
HOW TO BUILD AN ACCESSIBLE ENVIRONMENT IN DEVELOPING COUNTRIES

Based on the Cambodia
Program's experience



Manual #2 - Access to
water and sanitation
facilities

Part 2 Open washing
areas and water points

Handicap International

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Part 2 – Open washing areas and water points



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Introduction

This booklet is part of the set called “**How to build an accessible environment in developing countries**” . It represents the first technical manual on how to build accessible infrastructures in concrete terms. Because of its technical content, this manual aims mainly to be used by Ministries, NGOs, DPOs and more in particular due to its technicians (engineers, architects, building companies, NGOs with technical background...). People without specific technical knowledge can use it for understanding standards, general principles and can use drawings and pictures for enhancing understanding.

In this manual, we will focus on how to build accessible water and sanitation (or watsan) facilities, which comprise toilets, closed showers, washing areas and access to clear water. Such facilities are very important, not only to PwD but to everyone because they constitute a component of our everyday life. Several reasons support the fact that every watsan infrastructure should be constructed accessible to anyone:

- For dignity reasons: PwD should not rely on everyone (not even their family) for their intimate needs.
- For health reasons: being able to access clear water, toilets and washing areas easier, PwDs will need to spend less time to maintain or even increase their hygiene.
- For economic reasons: the time spent to have access to watsan facilities (by PwD and their families) is potentially some time that can be used to participate in social or economic life

Moreover, access to water is a human right, as it underlined in the Article 25 of the UN Declaration of Human Rights and in the Article 27 of UN Convention on the Rights of the Child. As for the previously mentioned UN Convention on the Rights of People with Disabilities, access to clean water services is marked as a right in the article 28 (adequate standard of living and social protection).

In this booklet on water and sanitation facilities, we will present various solutions for accessible washing areas (either with a water pump or with a water tank) and accessible water points at lakes and rivers. Each time, the construction will be mainly described by the means of technical drawings, accompanied by some important comments and remarks. Pictures of examples in Cambodia or 3-dimensional drawings showing the final buildings will also be presented. This will help to gain a better representation of the different technical solutions on offer in this booklet. Sometimes, calculation table are introduced in ready-to-use table form: the reader will have the necessary tool to estimate a specific cost for his/her attempted accessibility solution.

Nota Bene:

For each technical solution, you will find a clue about its difficulty:



- “High difficulty” means that it requires special skills that must have been learnt, such as brickwork, or making reinforced concrete. The whole construction process must be supervised by a technician.



- “Medium difficulty” means that a part of the construction process will require the intervention of a technician (most probably brickwork and/or concrete), but the remaining can be realized by beneficiaries themselves.



- “Easy” means that everyone (sometimes even children) can implement the design proposed. It does not require any particular skills.

Open washing areas

In this section, we will develop the subject of the accessibility of open washing areas. This type is quite common at the community level, especially in Cambodia.

As for the toilets, improved access to washing areas has the potential to improve the living conditions of PwDs, by offering better hygiene (hence less risks to health). Likewise increased independency is fostered, which should notably free some time for their families and them to participate more actively in other aspects of life.

Washing areas with pumps and/or wells

Washing area equipped with a water pump

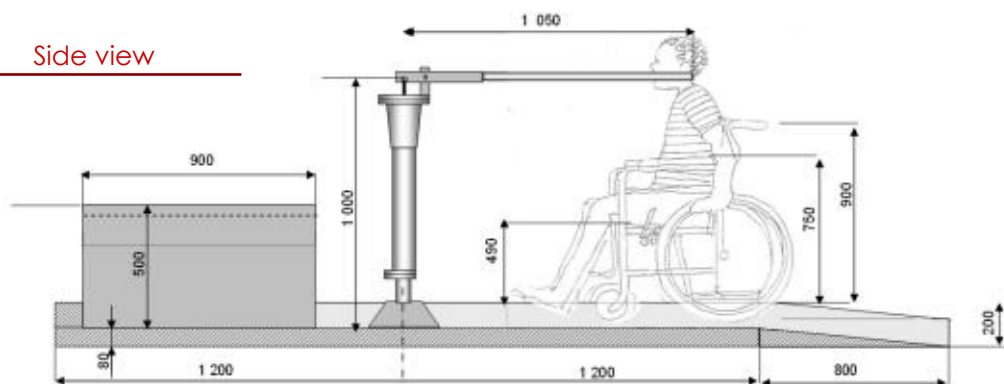
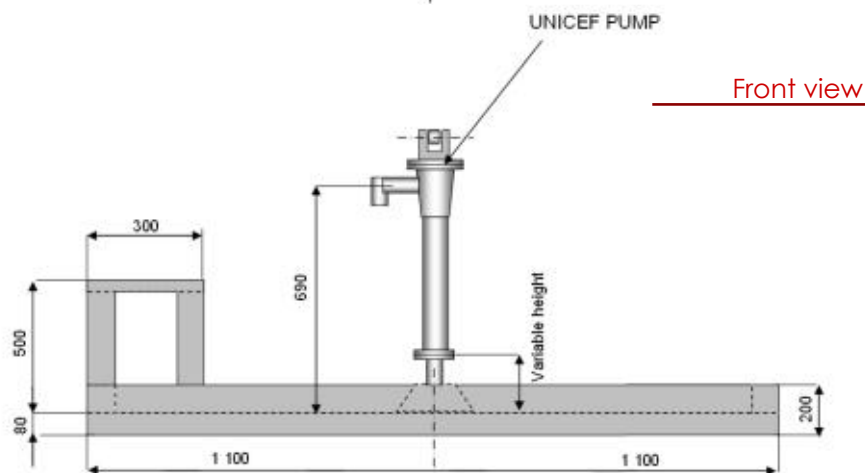
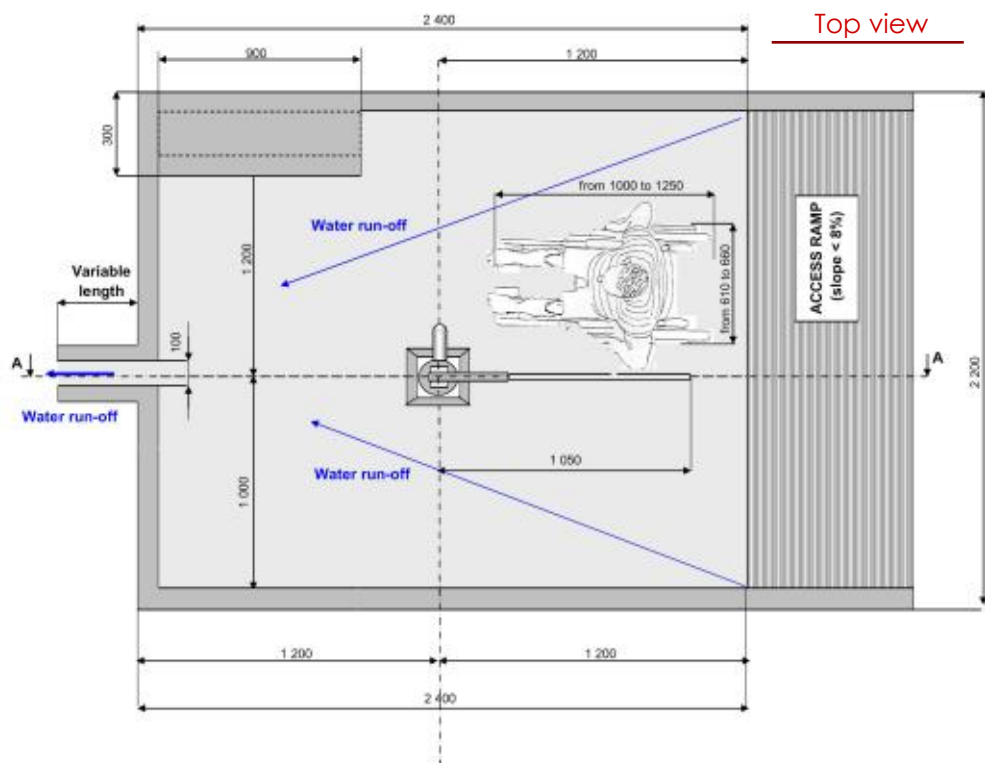
This kind of design presented here is quite simple and will not require very specialized skills. It consists of a platform built from reinforced concrete, equipped with a standard water pump operated manually. A ramp permits the access to the platform for all users. There is enough space to maneuver easily around the pump. An additional seat is proposed for people who have difficulties or are not able to stand when washing.

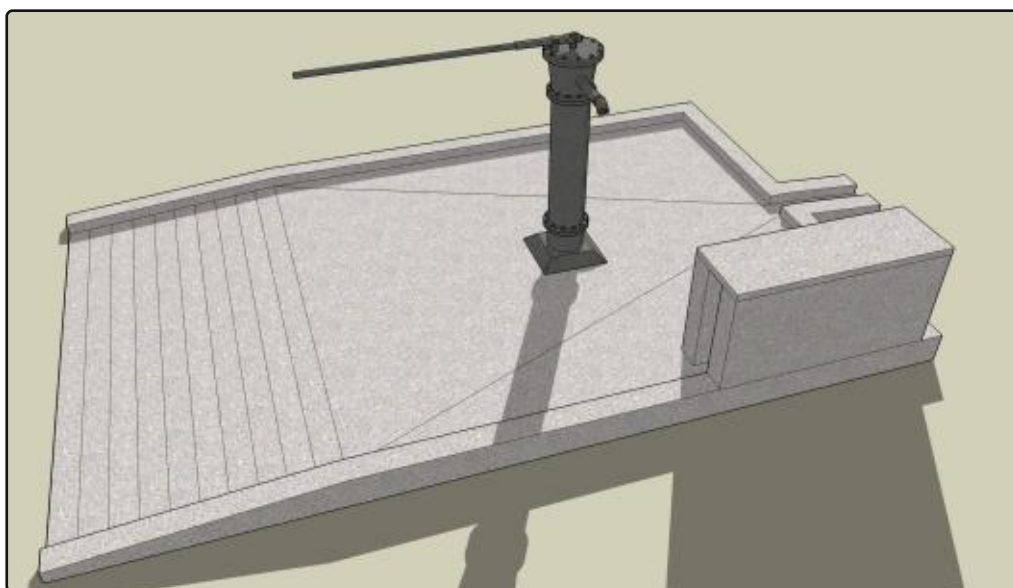
The system of water evacuation (slightly sloppy platform and evacuation drain) is very important: without it, the basin will fill with water, making it slippery and dangerous. By avoiding ponds of stagnant water we will also reduce the mosquitos' proliferation.

NB: Due to the type of water pump, this washing area is only suitable for places where the ground water is at a depth of no more than -8 m. If the ground water is deeper, you will have to choose another pump, which will ask for more resources.



Technical drawings



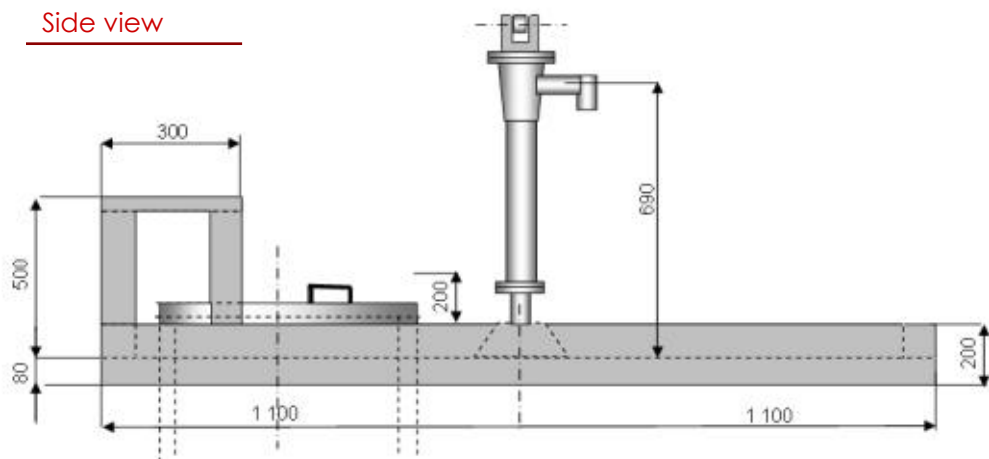
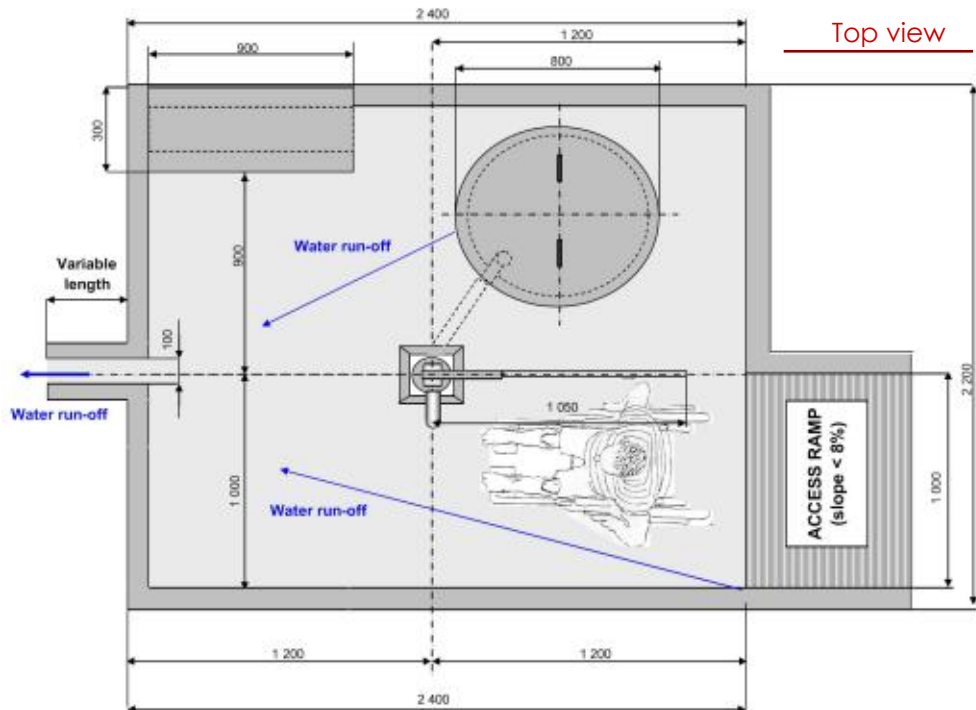


