 2011. In mid-2012, "the ICRC Directorate, stressing the importance of the CRPD, initiated a process to establish an internal ICRC Framework on Persons with Disabilities, spelling out the organization's strategic plans and orientation in this area."[52]

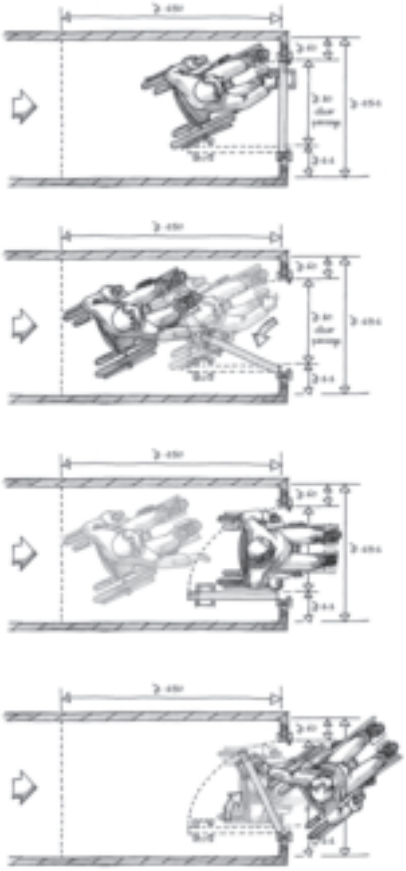


Figure 4.3
ICRC recommended dimensions for doors based on ISO 21542:2011: frontal access, opening by pulling
Pierre-Antoine Thierry/MEDDE

In 2013, within the International Red Cross and Red Crescent Movement, a resolution of the Council of Delegates identified that the Movement's components "can do more to prevent the incidence of disabilities and to support the full inclusion of persons with disabilities, ranging from addressing their needs and contributing to the removal of barriers to their active participation, sense of belonging and inclusion through humanitarian diplomacy at the national, regional and international levels, to changing mindsets and behaviour from stigma and exclusion to respect for diversity and social inclusion."[53]

Given this guidance, and conscious of the exemplary status that physical rehabilitation activities may have in some countries, the international standard ISO 21542:2011 is considered as the ICRC's reference standard for physical rehabilitation centre construction projects. The reference to ISO 21542:2011 nevertheless concerns only its requirements and recommendations related to mobility impairments. Use of this reference does not mean that ISO 21542:2011 requirements are the minimum ICRC requirements for PRC projects. It presents target objectives. Contextualization leading to adaptations may occur.

There are at least two major reasons for using the ISO 21542:2011 standard as a reference. First, this international standard is the result of a consensus between a large numbers of countries. Adopted or embedded into national regulations, this standard frequently constitutes a minimum set of requirements

49 Abstract of ISO 21542:2011 posted on the ISO website (retrieved in May 2014 from http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=50498).
50 Committee ISO/TC59/SC16 (ed.), *Building construction – Accessibility and usability of the built environment*, ISO 21542:2011, International Organization for Standardization, Geneva, 2011, p. ix.
51 Statement delivered by Claude Tardif to Round Table One "International and Regional Cooperation and partnerships for disability inclusive development" at the High-level Meeting of the General Assembly on the Realization of the Millennium Development Goals and Other Internationally Agreed Development Goals for Persons with Disabilities, United Nations, New York, 2013, p. 3 (retrieved in May 2014 from https://papersmart.unmeetings.org/media2/107588/icrc.pdf).
52 *Ibid*., p. 3.
53 ICRC, *Promoting disability inclusion in the International Red Cross and Red Crescent Movement* (adopted resolution CD/13/R9), Council of Delegates of the International Red Cross and Red Crescent Movement, Sydney, 2013.

for many States party to the CRPD. Second, the possibility of referring to the ISO international standard puts an end to the mobilization of so-called "international" references in the field. These "international" references are in fact mostly national standards of more economically developed countries or their popularization in humanitarian contexts. The reference to a recognized international standard avoids taking part unintentionally in the power struggle between some States over standards in some contexts in which the ICRC operates.

The use of ISO 21542:2011 as a reference has to be evaluated on a case-by-case basis.

As already mentioned, the existence of *de jure* or *de facto* accessibility standards, as well as of an enforced building code including accessibility provisions, has to be checked at an early phase of the project development cycle, at the Feasibility stage.

This evaluation, together with the identification of the controlling process(es) established, is not, however, limited to accessibility and encompasses other aspects of a construction such as, *inter alia*, fire safety and seismic engineering. Two different scenarios may arise.

First scenario: the country or region has an enforced building code or set of *de jure* standards. In that case the ICRC complies with it. If, however, those standards or the building code are/is incomplete or out of date, the ICRC can voluntarily decide to over-engineer. In that case, the ISO 21542:2011 requirements relating to mobility impairments will constitute the minimum reference.