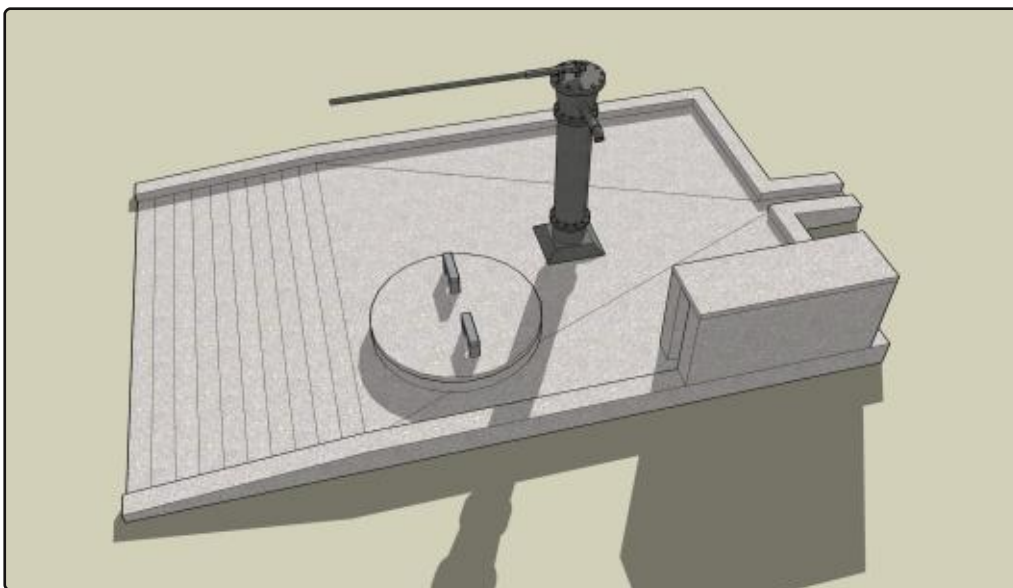
Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	2.20	2.20	0.10	1	0.484
2	Stones 4 x 6 for granular compacted fill	m2	2.20	2.20	0.15	1	0.726
3	Border in brickwork	m2	7.60	0.12		1	0.912
4	Blinding concrete	m3	2.20	2.20	0.04	1	0.194
<u>ACCESS RAMP (slope 8%)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	2.20	0.80	0.15	1	0.264
2	Blinding concrete	m3	2.20	0.80	0.04	1	0.070
3	Reinforced concrete	m3	2.20	0.80	0.10	1	0.176
4	Border in brickwork	m2	1.60	0.12		1	0.192
<u>EARTHWORK</u>							
1	Earthwork	m3	2.60	2.20	0.30	1	1.716
2	Laterite fill	m3	2.60	2.20	0.15	1	0.858
<u>PUMP AND PIPING</u>							
1	Pump	Unité					1.000
2	Piping (including manpower)	F.F.					1.000
<u>MISC</u>							
1	Shower seat	m2					
<u>UNEXPECTED</u>							
1	Unexpected	5%					
<u>GENERAL TOTAL</u>							

Variation on the design

Here we present a variation of the washing area, equipped with a standard water pump. This time, the water is not pumped directly into the ground, but into a well that plays the role of intermediate.





Concrete slab with water pump

Advantages: simple conception, rapidly built, easy cleaning, water cleaner than in the case of a well

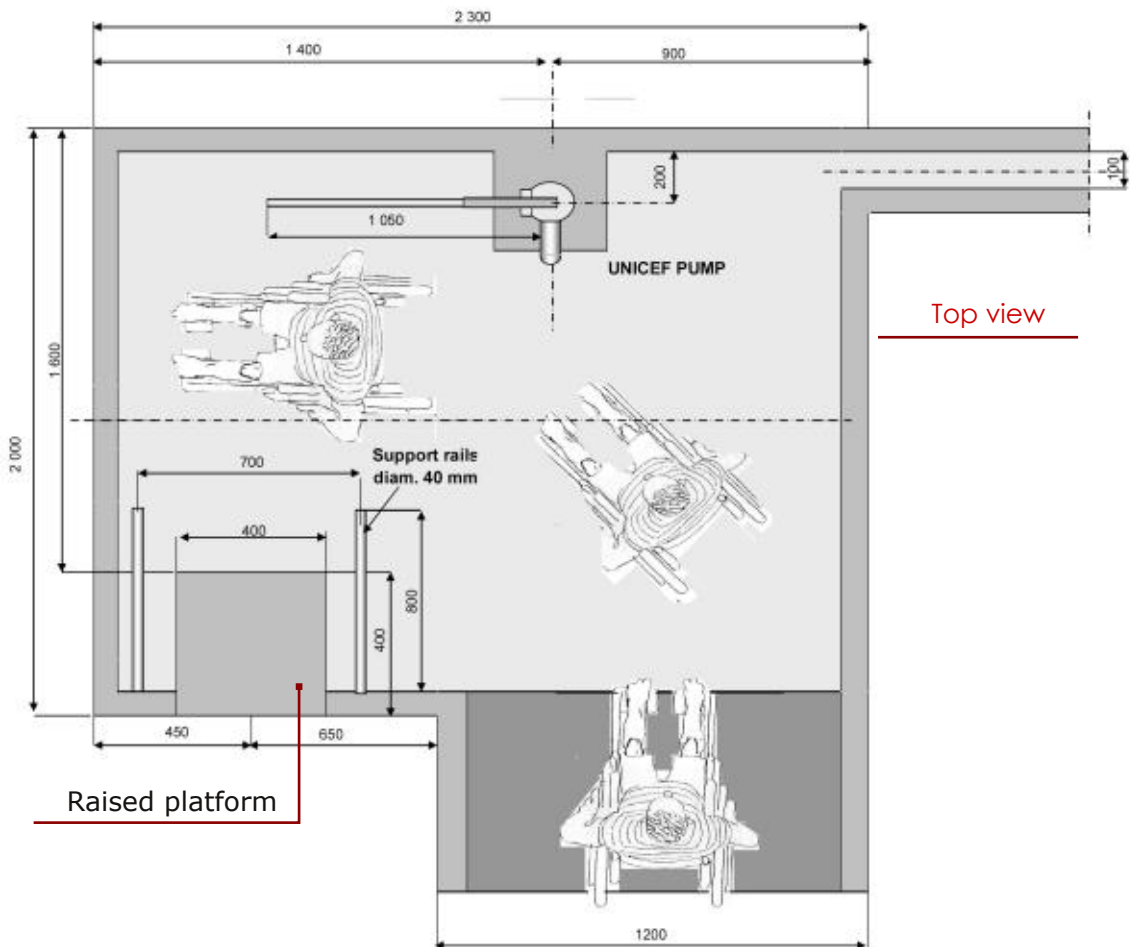
Drawbacks: expensive water pump, technical maintenance of this pump, maintenance around the access ramp

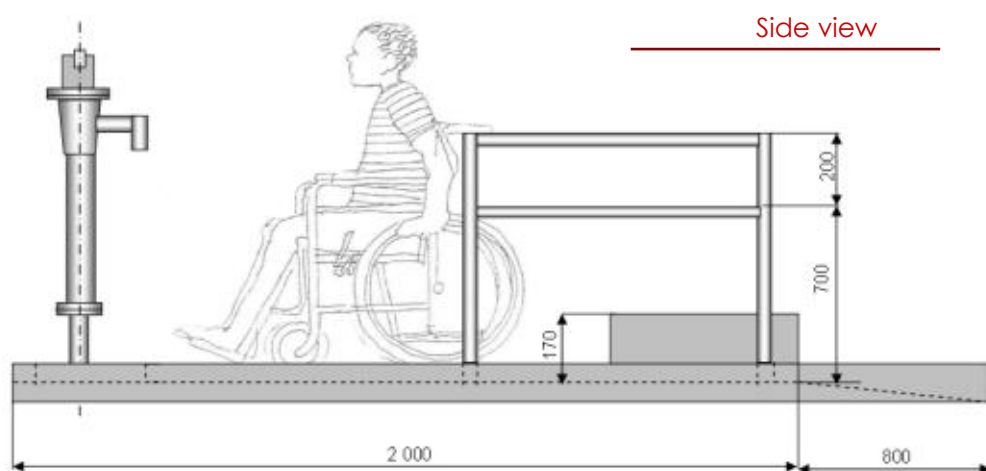
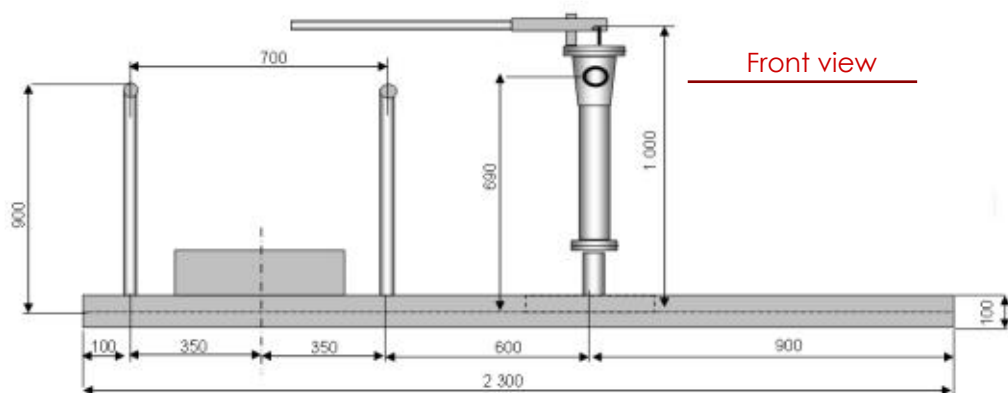
Washing area with low platform

Medium
difficulty

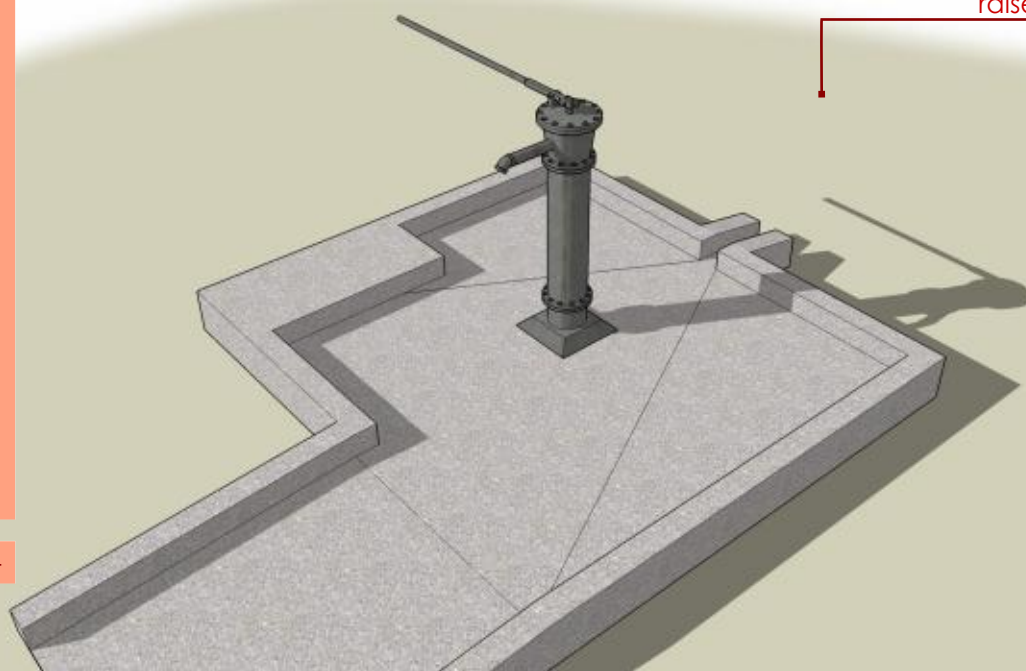
This example of an accessible washing area does not differ much from the two previous ones. Only here the shower seat is replaced by a little platform raised by a height between 5 and 20 cm. This platform can be more accessible to people who have a reduced mobility, especially the ones who cannot use their legs but who do not own a wheelchair. It will also reduce back-ache for women doing the laundry.

Technical drawings





Another example of a raised platform



Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	2.30	2.00	0.10	1	0.460
2	Stones 4 x 6 for granular compacted fill	m2	2.30	2.00	0.15	1	0.690
3	Border in brickwork	m2	7.40	0.12		1	0.888
4	Blinding concrete	m3	2.30	2.00	0.04	1	0.184
<u>ACCESS RAMP (slope 8%, length 1m)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	1.20	1.00	0.15	1	0.180
2	Blinding concrete	m3	1.20	1.00	0.04	1	0.048
3	Reinforced concrete	m3	1.20	1.00	0.10	1	0.120
4	Border in brickwork	m2	2.00	0.12		1	0.240
<u>EARTHWORK</u>							
1	Earthwork	m3	2.70	2.40	0.30	1	1.944
2	Laterite fill	m3	2.70	2.40	0.15	1	0.972
<u>HAND WATER PUMP</u>							
1	Pump	Unit					1.000
<u>MISC</u>							
1	Brickwork for shower seat	m2	0.40	0.17		4	0.272
2	Reinforced concrete for shower seat	m3	0.40	0.40	0.05	1	0.008
3	Support rails	F.F.					
<u>UNEXPECTED</u>							
1	Unexpected	5%					
TOTAL GÉNÉRAL							

Raised platform and water pump

Advantages: simple conception, rapidly built, easy cleaning, water cleaner than in the case of a well

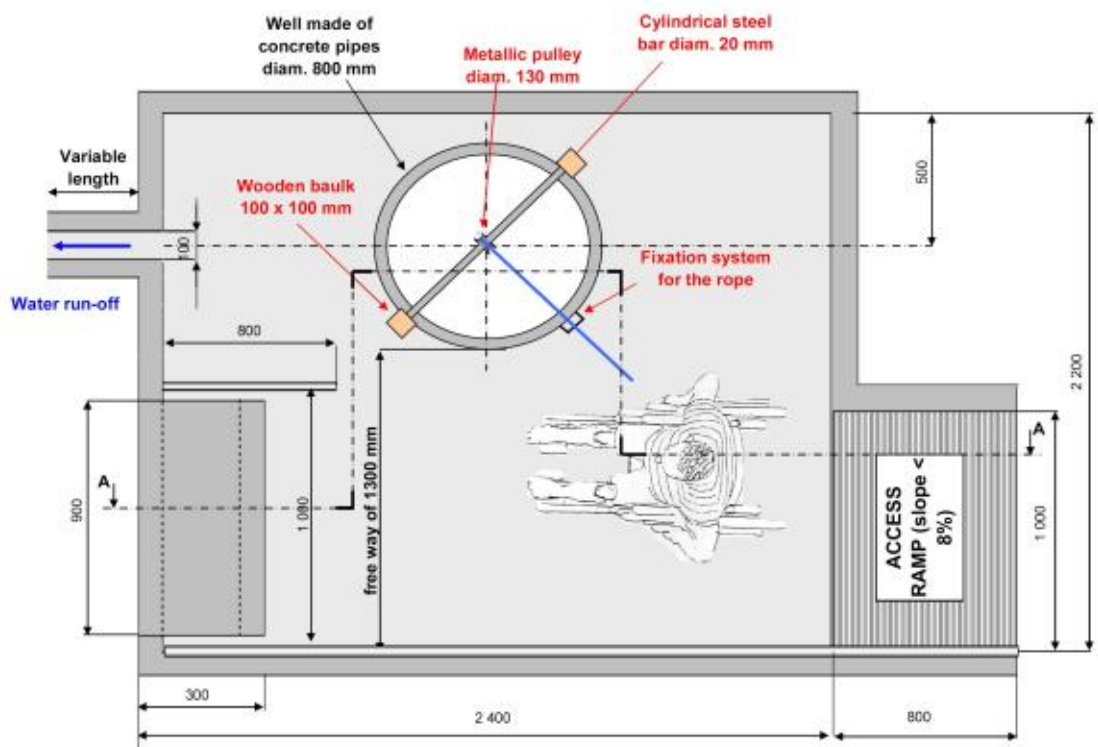
Drawbacks: expensive water pump, technical maintenance of this pump, maintenance around the access ramp

Washing area with well and pulley

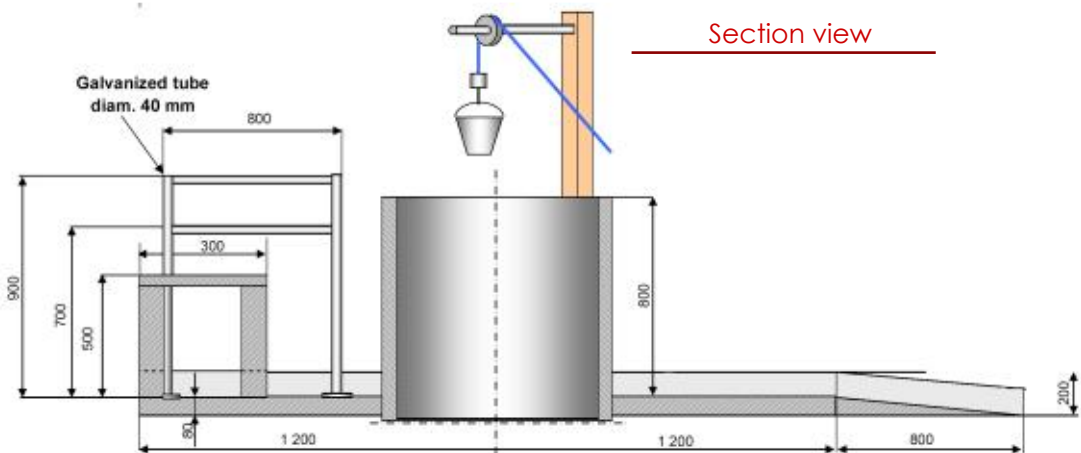
In this example, the washing platform is equipped with a pulley helping to get back up a bucket full of water from a well. Here the user is expected to either stand up or sit down using the well. It is more easy to let the rope go downwards than to pull it upwards.

The problem is that the operator will have to lean over the edge to grasp the water bucket, which can be quite difficult for persons with a limited range of movements. Remember also to propose a system to tie the rope once the bucket is up, so that the users will have their two hands free to handle it. Another little tip is to add some weight on the rope above the bucket in order facilitate the descent to the water.

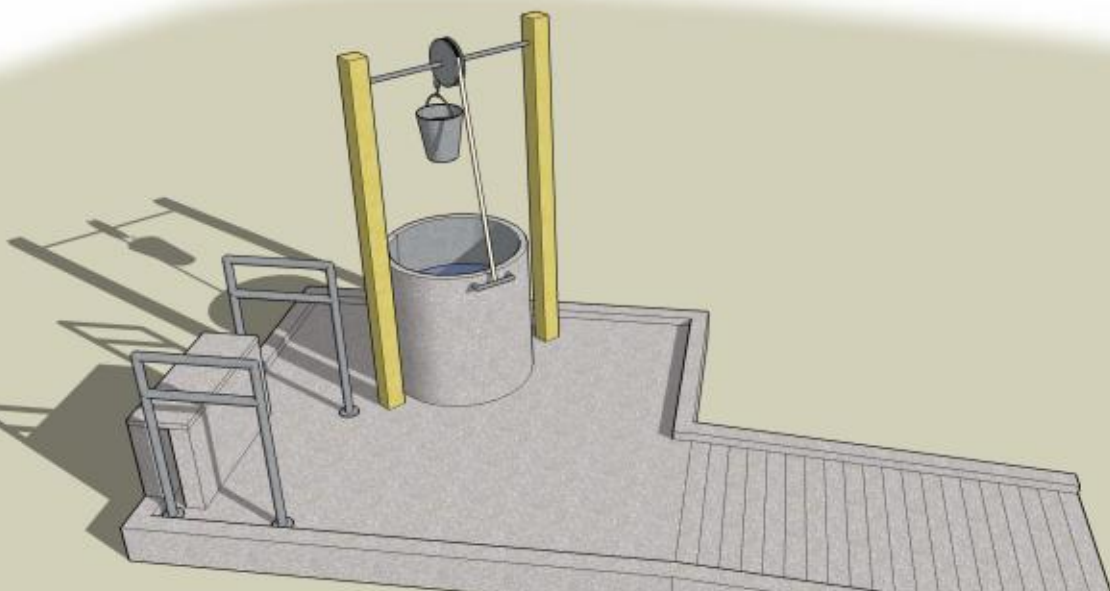
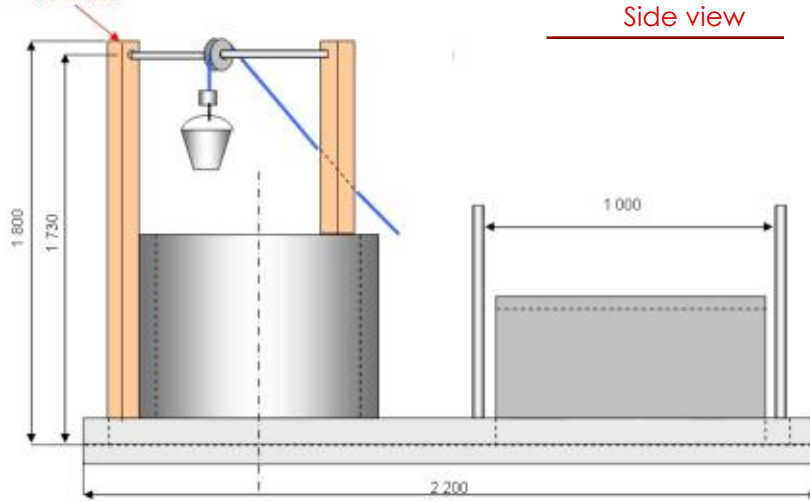
Technical drawings



Top view



Wooden baulk 100 x 100 mm



Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	2.40	2.20	0.08	1	0.422
2	Stones 4 x 6 for granular compacted fill	m2	2.40	2.20	0.15	1	0.792
3	Border in brickwork	m2	8.00	0.12		1	0.960
4	Blinding concrete	m3	2.40	2.20	0.04	1	0.211
<u>ACCESS RAMP (slope 8%)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	1.20	1.00	0.15	1	0.180
2	Blinding concrete	m3	1.20	1.00	0.04	1	0.048
3	Reinforced concrete	m3	1.20	1.00	0.08	1	0.096
4	Border in brickwork	m2	2.00	0.12		1	0.240
<u>EARTHWORK</u>							
1	Earthwork	m3	2.80	2.60	0.30	1	2.544
2	Laterite fill	m3	2.80	2.60	0.15	1	0.197
<u>PIPING</u>							
1	Concrete pipes diam 800 mm	Unit				1	1.000
2	Cover in reinforced concrete diam 800 mm	m3	0.80		0.08	1	0.080
<u>LIFTING SYSTEM</u>							
1	Wooden baulk 100 x 100 x 1800	m3	1.80	0.10	0.10	2	0.036
2	Stell axis diam 20 mm	FF					1.000
3	Pulley diam 130 mm	Unit				1	1.000
<u>MISC</u>							
1	Shower seat in brickwork	m2					0.900
2	Reinforced concrete for shower seat	m3	0.90	0.30	0.05		0.014
<u>SUPPORT RAILS</u>							
	Support rails and fixations	Unit				1	1.000
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							

Water well and pulley

Advantages: easier to use than only a well, user can either stand up or sit down, simple design, easy cleaning

Drawbacks: user has to be able to grasp a rope and lean over the well, water more easily contaminated than in the case of a water pump

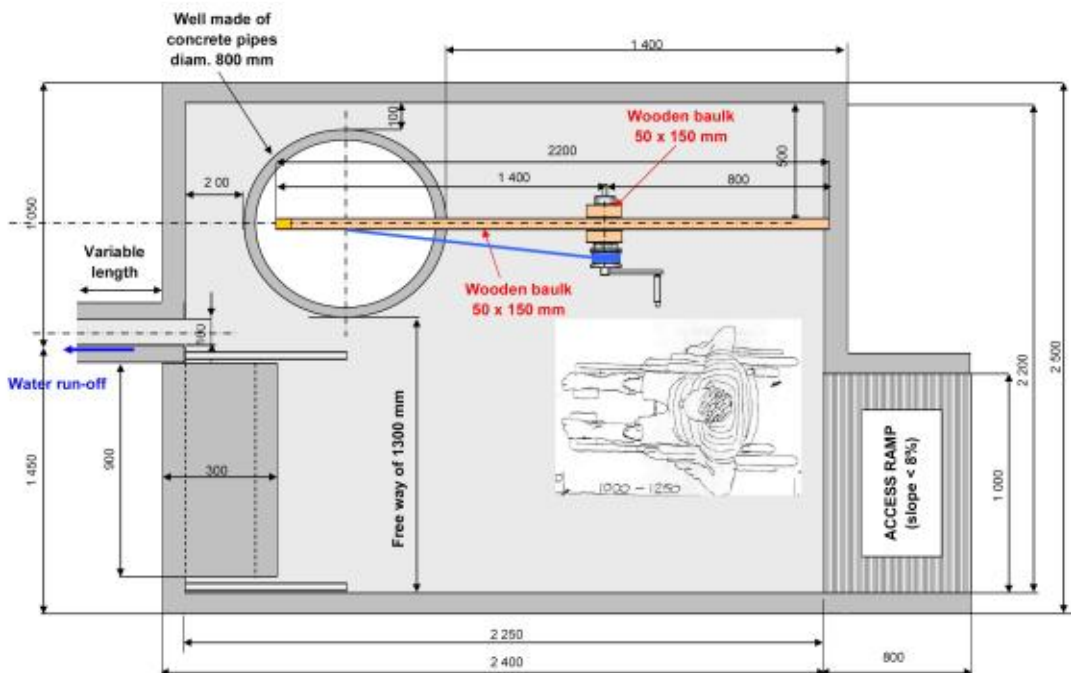
Washing area with well and hand winch

High
difficulty

Here we present a variation of a bucket lifting system consisting of a cantilever equipped with a winch with ratchet and pawl. This mechanism is made of steel in order to have an improved lifespan. Wood could be used too but keep in mind that it would wear off more rapidly. The system being quite complex to build, it is reserved for specialists who have mastered the assembly of such mechanism before.