Second scenario: the country has neither an enforced building code nor standards. In that case, the ICRC voluntarily decides to over-engineer. The minimum reference is then ISO 21542:2011 with its key accessibility requirements relating to mobility impairments.

This reference to ISO 21542:2011 must be contextualized.

Because of an extensive copyright policy, ISO prohibits the reproduction or use in any form of any part of its standards. This policy unfortunately prevents any dissemination of the key elements of this standard in this handbook. Some principles can be nevertheless mentioned.

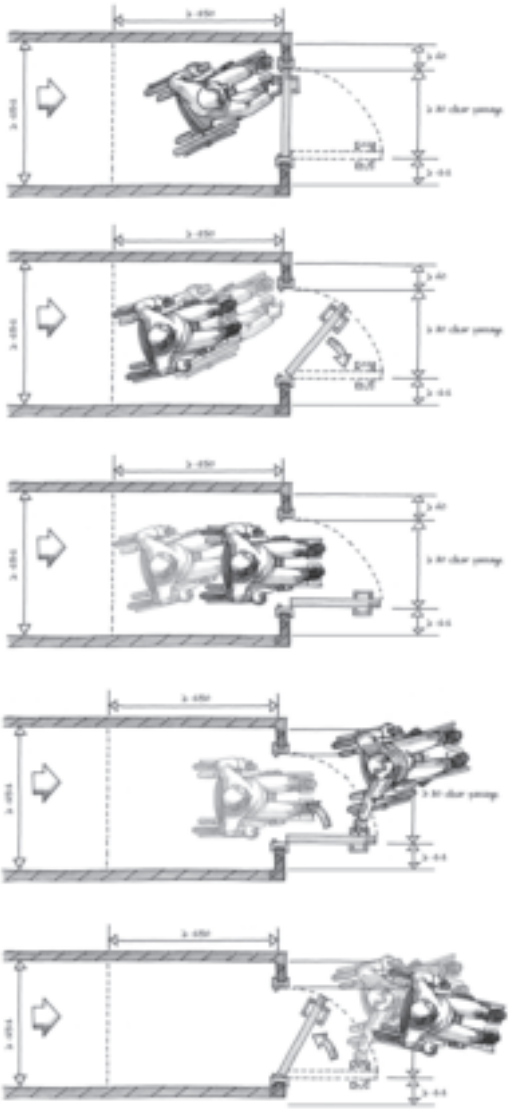


Figure 4.4
ICRC recommended dimensions for doors based on ISO 21542:2011: frontal access, opening by pushing
Pierre-Antoine Thierry/MEDDE

If ISO 21542:2011 is used as a reference for the construction of a PRC, it does not mean that it must apply in its entirety. The international standard includes some provisions for developing countries. However, some of its requirements and recommendations are not appropriate to some contexts in which the ICRC works. They therefore have to be contextualized.

ISO 21542:2011 should nevertheless act as a framework. It defines key accessibility issues, of which the following one must be considered for mobility impairments:

- An equitable approach to buildings;
- Equitable entry;
- Equitable use of the same horizontal and vertical paths;
- Equitable use of equipment and furniture;
- Equitable use of toilet and sanitary facilities;
- Equitable exit and evacuation routes (fire safety provisions).

The key accessibility issues considered for a project, and their derivatives, must be identified at the Feasibility stage.

Once the main requirements have been identified, some adaptations may be necessary. Some of these adaptations may ease the international standard requirements whereas some others may amplify them.

For instance, the dimensions of wheelchairs considered in ISO 21542:2011 are 80 × 130 cm. These dimensions induce a minimal horizontal manoeuvring space of 150 × 150 cm clear of obstacles to enable a

Figures 4.5 and 4.6
ICRC recommended dimensions for the reception counter based on ISO 21542:2011
Pierre-Antoine Thierry/MEDDE

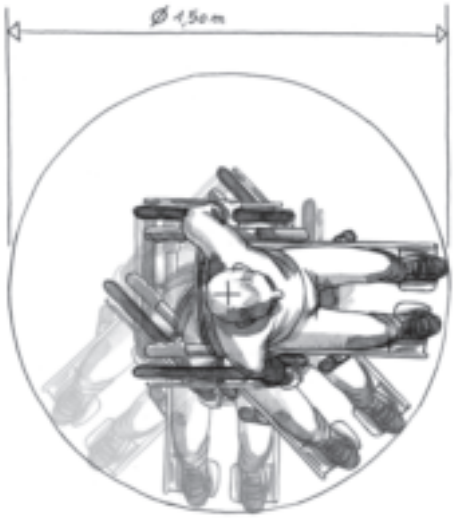


Figure 4.7
Manoeuvring spaces for a four-wheeled wheelchair, compliant with ISO 21542:2011
Pierre-Antoine Thierry/MEDDE