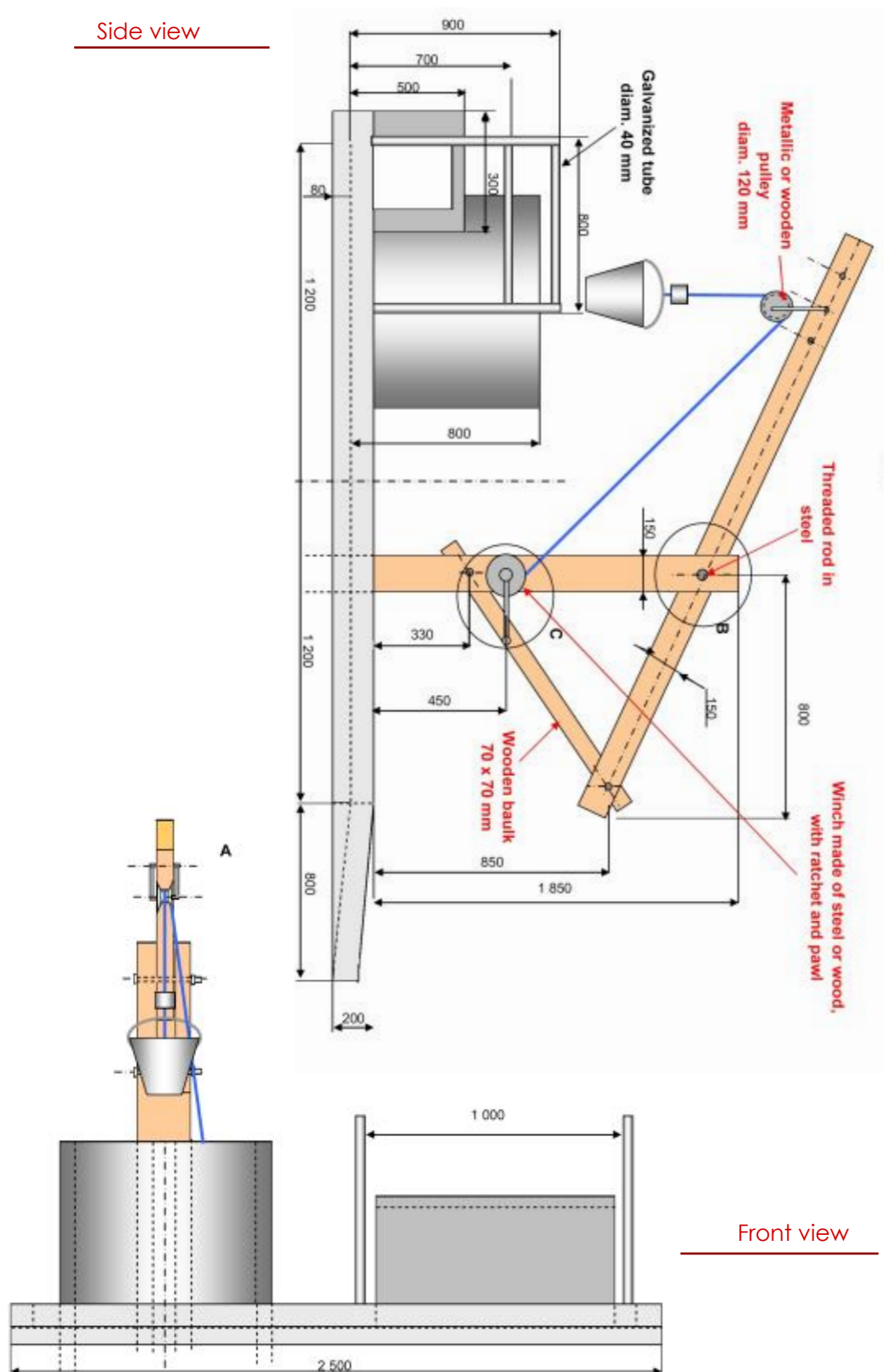
The advantages of such a system are various. The main point is that it will require less strength and only one arm to lift the bucket filled of water out of the well. So it should help a lot of users, and not only PwDs, but also children, people weak from illness, elders... This system should also reduce the hands and arms hurting due to the rope slipping out of the user's fingers.

Technical drawings



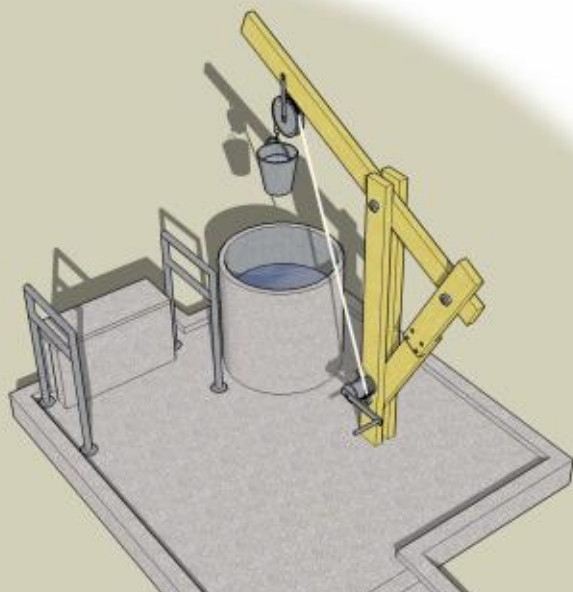
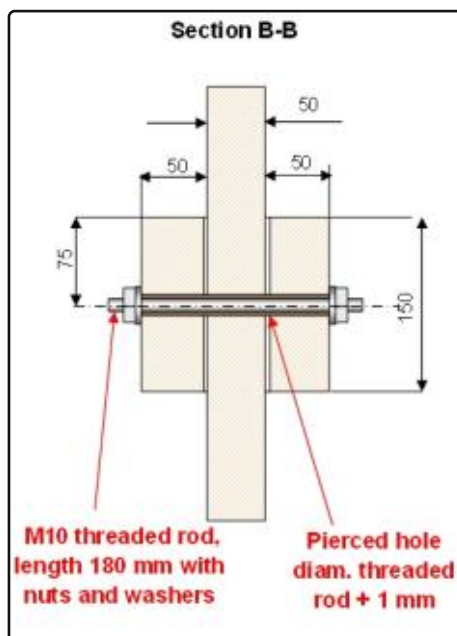
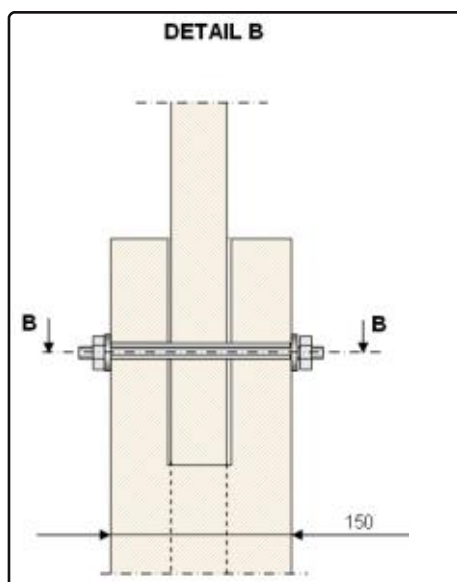
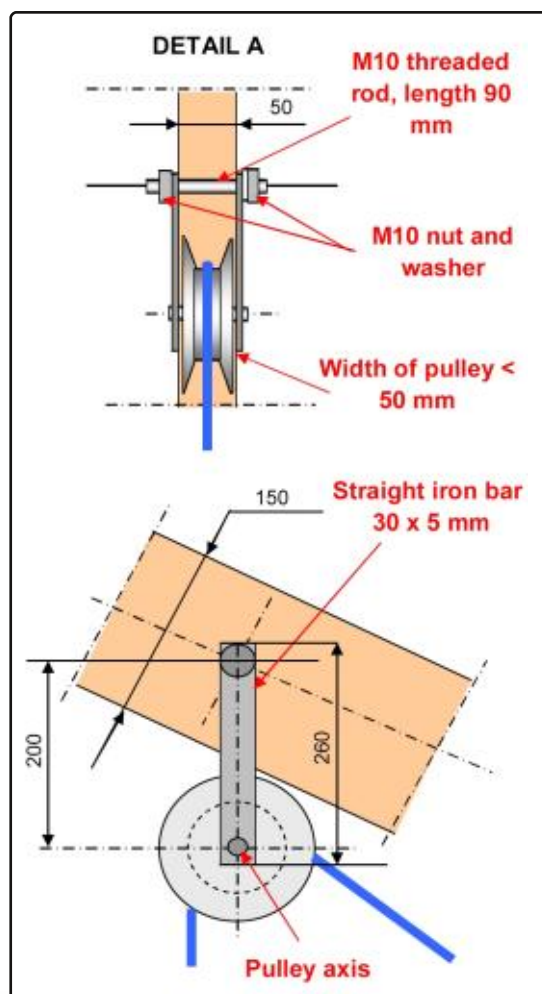
Top view

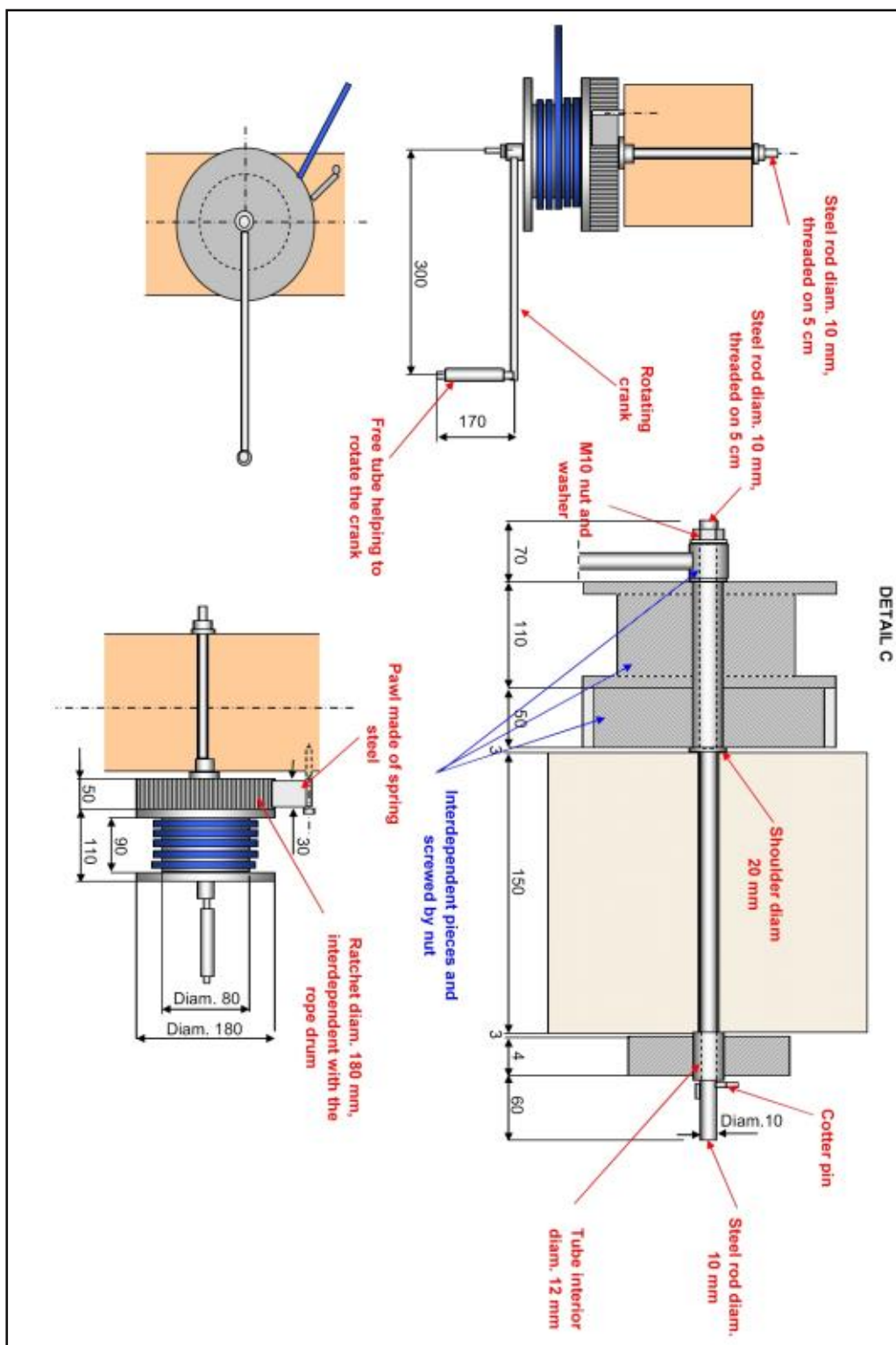
Side view



Front view

Constructional details





Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	2.40	2.50	0.08	1	0.480
2	Stones 4 x 6 for granular compacted fill	m2	2.40	2.50	0.15	1	0.900
3	Border in brickwork	m2	8.60	0.12		1	1.032
4	Blinding concrete	m3	2.40	2.50	0.04	1	0.240
<u>ACCESS RAMP (slope 8%, length 1m)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	1.20	1.00	0.15	1	0.180
2	Blinding concrete	m3	1.20	1.00	0.04	1	0.048
3	Reinforced concrete	m3	1.20	1.00	0.08	1	0.096
4	Border in brickwork	m2	2.00	0.12		1	0.240
<u>EARTHWORK</u>							
1	Earthwork	m3	2.80	2.90	0.30	1	2.796
2	Laterite fill	m3	2.80	2.90	0.15	1	0.219
<u>PIPING</u>							
1	Concrete pipes diam 800 mm	Unit				1	1.000
<u>CANTILEVER AND HAND WINCH</u>							
1	Wooden baulk 150 x 50 x 1800	m3	1.85	0.15	0.05	2	0.028
2	Wood arm 150 x 50 x 2200	m3	2.20	0.15	0.05	1	0.017
3	Wooden bracket 1 x 0,07 x 0,07	m3	1.00	0.07	0.07	1	0.005
4	Pulley diam. 120 mm + fixations	FF				1	1.000
5	Fixing of the wich	FF				1	1.000
6	Winch	FF				1	1.000
7	Ironmongery	FF				1	1.000
8	Manpower	FF				10.0%	1.000
<u>MISC</u>							
1	Brickwork for shower seat	m2					0.900
2	Reinforced concrete for shower seat	m3	0.90	0.30	0.05		0.014
<u>SUPPORT RAILS</u>							
	Support rails and fixations	Unit				1	1.000
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							

Cantilever and hand winch

Advantages: not much strength required, only one arm to operate the mechanism, no need to grasp the rope

Drawbacks: risk of water contamination due to the well, very complex mechanism, expensive

Open washing areas with jars or water tanks

In this section, we will study open washing areas different from the ones presented in the previous chapter, for they have no more natural water tanks (such as ground water or wells) but artificial ones such as jars or water tanks.

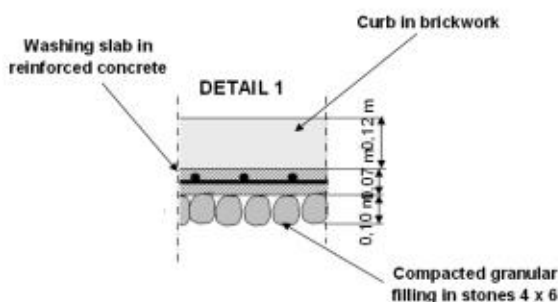
Before considering technical details, it is firstly important to pinpoint to the fact that wide-mouthed jars suit best the needs of everyone (especially the PwDs). It is easier to lift water from them, even with limited arm movements. But the major drawback of a water providing system like this is that the water in it will be rapidly tainted because of the repeated movements of the scoop in it. This is not really important if this water only serves for bathing and cleaning the clothes. If this water is also used for drinking and cooking, it needs to be filtered and boiled.

Washing area with water jar

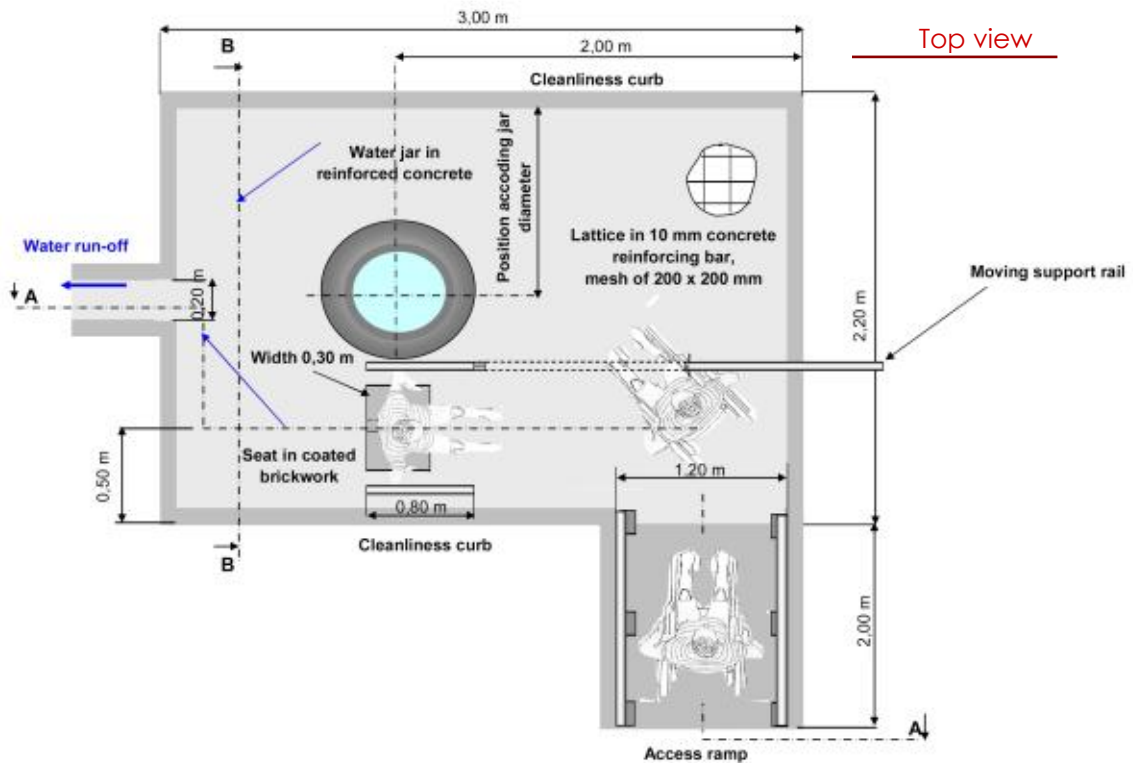
This is an example of a simple accessible design for a washing area equipped with a big jar serving as a water tank. The user can sit on the dedicated seat next to this jar, and use a scoop to wash himself or herself. The presence of support rails will help people with a reduced mobility as well as wheelchair users. Painted with bright colors, they can also facilitate the use of the washing area by people with a visual impairment.

Medium difficulty

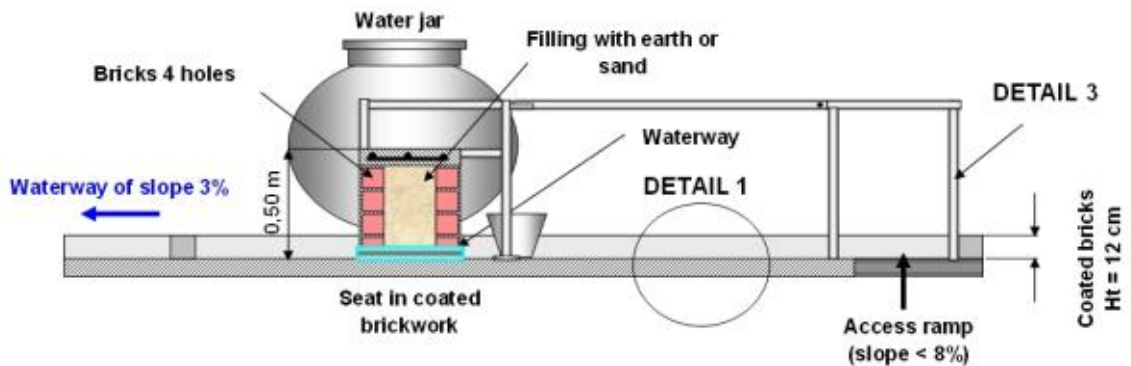
Technical drawings



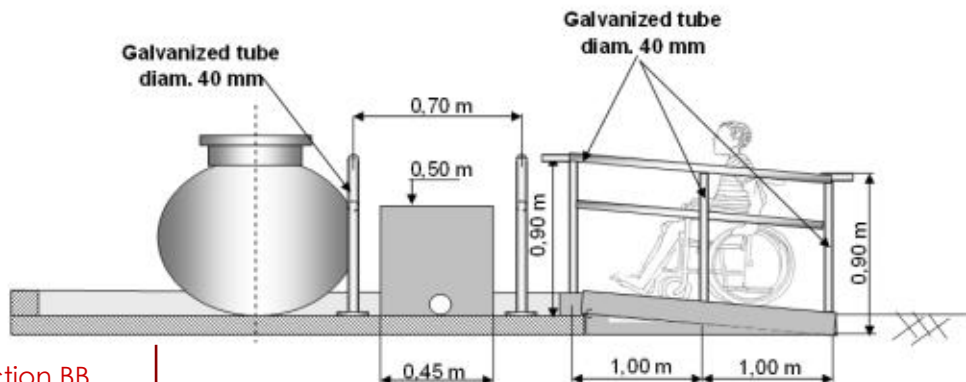
Don't forget!
You can use a **bamboo mesh** (or some other rigid wood if bamboos are not available) instead of an iron mesh in order to reinforce the concrete. It will do the same job for a more **affordable cost**.



Section AA

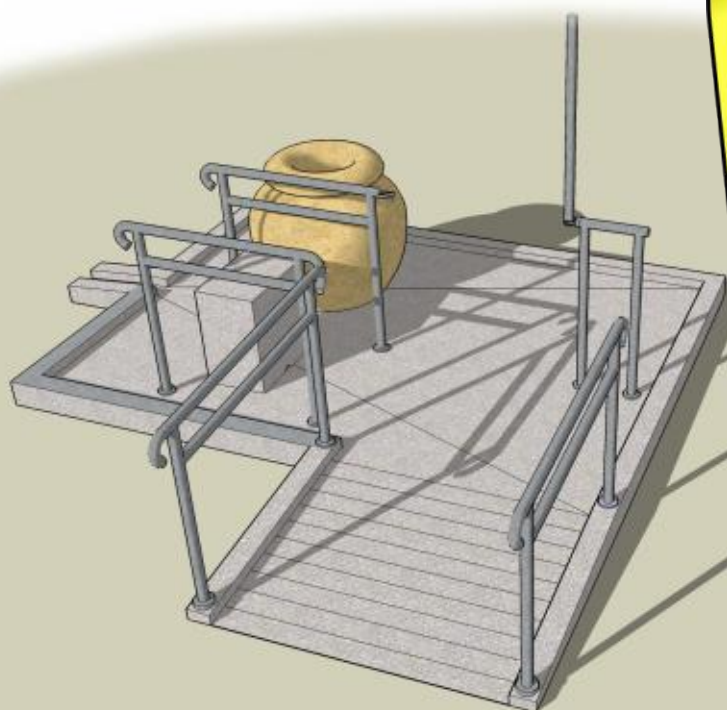


Section BB



Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	3.00	2.20	0.08	1	0.528
2	Stones 4 x 6 for granular compacted fill	m2	3.00	2.20	0.15	1	0.990
3	Border in brickwork	m2	9.20	0.12		1	1.104
4	Blinding concrete	m3	3.00	2.20	0.04	1	0.264
<u>ACCESS RAMP (slope 8%, length 1m)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	2.00	1.20	0.15	1	0.360
2	Blinding concrete	m3	2.00	1.20	0.04	1	0.096
3	Reinforced concrete	m3	2.00	1.20	0.10	1	0.240
4	Border in brickwork	m2	4.00	0.12		1	0.480
<u>EARTHWORK</u>							
1	Earthwork	m3	3.40	2.60	0.30	1	2.652
2	Laterite fill	m3	3.40	2.60	0.15	1	1.326
<u>WATER JAR</u>							
1	Big jar	Unit					1.000
2	Support rails	F.F.					
<u>MISC</u>							
1	Brickwork for shower seat	m2	0.50	0.45		2	0.450
2	Reinforced concrete for shower seat	m3	0.50	0.45	0.05	1	0.011
3	Galvanized tube diam. 40 mm	lm	14.60				14.600
4	Support rail fixations	FF					
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							