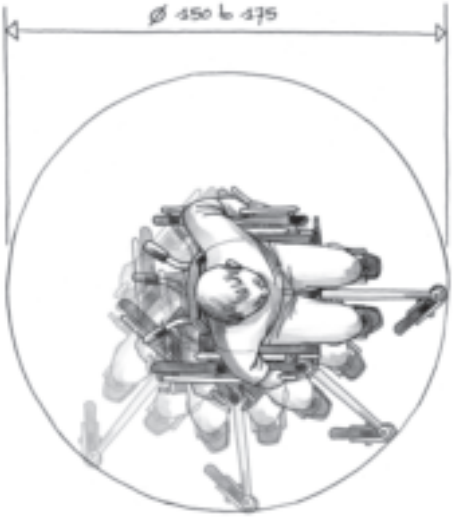


Figure 4.8
Manoeuvring space for a three-wheeled wheelchair, based on ICRC evaluation
Pierre-Antoine Thierry/ICRC

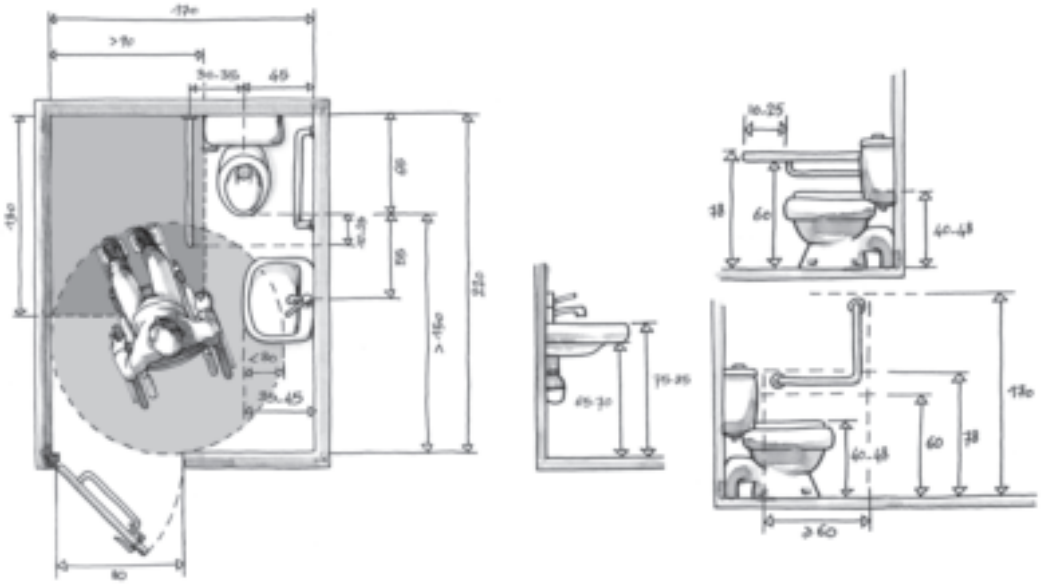


Figure 4.9
Recommended dimensions for toilets with lateral transfer from one side based on ISO 21542:2011 type C toilet room
Pierre-Antoine Thierry/ICRC




Figures 4.10 to 4.13
Different wheelchairs and tricycles used by the ICRC
David Constantine/MOTIVATION

change of direction. In each different context in which the ICRC works, the average dimensions of the different wheelchairs used by service users must be checked. It is not rare for three-wheeled wheelchairs used in developing countries to need a 175 cm-diameter turning space clear of obstacles. In some countries, this circle may be as much as 200 cm in diameter.

The same principle applies to prone trolleys, which are not considered in the international standard. If the PRC offers service users treatment on prone trolleys, these items of equipment must be measured and a clear manoeuvring space calculated and incorporated into the architectural programme and the designs.

To conclude the discussion of these principles, when a PRC is erected in a remote area or has to take account of the specific cultural habits of its service users, the appropriateness of some of ISO 21542:2011 requirements may again be called into question. While its framework is still useful for the identification of key accessibility issues, solutions may not always be appropriate in low-resource contexts with traditional forms of construction and informal settlements, for instance.

In such cases, requirements may be adapted on the basis of *ad hoc* studies such as those conducted by the Water, Engineering and Development Centre at Loughborough University (UK). One of them[54] focuses on access to the domestic water supply and sanitation and proposes adapted solutions for toilet facilities and water stands. The requirements for mobility impairments in ISO 21542:2011 may then be adapted or replaced by some of the simple, low-cost and maintainable recommendations put forward in this study.

54 Hazel Jones & Bob Reed, *Water and sanitation for disabled people and other vulnerable groups: designing services to improve accessibility*, Loughborough University (Water and Development Centre), Loughborough, 2005.

ANNEXES

Annex 1
VISION TEMPLATE

For construction projects eligible for the PMCP

The following document has been developed as a template for construction projects eligible for the Protocol for the Management of ICRC Construction Projects (PMCP).

The PMCP is accessible from the WatHab RefMan database.

- Grey in this template: Guidelines that have to be deleted in the final document.
- Black in this template: Text to be used as it is and not deleted.