**Wide-mouthed jar**

Advantages: easy to find in Cambodia, simple design

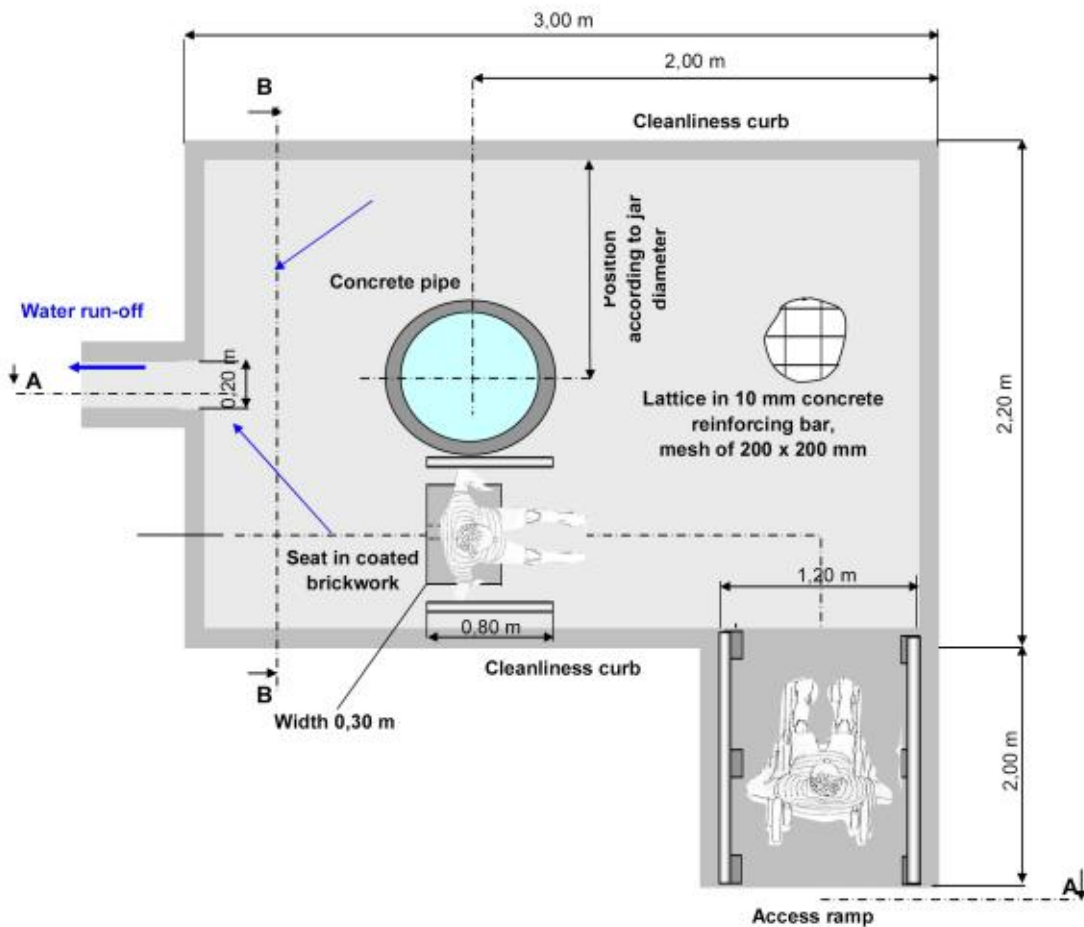
Drawbacks: many handrails so quite expensive, rapidly tainted, jar not easy to clean

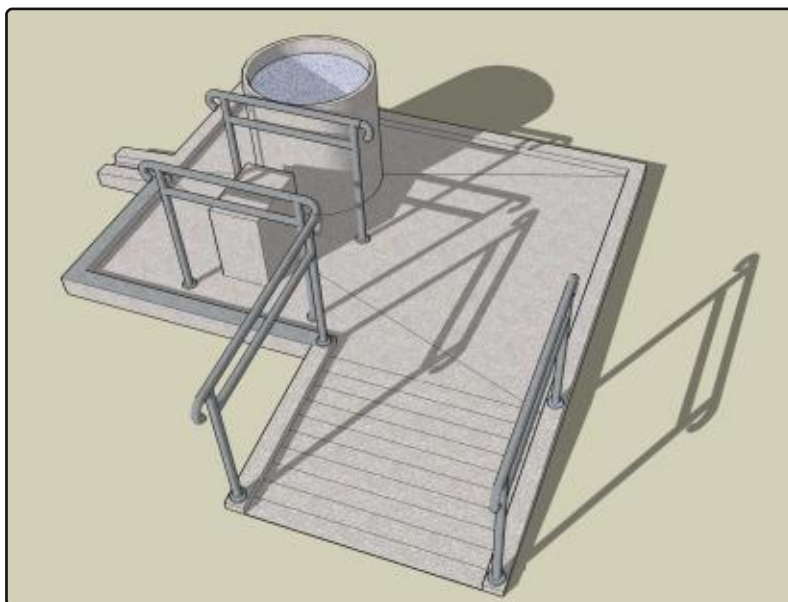
Washing area with concrete pipe

Medium
difficulty

This time, it is no more a jar but a pipe in concrete that serves as water tank. Apart from this fact, there is no difference in the use of this washing area compared to the one presented before.

Technical drawings





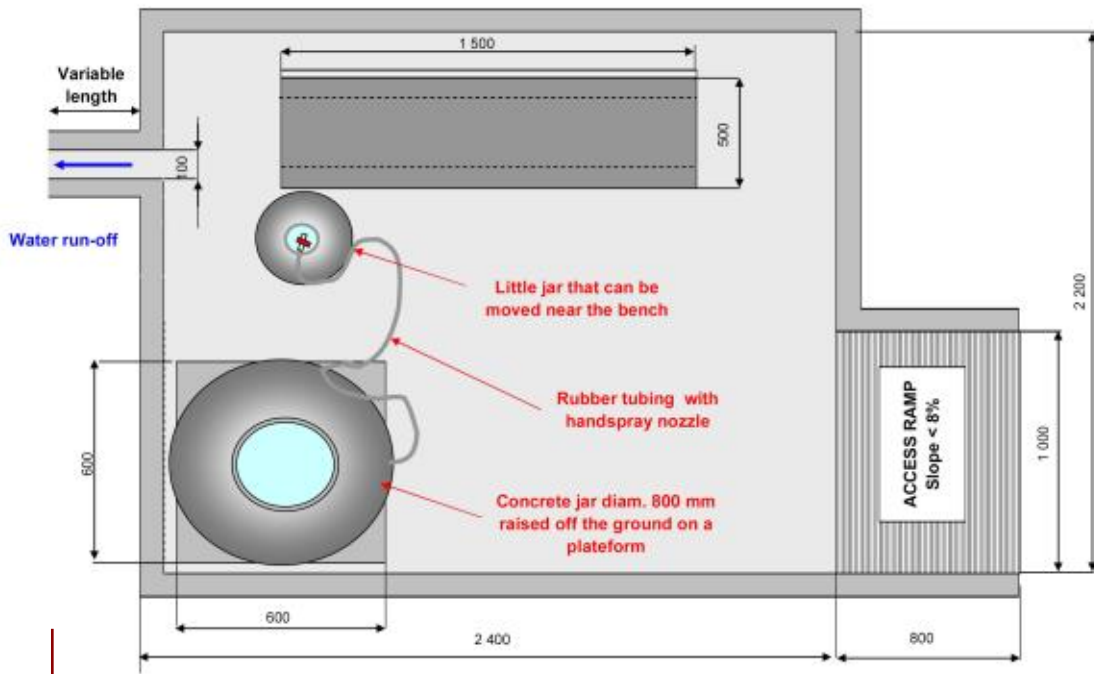
Washing area with gravitational system

In this design, the fact of raising the tank off the ground (here a water jar) will permit to use the gravitational force in order to make the water flow. This flow can be more convenient to use for a PwD than to have to use a scoop in a jar or a pipe. But you have to be aware that in this system, the water jar will also be more difficult to fill and to wash.

NB: you can put the big jar higher in order to have more water pressure.

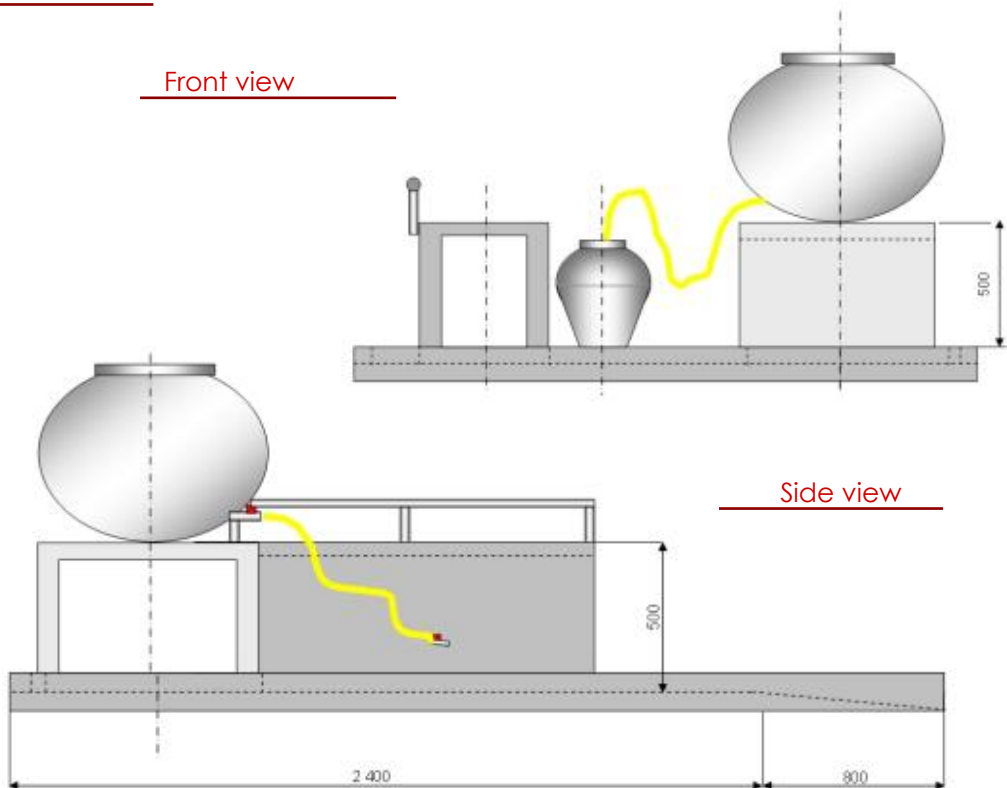
Medium
difficulty

Technical drawings



Top view

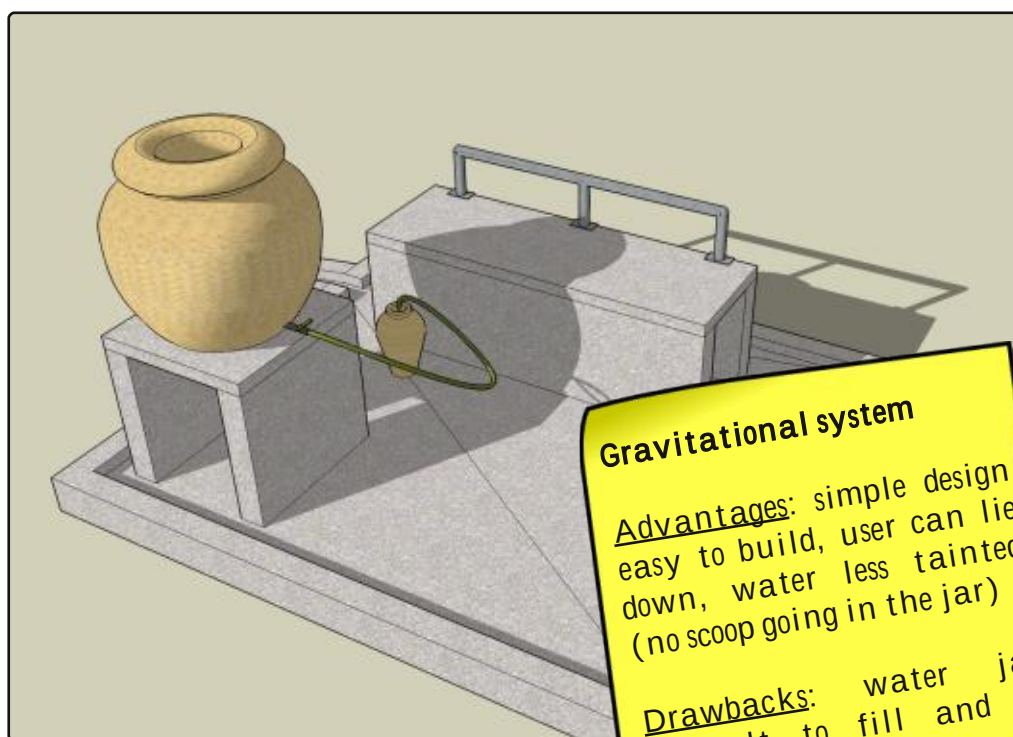
Front view



Side view

Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	2.40	2.20	0.10	1	0.528
2	Stones 4 x 6 for granular compacted fill	m2	2.40	2.20	0.15	1	0.792
3	Border in brickwork	m2	8.00	0.12		1	0.960
4	Blinding concrete	m3	2.40	2.20	0.04	1	0.211
<u>ACCESS RAMP (slope 8%, length 1m)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	1.00	0.80	0.15	1	0.120
2	Blinding concrete	m3	1.00	0.80	0.04	1	0.032
3	Reinforced concrete	m3	1.00	0.80	0.10	1	0.080
4	Border in brickwork	m2	1.60	0.12		1	0.192
<u>EARTHWORK</u>							
1	Earthwork	m3	2.80	2.60	0.30	1	2.184
2	Laterite fill	m3	2.80	2.60	0.15	1	1.092
<u>JARS</u>							
1	Big jar	Unité					1.000
2	Little jar	Unité					1.000
3	Rubber tubing, valves and handspray	FF					1.000
4	Brickwork for big jar support	m2	0.60	0.50		2	0.600
5	Reinforced concrete for big jar support	m3	0.60	0.60	0.05	1	0.018
<u>MISC</u>							
1	Brickwork for shower bench	m2	1.50	0.50		2	1.500
2	Reinforced concrete for shower bench	m3	1.50	0.50	0.05	1	0.038
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							



Gravitational system

Advantages: simple design
easy to build, user can lie
down, water less tainted
(no scoop going in the jar)

Drawbacks: water jar
difficult to fill and to
clean

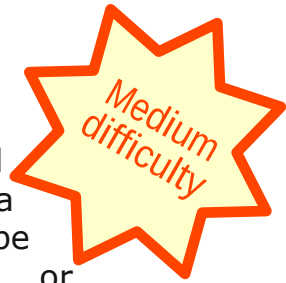
Access to water – Rivers, lakes and water pools

In this chapter, we will take up the subject of the access to natural water reserves such as little water pools, rivers or lakes. Although these water points do not usually provide drinking water, they are still very important for tasks of the everyday life like washing clothes or dishes, or bathing.