Once completed, the Vision (excluding its annexes) may not exceed four A4 pages printed on both sides.

A. GENERAL

A.1 Executive summary (PRP + Management)

Vision summarized in a maximum of one paragraph.

A.2 Situation analysis (Management)

Extracts (copy and paste) from the last PfR if the situation analysis has not changed.
If necessary, expand to give further explanation.

Planned activities are implemented in a certain environment. The aim is to gain a clear understanding of the environment and relevant stakeholders. The situation analysis sets the framework for an ICRC operation in a specific country or context. It must be relevant to the entire operation, not only to a programme.

Add, if necessary, a summary of recent developments in national, regional and international politics as well as in the economic, environmental and social situation, with a clear focus on events which:

- occurred since the last PfR;
- will have an impact on the trends that you are anticipating for the coming year.

A.3 Problem analysis for the target population (PRP + Management)

Extracts (copy and paste) from the last PfR if the problem analysis has not changed and the project associated with this Vision has already been presented.
If necessary, expand to give further explanation.
If the project was not previously considered, summarize the evolution in the problem analysis leading to its being considered now.

Whereas the situation analysis relates to an entire country or context, in the problem analysis the focus is on the problems of the different target populations for which activities are to be developed.

This analysis is intended to synthesize the situation, problems, needs and demands of the target population. The text must enable the reader to comprehend the rationale of the operational strategies. It must include, *inter alia*:

- facts and figures;
- existing stakeholders (authorities, NGOs, etc.).

A.4 Expected humanitarian impact (PRP + Management if necessary)

The expected humanitarian impacts are the intended positive effects or the significant changes that the delegation is realistically expecting for the target population. It is framed by the long-term vision defined for the context (see "A.2 Situation analysis") and is based on the findings described under "A.3 Problem analysis."

A list (bullet points) of the different kinds of impact that should be achieved by the action programme as a whole should include:

- Improve access to health care for those needing it;
- Improve level of health-care standards for the medical staff;
- Partnership with the National Red Cross/Red Crescent Society;
- Improve ICRC visibility/strategic anchorage.

A.5 Specific operational strategies (PRP + Management if necessary)

Based on the most likely scenario developed in the problem analysis and on the results of an ICRC internal SWOT analysis, describe how the delegation intends to contribute to the expected humanitarian impact for the target population (what combination of modes of action, what programmes and, if relevant, special approaches for women, children and other specific categories).

As well as the expected humanitarian impacts, the specific operational strategies are framed by the long-term vision defined for the context (see "A.2 Situation analysis") and is based on the findings described under "A.3 Problem analysis."

A list (bullet points) of the various operational strategies that should be incorporated into the action programme as a whole should include:

- Training for staff;
- Involvement of the National Red Cross/Red Crescent Society;
- Maintenance of existing structures;
- Construction of a new Physical Rehabilitation Centre (PRC).

	Helpful To achieve the objective	**Harmful** To achieve the objective
Internal origin Attributes of the ICRC	**Strengths**	**Weaknesses**
External origin Attributes of the context	**Opportunities**	**Threats**

B. CONSTRUCTION PROJECT

B.1 Formulation of objectives (PRP)

Extracts (copy and paste) from the last PfR if the construction project associated with this Vision was previously considered.
If necessary, expand to give further explanation.

Data extracted from the PfR (ONLY IF DATA EXIST)	
General objective (GO) code	OU-WSGASSENG
GO formulation	
Specific objective (SO) Title and number	
SO formulation	
Budget	

If the construction project associated with this Vision was not considered at the time of PfR, please:

- specify the GO to which it will be financially linked during the coming year (to incorporate into the next PfR);
- formulate the project construction objectives (to incorportate into the next PfR).

GO financially linked	
GO formulation	

Note: Because the construction of a Physical Rehabilitation Centre (PRC) has a clearly defined time frame, a budget, results to be achieved and a dedicated project manager if the Protocol is activated, a GO Project may be considered.

B.2 Schematic project brief (PRP)

Description (one page maximum) of the project proposal including, *inter alia*:

- Groups to be rehabilitated: lower and upper-limb amputees, people suffering from post-polio-myelitis syndrome and other people with disabilities such as people with spinal cord injuries and children with clubfoot or cerebral palsy;
- Total number of service users expected per annum;
- Number of physiotherapy-only service users expected per annum;
- Expected production capacity per annum: x prostheses, x orthoses, x walking aids and x wheelchairs;
- Type and size of services: clinical area, physiotherapy (PT), prosthetics and orthotics (P&O), service user accommodation, administration, storage, guest house;
- Staffing: P&O technicians, benchworkers, PT staff, general staff, administrative and management staff;
- Cultural, social and environmental aspects to consider: gender separation, prayer area, etc.

Notes

- The final programme will be adapted and completed during the feasibility study.
- The list of rooms given below can be completed in XLS format and appended to the Vision.

Room function	Number	Size (m²)	Requirements/comments

B.3 Other considerations (PRP)

- Description of different phases if necessary: short-term and mid-term constructions;
- Description of possible partnerships with counterparts;
- Considered location(s) for the project and ownership description: an existing building(s) to be renovated/converted or a plot(s) of land.

Reminder

No commitment to external partners or resources mobilization before the Feasibility "go-ahead." According to the Protocol, except in extraordinary circumstances, no commitment or offer for a plot may be entered into at the Vision stage.

Region	City		Coordinates (decimal degrees)	Altitude (m)	Geoportal link (polygon)
		1st area or plot considered			
		2nd area or plot considered			

B.4 Annexes (PRP)

Plot location, pictures, plan of existing premises, etc.

Annex 2
FEASIBILTY TEMPLATE

For construction projects under the PMCP

The following document has been developed as a template for construction projects activated under the Protocol for the Management of ICRC Construction Projects (PMCP).

- Grey in this template: Guidelines that have to be deleted in the final document.
- Black in this template: Text to be used as it is and not deleted.

Annex 3
NEW PHYSICAL REHABILITATION CENTRES IN YEMEN AND MYANMAR

In 2013 and 2014, a feasibility study in Sa'ada, Yemen, and another in Myitkyina, Myanmar, were developed with the support of a preliminary draft of this handbook.

Plans of both projects are presented in this Annex and follow the same structure as the ten-centre study in order to facilitate their reading.

Tables 1, 2 and 3 of section 2.2 are also reproduced here and supplemented by data and expected statistics on the Sa'ada and Myitkyina PRC projects.

	Battambang	Beira	Faizabad	Hpa-An	Juba	Kabul	Kampong Speu	Muzaffarabad	Port-au-Prince	Rakrang	Myitkyina	Sa'ada
Fully enclosed and covered area (FECA) (m²)	1,938	597	1,731	1,106	1,217	7,121	937	2,441	1,657	476	1,855	2,446
FECA/TFA percentage	64%	64%	96%	55%	64%	96%	60%	85%	97%	100%	57%	93%
Partially enclosed and covered area (PECA) (m²)	1,068	304	70	913	665	280	615	426	14	–	1,412	188
PECA/TFA percentage	36%	33%	4%	45%	35%	4%	40%	15%	1%	–	43%	7%
Unenclosed, uncovered and contained area (UUCA) (m²)	–	27	–	–	33	–	–	–	31	–	–	–
UUCA/TFA percentage	–	3%	–	–	2%	–	–	–	2%	–	–	–
Total floor area (TFA) (m²)	**3,006**	**928**	**1,801**	**2,019**	**1,915**	**7,401**	**1,552**	**2,867**	**1,702**	**476**	**3,267**	**2,634**
Net floor area (NFA) (m²)	**2,755**	**852**	**1,509**	**1,906**	**1,743**	**6,498**	**1,483**	**2,598**	**1,518**	**436**	**2,970**	**2,171**
NFA/TFA ratio	0.92	0.92	0.84	0.94	0.91	0.88	0.96	0.91	0.89	0.92	0.91	0.82
Plot area (PA) (m²)	**11,916**	**–**	**3,000**	**6,785**	**3,424**	**16,080**	**3,250**	**5,202**	**16,050**	**–**	**5,840**	**9,453**
Plot ratio (PR) = TFA/PA	0.3	–	0.6	0.3	0.6	0.5	0.5	0.6	0.1	–	0.6	0.3

Table III.1
TFA, NFA, plot ratio and NFA/TFA ratio of Myitkyina and Sa'ada PRCs (integrated into Table 1)

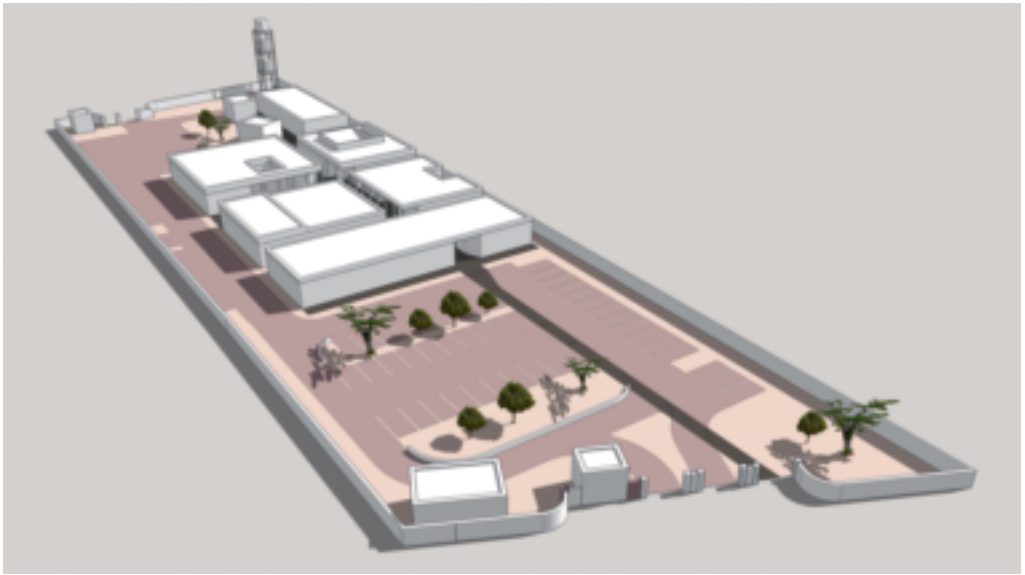


Figure III.1
Aerial view from the 3D model for the Sa'ada PRC.