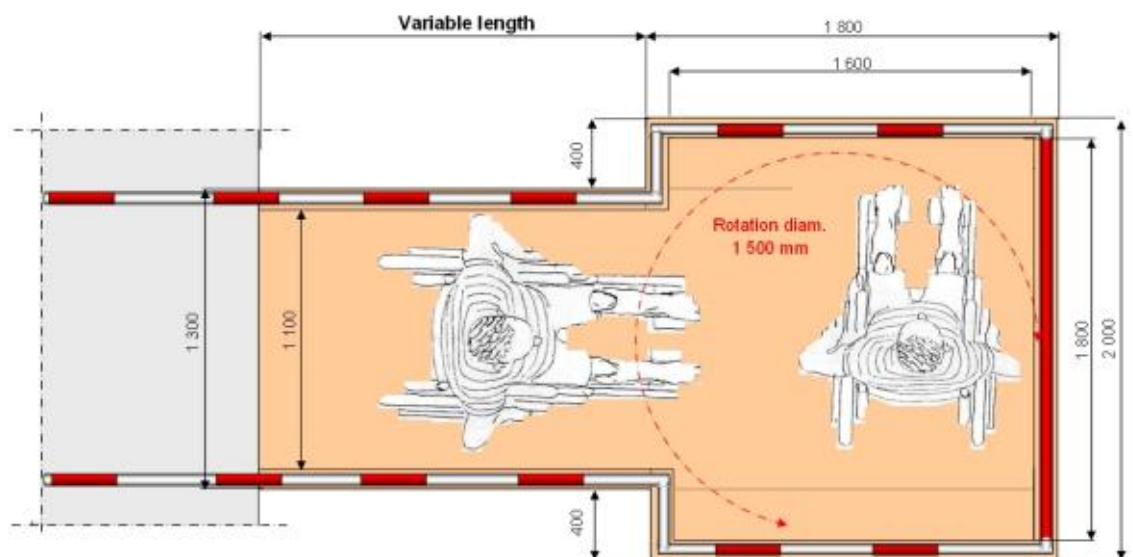
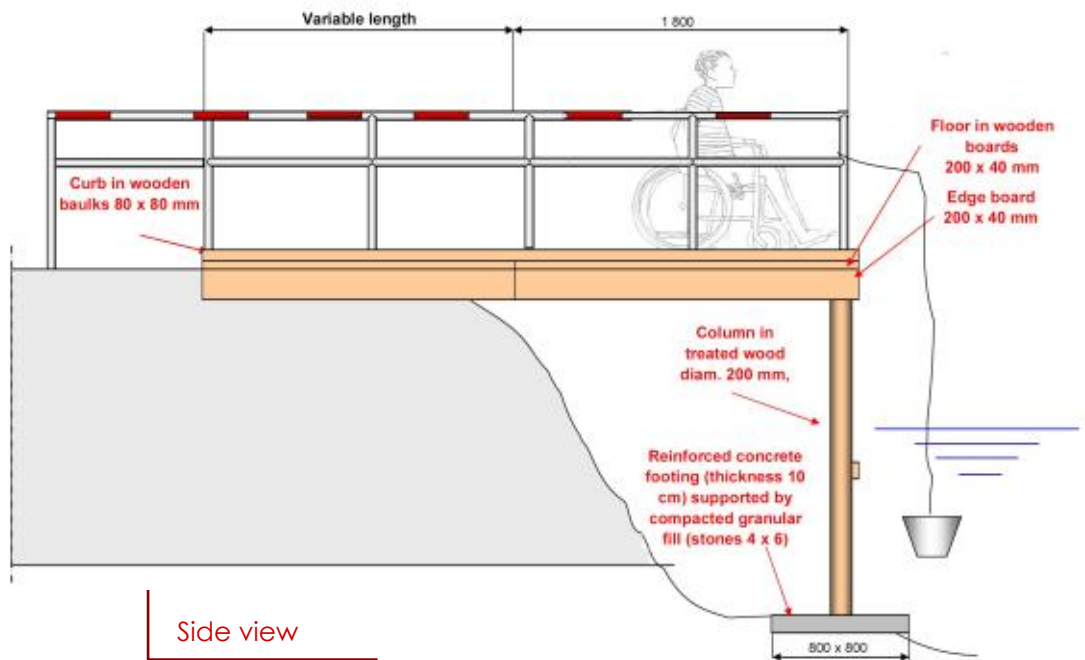
Wooden dock

This kind of construction can be used over open waters like near the banks of a lake or a river. The columns can be supported either by concrete footings or sufficiently big flat stones. All the wood used for the construction must be rot-proof or treated in order to increase greatly the lifespan of this construction.

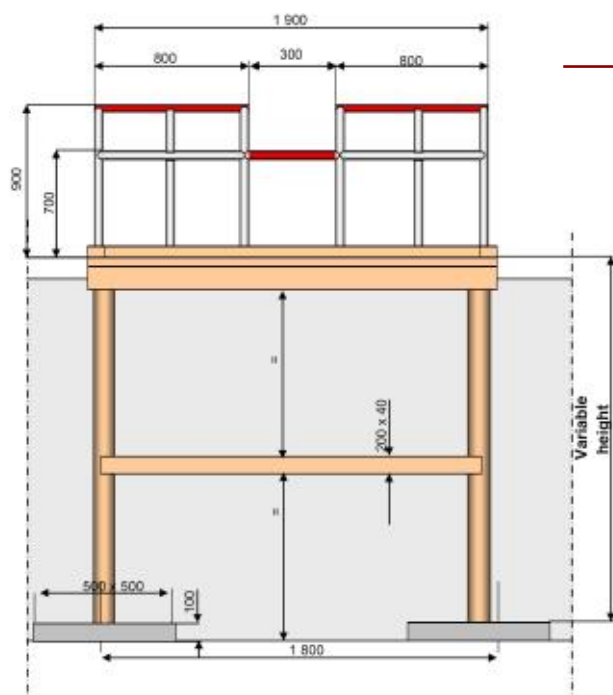
Handrails are mandatory in order to avoid the risk of falling. They must be made according to the accessibility standards (see the booklet #4 concerning free movement). They should be painted in bright colors in order to help people with visual impairments to orientate and use the dock.



Technical drawings



Top view



Front view

Wooden dock

Advantages: construction quite simple, easy access for everyone

Drawbacks: user can have difficulties to pull the bucket, heavy maintenance, lot of wood necessary

Cost estimation

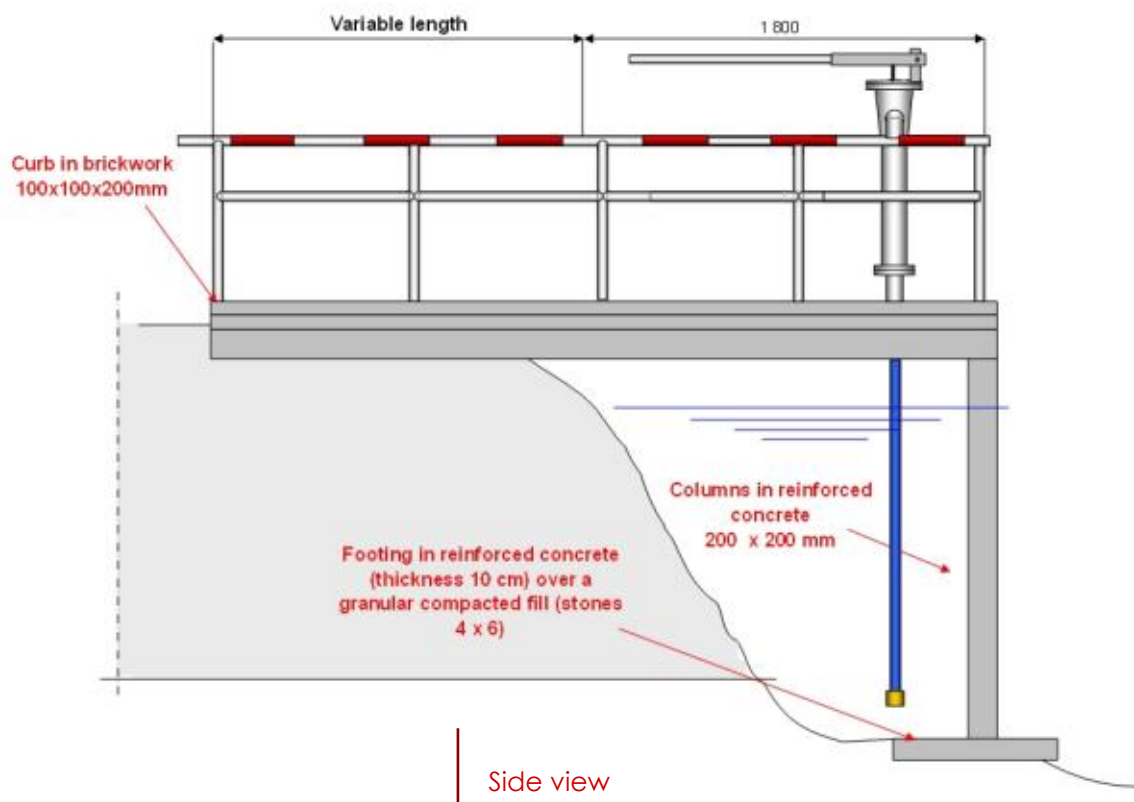
N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>PERMANENT FOUNDATIONS</u>							
1	Reinforced concrete for footings 800 x 800 x 10		0.80	0.80	0.10	2	0.128
2	Stones 4 x 6 for compacted granular fill		1.00	1.00	0.15	2	0.150
3	Blinding concrete		0.80	0.80	0.04	2	0.026
<u>WOODEN SUPERSTRUCTURE</u>							
1	Wooden columns 200 x 200 mm	m3	0.20	0.20	2.00	2	0.160
2	Edge board	m3	5.60	0.20	0.04		0.045
3	Wooden curb 80 x 80	m3	5.60	0.08	0.08	1	0.036
4	Board	m3	2.00	1.80	0.04	1	0.144
<u>VARIABLE MOVING AREA</u>							
1	Wooden curb 80 x 80	m3	4.00	0.08	0.08	1	0.026
2	Board	m3	2.00	1.30	0.04	1	0.104
3	Edge board	m3	4.00	0.20	0.04	1	0.032
<u>HANDRAILS</u>							
1	Tubes diam. 40 mm (horizontal)	m	9.60			2	19.200
2	Tubes diam. 40 mm (vertical)	m	11.00	0.90		1	9.900
3	Fixations	F.F.				1	11.000
<u>IRONMONGERY</u>							
1	Anti-termites and fungicidal treatment	Kg				4	4.000
2	Nails from 50 to 100 mm	Boite				6	5.000
3	Bolts with nuts 300 mm length & diam 20 mm	Unité				2	2.000
<u>EARTHWORK</u>							
1	Earthwork	m3	2.40	1.60	0.20	1	0.768
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							

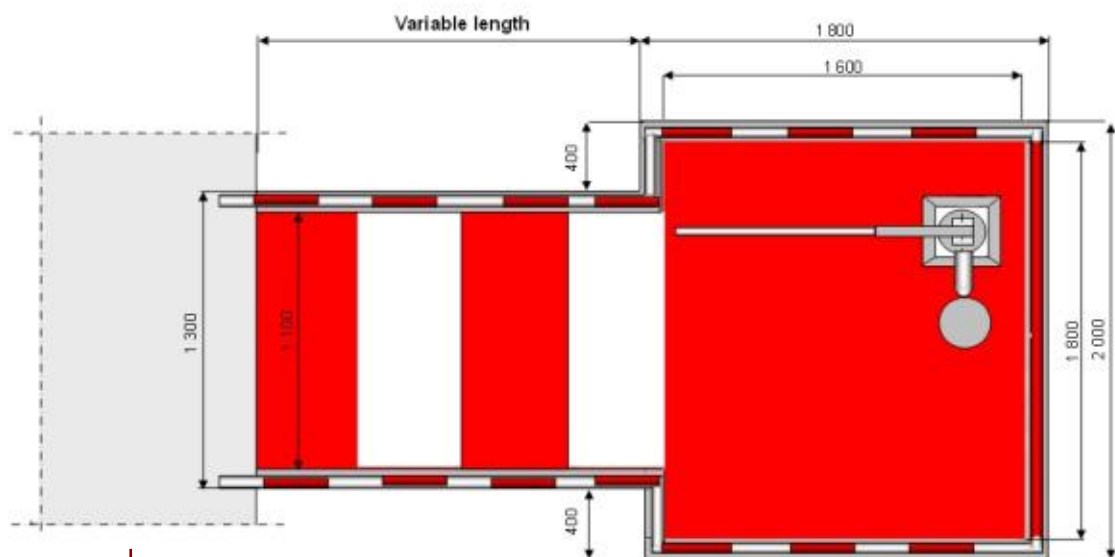
Dock in reinforced concrete



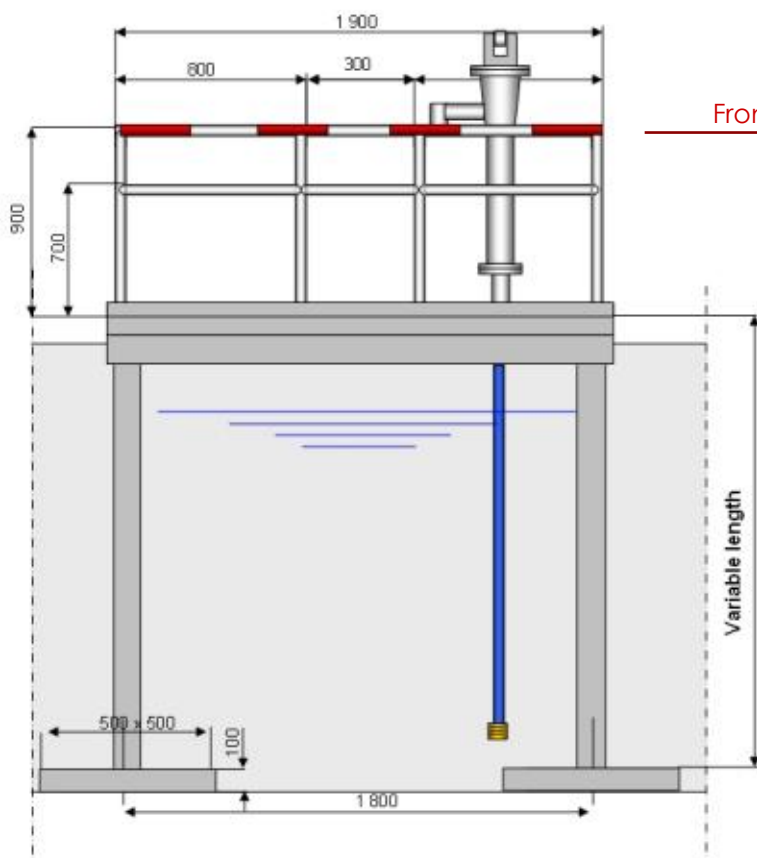
This same construction aims at the same result than the one before, only the technique is different. This time, the dock is made of reinforced concrete, which makes it more durable but also much more expensive and much more difficult to build. This time, it is equipped with a water pump, so that the users will not have to lend over the edge to get back up their bucket (reducing the risks of falling and back-ache, and more accessible to some people with a limited range of movements).

Technical drawings





Top view



Front view

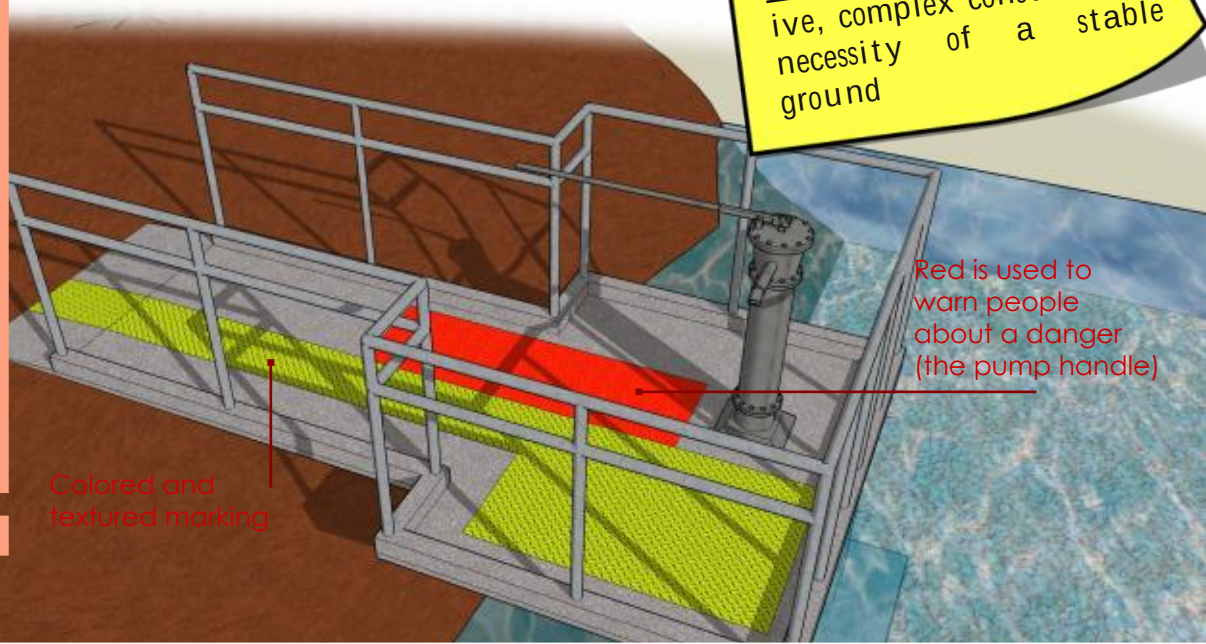
Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>PERMANENT FOUNDATIONS</u>							
1	Reinforced concrete for footings 800 x 800 x 10	m3	0.80	0.80	0.10	2	0.128
2	Stones 4 x 6 for compacted granular fill	m3	1.00	1.00	0.15	2	0.150
3	Blinding concrete	m3	0.80	0.80	0.04	2	0.026
<u>STANDARD SUPERSTRUCTURE</u>							
1	Columns in reinforced concrete 200 x 200 mm	m3	3.00	0.20	0.20	2	0.240
2	Boundary beam in reinforced concrete 200 x 300 mm	m3	5.60	0.20	0.20	1	0.224
3	Brickwork for curb 80 x 80 mm	m2	5.60	0.12		1	0.672
4	Board in reinforced concrete thickness 100 mm	m3	2.00	1.60	0.10	1	0.320
<u>MOVING AREA</u>							
2	Boundary beam in reinforced concrete 200 x 300 mm	m3	2.00	0.20	0.20	2	0.160
3	Brickwork for curb 80 x 80 mm	m2	2.00	0.12		2	0.480
4	Board in reinforced concrete thickness 100 mm	m3	2.00	1.30	0.10	1	0.260
<u>HANDRAILS</u>							
1	Tubes diam. 40 mm (horizontal)	m	9.60			1	9.600
2	Tubes diam. 40 mm (vertical)	m	11.00			1	11.000
3	Fixations	F.F.				1	11.000
<u>EARTHWORK</u>							
1	Earthwork	m3	2.40	1.70		1	4.080
<u>WATER PUMP AND PIPING</u>							
1	Pump	Unit					1.000
2	Piping (incl. manpower)	F.F.					1.000
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							

Concrete dock

Advantages: long lifespan, reduced maintenance

Drawbacks: very expensive, complex construction, necessity of a stable ground



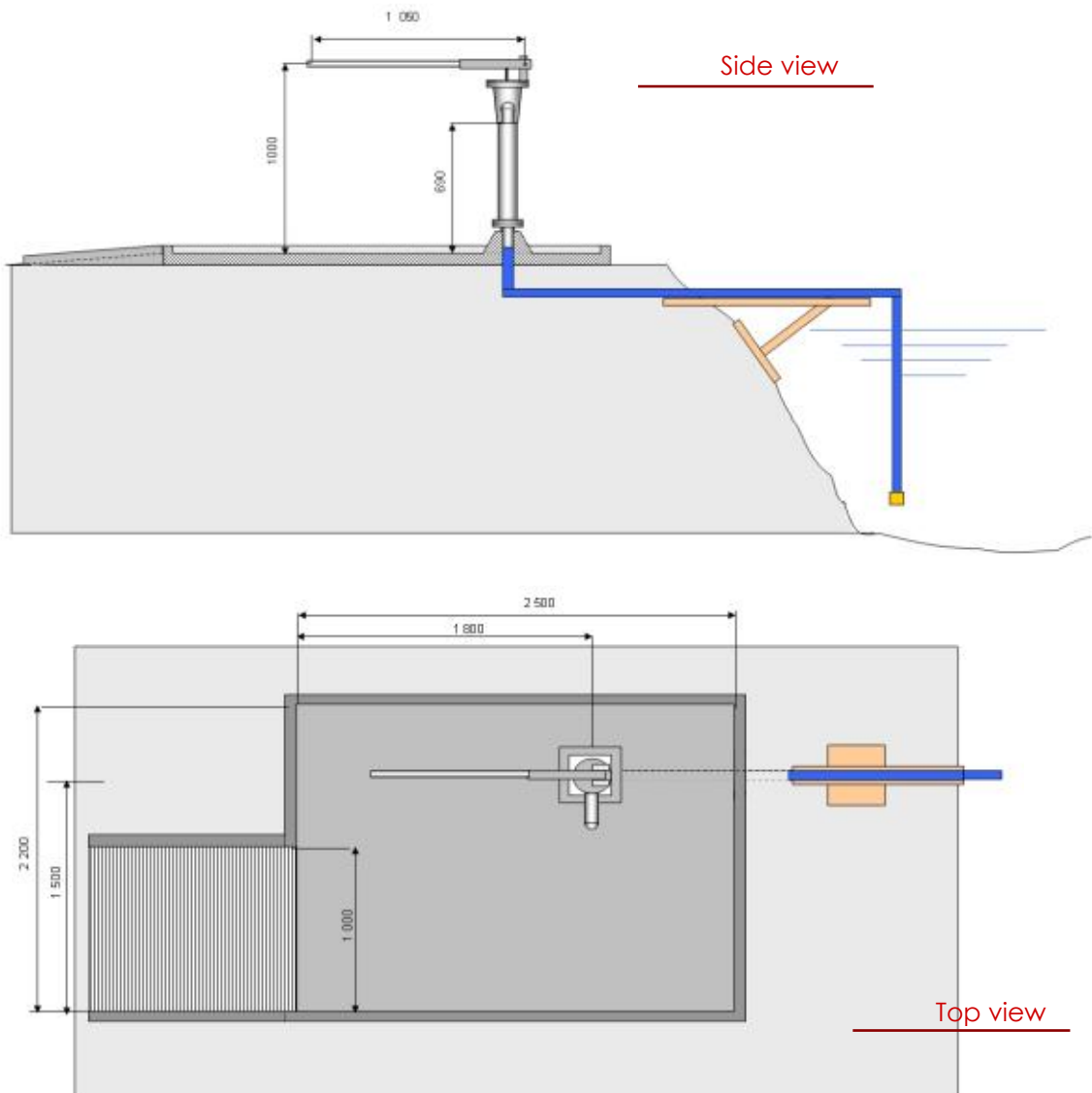
Colored and textured marking

Water point on a concrete area



The last example of an accessible water point is slightly different from the two previous ones. We do not consider docks anymore, but a concrete platform equipped with a hand pump, very similar to the one found for open washing areas. The only difference is that here the water is pumped from the river or the lake and not anymore from the ground water.

Technical drawings



Cost estimation

N°	WORK TYPE	Units	Dimensions				Quantity
			Lgth	Wdth	Ht	Nb.	
<u>WASHING SLAB</u>							
1	Reinforced concrete for slab 2,40 x 2,20 x 0,10	m3	2.50	2.20	0.10	1	0.550
2	Stones 4 x 6 for granular compacted fill	m2	2.50	2.20	0.15	1	0.825
3	Border in brickwork	m2	6.40	0.12		1	0.768
4	Blinding concrete	m3	2.50	2.20	0.04	1	0.220
<u>ACCESS RAMP (slope 8%, length 1m)</u>							
1	Stones 4 x 6 for granular compacted fill	m3	1.20	1.00	0.15	1	0.180
2	Blinding concrete	m3	1.20	1.00	0.04	1	0.048
3	Reinforced concrete	m3	1.20	1.00	0.10	1	0.120
<u>EARTHWORK</u>							
1	Earthwork	m3	2.90	2.60	0.30	1	2.262
2	Laterite fill	m3	2.90	2.60	0.15	1	1.131
<u>WATER PUMP AND PIPING</u>							
1	Pump	Unit					1.000
2	Piping (incl. manpower)	F.F.					1.000
<u>UNEXPECTED</u>							
1	Unexpected	5%					
GENERAL TOTAL							

Concrete area

Advantages: simple design,
easy to build, easy to clean

Drawbacks: expensive water
pump, necessary maintenance
for the pump

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