	Battambang	Beira	Faizabad	Hpa-An	Juba	Kabul	Kampong Speu	Muzaffarabad	Port-au-Prince	Rakrang	Myitkyina	Sa'ada
Circulation area	562	402	146	460	359	662	79	631	606	34	426	370
CIR (m²)	20%	47%	10%	24%	22%	10%	5%	24%	40%	8%	14%	17%
Clinical area	118	31	102	41	103	437	52	120	143	36	247	222
CLI (m²)	4%	4%	7%	2%	6%	7%	4%	5%	9%	8%	8%	10%
PT department	634	74	269	284	195	1,674	324	215	302	117	984	549
PTD (m²)	23%	9%	18%	15%	11%	26%	22%	8%	20%	27%	33%	25%
P&O department	322	254	111	296	215	1,536	237	378	182	178	425	338
POD (m²)	12%	30%	7%	16%	12%	24%	16%	15%	12%	41%	14%	16%
Service user accommodation	656	–	319	503	449	798	429	672	–	–	466	257
SUA (m²)	24%	–	21%	26%	26%	12%	29%	26%	–	–	16%	12%
Administration	110	55	159	184	161	357	196	202	185	19	259	234
ADM (m²)	4%	6%	11%	10%	9%	6%	13%	8%	12%	4%	9%	11%
Storage	209	36	227	88	103	812	138	174	46	32	145	133
STO (m²)	8%	4%	15%	5%	6%	12%	9%	7%	3%	7%	5%	6%
Services area	144	–	106	50	127	221	27	122	54	–	18	68
SER (m²)	5%	–	7%	3%	7%	3%	2%	5%	4%	–	1%	3%
Guest house	–	–	70	–	–	–	–	–	–	–	–	–
GUE (m²)	–	–	5%	–	–	–	–	–	–	–	–	–

Table III.2
NFA breakdown by service at Myitkyina and Sa'ada PRCs (integrated into Table 2)

		Battambang	Beira	Faizabad	Hpa-An	Juba	Kabul	Kampong Speu	Muzaffarabad	Port-au-Prince	Rakrang	Myitkyina	Sa'ada
Total service users per annum		**7,747**	**–**	**7,226**	**2,548**	**1,416**	**31,922**	**3,316**	**4,878**	**3,013**	**542**	**2,000**	**2,040**
Devices produced per annum	**Prostheses**	1,162	173	177	1,030	276	1,173	435	991	90	565	360	240
	Orthoses	614	121	699	16	100	5,325	552	745	712	9	540	360
	Walking aids (pairs of crutches)	1,263	–	777	660	423	2,553	316	568	6	258	1,000	–
	Wheelchairs	352	–	43	15	77	471	228	129	36	41	50	240
SU for PT only, per annum		**4,200**	**–**	**5,954**	**898**	**708**	**22,268**	**1,462**	**1,491**	**244**	**498**	**750**	**1,200**
Beds		**94**	**20**	**50**	**52**	**60**	**150**	**40**	**55**	**–**	**(63)**	**55**	**28**
Staff	**P&O technicians**	9	6	9	8	14	26	6	8	5	7	3	6
	Benchworkers	15	3	1	7	2	108	7	12	2	5	9	6
	PT	9	0	13	4	5	46	5	6	3	8	2	6
	General staff	20	4	29	18	12	80	17	14	34	5	14	28
	Admin. and management	4	2	2	6	2	8	3	8	3	3	6	5
	Total	**57**	**15**	**54**	**43**	**35**	**268**	**38**	**48**	**47**	**28**	**34**	**51**

Table III.3
Expected activity statistics and staffing at Myitkyina and Sa'ada PRCs (integrated into Table 3)

Figure III.2
Aerial view of the 3D model for the Myitkyina PRC

Figure III.3
Plan of the Sa'ada PRC as designed in the feasibility study, February 2014

Sa'ada (Yemen, 2014)

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Assessment room	CLI3	38
002	Office		25
003	Office		25
004	Office		18
005	Office		13
006	Archives		10
007	Scullery		10
008	WC (male)		8
009	WC (female)		8
010	Office		25
011	WC (male)		7
012	Social services		12
013	Waiting room (male)	CLI2	23
014	Reception	CLI1	23
015	Meeting/training room	ADM1	46
016	WC (female)		9
017	Waiting room (female)	CLI2	40
018	WC		13
019	Casting room	POD1	35
020	Casting room	POD1	35
021	Fitting room	CLI3	30
022	Fitting room	CLI3	30
023	Clubfoot room	PTD7	24
024	Cerebral palsy room	PTD6	36
025	Store		5
026	WC (female)		10
027	Exercise room (female)	PTD1	120
028	Individual treatment cubicle (female)	PTD2	13
029	Individual treatment cubicle (female)	PTD2	13
030	Advanced training court (female)	PTD4	86
031	Assembly room	POD4	112
032	Rectification room	POD2	35
033	Thermoforming room	POD3	40
034	Machine room	POD8	40
035	Wheelchair assembly room	POD10	18
036	Office		10
037	Exercise room (male)	PTD1	120
038	Individual treatment cubicle (male)	PTD2	13
039	Individual treatment cubicle (male)	PTD2	13
040	Daily store	STO2	8
041	WC (male)		10
042	Changing room (staff - female)		13
043	WC (staff - female)		4
044	Changing room (staff - male)		13
045	WC (staff - female)		4
046	Main store	STO1	119
047	Maintenance room		15
048	Bin store		15
049	Prayer room		30
050	Dining room		55
051	Kitchen		36
052	Housekeeping room		2
053	Kitchen store		6
054	Laundry		6
055	Dormitory (male)		18
056	Dormitory (male)		12
057	Dormitory (male)		18
058	Bathroom (male)		19
059	Bathroom (female)		19
060	Dormitory (female)		18
061	Dormitory (female)		18
062	Guard room		11
063	Guard room		11
064	Generator		38
065	Advanced training court (male)	PTD4	91
066	Outdoor wheelchair exercise court		
067	Outdoor sports court	PTD3	
068	Water tower		
	Circulation area		370
Net floor area (NFA)			**2,171**

Room list	Quantity (room)	Users	Usable area m²	Services area m²	Circulation area m²
Administration area					
Management office	1		25		
Administration office	1		25		
Head of PT office	1		18		
Office	2		38		
Meeting room / Training room	1		46		
Scullery	1		10		
Guard room (entrance control)	2		22		
WC	2		16		
Changing room + bathroom + WC	2		34		
Subtotal			**234**	**0**	
Clinical area					
Reception	1		23		
Archives	1		10		
Social services	1		12		
Waiting area + Relative education	2		63		
WC	2		16		
Assessment room	1		38		
Fitting room	2		60		
Subtotal			**222**	**0**	
Prosthetics and Orthotics Department					
Casting room	2		70		
Rectification room	1		35		
Thermoforming room	1		40		
Assembly room	1		112		
Machine room	1		40		
Wheelchair assembly room	1		18		
WC	1		13		
Head of P&O office	1		10		
Subtotal			**338**	**0**	
Physiotherapy Department					
Exercise room	2		240		
Advanced training court	2		177		
Individual treatment cubicle	4		52		
WC	2		20		
Clubfoot room	1		24		
Cerebral palsy room	1		36		
Wheelchair exercise court (uncovered)	1				
Subtotal			**549**	**0**	

Service user accommodation					
Dormitory (female and children)	2		36		
Dormitory (male)	3		48		
Bathrooms + WC (male)	2		19		
Bathrooms + WC (female)	2		19		
Dining room + Communal area	1		55		
Kitchen	1		36		
Kitchen store	1		6		
Laundry + Drying area + Ironing area	1		6		
Prayer room (mosque)	1		30		
Housekeeping room	1		2		
Subtotal			**257**	**0**	

Services area					
Generator room + fuel store	1			38	
Maintenance room	1			15	
Waste management	1			15	
Store	1		5		
Daily store			8		
Main store	1		120		
Subtotal			**133**	**68**	

Reference					
Totals	UA	ISO 9836:2011 para. 5.1.7	1,733		
	SA	ISO 9836:2011 para. 5.1.8		68	
	CA	ISO 9836:2011 para. 5.1.9			370
	Ratios			3%	17%
Net floor area	NFA	ISO 9836:2011 para. 5.1.5	**2,171**		

Fully enclosed and covered area	FECA	ISO 9836:2011 para. 5.1.3.1-a	**2,446**
Partially enclosed and covered area	PECA	ISO 9836:2011 para. 5.1.3.1-b	**188**
Unenclosed, uncovered and contained area	UUCA	ISO 9836:2011 para. 5.1.3.1-c	**0**
Total floor area	TFA	ISO 9836:2011 para. 5.1.3	**2,634**

NFA/TFA ratio	**0.82**

Plot area	**9,453**

Plot ratio	**0.28**

Note: Light blue cells are inputs; blue cells are results.

Figure III.4
Plan of the Myitkyina PRC as designed in the feasibility study, July 2014

Myitkyina (Myanmar, 2014)

Key

No.	DESIGNATION	CODE (section 3.2)	AREA (m²)
001	Waiting area + Relative education	CLI2	64
002	Reception	CLI1	27
003	Archives		18
004	Management office		18
005	Head of PT office		18
006	Head of P&O office		18
007	Administration office		26
008	WC		18
009	Social services		18
010	Meeting/training room	ADM1	40
011	WC (male)		18
012	Dormitory (staff)		18
013	Dormitory (male)		60
014	Dormitory (male)		60
015	Dormitory (male)		60
016	WC (male)		15
017	WC (male)		15
018	Outdoor sports court	PTD3	671
019	Laundry + Drying area + Ironing area		27
020	Kitchen store		14
021	Kitchen		27
022	Dining room + Communal area		14
023	WC (female)		15
024	WC (female)		15
025	Dormitory (female)		60
026	Dormitory (female)		60
027	Dormitory		24
028	Cafeteria + Dining room (staff)		36
029	Dormitory (staff)		18
030	Exercise room + Advanced training court	PTD1 + PTD4	237
031	WC (female)		18
032	Individual treatment cubicle	PTD2	40
033	Daily store	PTD2	18
034	Wheelchair assembly room	POD10	18
035	Thermoforming room	POD3	45
036	Rectification room	POD2	44
037	Machine room	POD8	36
038	Assembly room	POD4	115
039	Fitting room	CLI3	75
040	Casting room	POD1	47
041	WC		8
042	WC		8
043	Assessment room	CLI3	27
044	Office		15
045	Sewing room	POD9	15
046	Guard room		16
047	Main store	STO1	73
048	Cool store		36
049	Generator room		18
050	Fuel store		18
051	Changing room + WC (staff - female)		18
052	Changing room + WC (staff - male)		18
053	Metal room + Maintenance	POD7	89
	Circulation area		426
Net floor area (NFA)			**2,970**

Room list	Quantity (room)	Users	Usable area m²	Services area m²	Circulation area m²
Administration area					
Management office	1	1	18		
Administration office	1	2	26		
Head of PT office	1	1	18		
Head of P&O office	0		18		
ICRC staff office	1	4	15		
Meeting room / Training room	1	30	40		
Cafeteria + Dining room	1	15	36		
Guard room (entrance control)	1	2	16		
Dormitory	2	1	36		
Changing room + Bathroom + WC	2	6	36		
Subtotal			**259**	**0**	
Clinical area					
Reception	1	2	27		
Archives	1	n/a	18		
Social services	1	1	18		
Waiting area + Relative education	1	14	64		
WC	1	1	18		
Assessment room	1	1	27		
Fitting room	1	3	75		
Subtotal			**247**	**0**	
Prosthetics and Orthotics Department					
Casting room	1	3	47		
Rectification room	1	9	44		
Thermoforming room	1	3	45		
Assembly room	1	12	115		
Machine room	1	3	36		
Wheelchair assembly room	1	1	18		
WC's	2	1	16		
Metal room + Maintenance	1	2	89		
Sewing room	1	1	15		
Subtotal			**425**	**0**	
Physiotherapy Department					
Exercise room + Advanced training court	1	10	237		
Individual treatment cubicle	1	1	40		
Multiple outdoor sport court (covered)	1	12	671		
WC	2		36		
Subtotal			**984**	**0**	

Service user accommodation					
Dormitory (female and children)	2	20	120		
Dormitory (male)	3	30/35	180		
Bathrooms + WC (male)	2	6	30		
Bathrooms + WC (female)	2	6	30		
Dining room + Communal area	1	50	14		
Kitchen	1	2	27		
Kitchen store	1	n/a	14		
Laundry + Drying area + Ironing area	1	1	27		
Visitors' dormitory	1		24		
Subtotal			**466**	**0**	

Services area					
Generator room + Fuel store	1	n/a		18	
Waste management			18		
Store	1		36		
Daily store	1	1	73		
Main store	1		18		
Subtotal			**145**	**18**	

Reference					
Totals	UA	ISO 9836:2011 para. 5.1.7	2,526		
	SA	ISO 9836:2011 para. 5.1.8		18	
	CA	ISO 9836:2011 para. 5.1.9			426
	Ratios			1%	14%
Net floor area	NFA	ISO 9836:2011 para. 5.1.5	**2,970**		

Fully enclosed and covered area	FECA	ISO 9836:2011 para. 5.1.3.1-a	**1,855**
Partially enclosed and covered area	PECA	ISO 9836:2011 para. 5.1.3.1-b	**1,412**
Unenclosed, uncovered and contained area	UUCA	ISO 9836:2011 para. 5.1.3.1-c	**0**
Total floor area	TFA	ISO 9836:2011 para. 5.1.3	**3,267** (estimated)

NFA/TFA ratio	0.91

Plot area	**5,840**

Plot ratio	0.56

Note: Light blue cells are inputs; blue cells are results.

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MISSION

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