



# RURAL WATER POINT INSTALLATION PROGRAM MOZAMBIQUE

THE CANADIAN CONSULTING ENGINEERING AWARDS 2016

CATEGORY: INTERNATIONAL

DEADLINE: APRIL 21st 2016

# PROJECT SUMMARY

Cowater managed this complex 5-year, USD 4.6M program providing access to water and sanitation to 315,000 beneficiaries in two remote Northern provinces in Mozambique, improving health and quality of life. Cowater was responsible for planning, scheduling, financial management, design, and construction supervision of 600 rural water systems. To maximize sustainability and impact, Cowater trained 25 facilitators to work with communities, mobilize their participation, promote good health and hygiene, and facilitate construction of household sanitation facilities.

## PROJECT DESCRIPTION

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In 2014, Mozambique was ranked 180<sup>th</sup> out of 188 countries assessed in the UN Human Development Report. One of the main challenges in rural areas is access to clean water and sanitation. Only 33% of the rural population has access to drinking water and 11% has access to adequate sanitation. To assist in addressing the lack of adequate services in poor, rural areas, Cowater managed this five-year, USD 4.6M project which provided clean water and improved sanitation to 315,000 beneficiaries, improving their health, economic well-being and quality of life. The project, funded by the Millennium Challenge Account – Mozambique, targeted 13 districts in the provinces of Cabo Delgado and Nampula in the remote Northern part of the country.

Cowater was responsible for planning, scheduling, financial management, hydrogeological surveys, design, tender documents, and construction supervision for 600 boreholes with hand pumps and 10 solar powered pumping systems. Associated infrastructure was also constructed, including cattle watering troughs and washing basins. Nine contractors were involved in the construction, requiring detailed contract management and careful construction supervision to ensure infrastructure of high quality was constructed.

To maximize sustainability of the infrastructure, communities must want the infrastructure, be involved throughout the project, and understand how to operate and maintain the systems. Cowater trained 25 facilitators to work with communities, mobilize their participation, generate demand for the infrastructure, promote good health and hygiene habits, and facilitate the construction of sanitation facilities. In each community, a water committee was trained to manage, operate and maintain their systems. Additionally, 92 mechanics were trained within the target districts to perform maintenance and repairs on the hand pumps. Following construction, monitoring and evaluation was conducted to ensure systems remained functional, and being used and maintained appropriately.



Water reserve and solar panel

# PROJECT OBJECTIVES, SOLUTIONS AND ACHIEVEMENTS

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The objective of the project was to increase access to reliable and quality water and sanitation facilities in rural areas of Nampula and Cabo Delgado, through 1) construction of 600 rural water points, serving 300,000 people; 2) increasing the number of latrines in use by community members; and 3) improving health and hygiene practices.

This complex project required diverse and innovative solutions. The project, managed from Cowater's head office in Ottawa, was implemented by a multi-disciplinary team of 35 local personnel, led by a Canadian team leader in the field. The success of the project was based on:

- 1) Detailed project planning and scheduling to maximize the use of resources across a large geographical area with disperse rural communities.
- 2) Local knowledge of the geography, hydrogeology, design standards, communities, cultures, languages, and practices to ensure effective technology selection, design, construction supervision, communication and training.
- 3) Contracting works construction in three phases and a number of lots per phase to enable the participation of local contractors, minimizing construction costs.
- 4) Rigorous construction supervision to ensure infrastructure of high quality was constructed.
- 5) Capacity building and training of communities, water committees, local government stakeholders and local mechanics to improve service delivery in the sector in the future.
- 6) Improving the supply chain for hand pump spare parts using local mechanics as parts vendors to enable communities to access both expertise and parts.
- 7) Promotion of improved sanitation and hygiene habits through participatory sessions in each community to encourage households to construct latrines and practice good hygiene habits.
- 8) Working with the Client and stakeholders to develop a pilot project to introduce solar powered pumping systems where viable, increasing the number of beneficiaries of the project.

Cowater exceeded the project objectives by constructing 600 rural water points, as well as 10 solar pumping systems (not initially planned as part of the project), serving a total of **315,000** people. Cowater trained **25** local facilitators who conducted a total of **3,200** hygiene promotion sessions, for **127,000** participants. As a result, **13,400** latrines were constructed. A total of **92** local mechanics within the **13** target districts were trained and provided with a stock of spare parts to begin their repair businesses. Over the course of the project **400** existing water points were repaired by these mechanics.

## TECHNICAL EXCELLENCE AND INNOVATION

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The best example of technical excellence and innovation within this project was the introduction of small-scale solar systems in communities where the population size was sufficient to warrant the investment and the yield of the borehole was sufficient to meet the needs of a small distribution system. The Client agreed to Cowater's proposal to pilot this technology to provide a higher level of service to a greater number of beneficiaries. Ten systems were constructed within the project, each consisting of a solar panel array, an elevated storage tank, an electric submersible pump and a distribution system with three public taps in different locations. A new management model was required, different than that for a single water point, and was developed by the team in consultation with communities and drawing from successful examples in other regions. (Please see detailed drawings starting from page 8)

### **Other examples include:**

- Implementing newer hand pump technology (Afridev with Bottom Support and Blue Pump) in areas where the water table was deeper than 45m, the depth to which the standard hand pump in Mozambique (Afridev) can pump; and
- Developing a more robust spare parts supply chain by facilitating hand pump mechanics to organize associations in each district to enable local governments to contract the mechanics and to allow them to buy parts in bulk.



**Construction at work**

## **LEVEL OF COMPLEXITY AND PROJECT CHALLENGES**

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Meeting the water and sanitation needs of a population in a large and disperse rural area of a developing country is inherently complex. To achieve the objectives, the project required a multi-pronged approach integrating technical, social, environmental and economic aspects, which was then tailored to each province and district as required to meet specific needs. The technical solution, in most cases, was simple: a borehole equipped with a hand pump. The challenge in a development context is to ensure the sustainability of the infrastructure in the long term through social interventions coupled with technical solutions. Cowater addressed major challenges to achieve the objectives of the project by:

- Dividing the construction work into lots by geographical area and conducting construction in phases, enabling smaller local contractors to work in parallel, while maintaining the ability to achieve economies of scale;
- Using newer hand pump technology (Afridev with Bottom Support and Blue Pump) in approximately 7% of boreholes where the water table was deeper than 45m, where the standard hand pump of Mozambique (Afridev) could not function;
- Building the capacity of local stakeholders (district government, local mechanics, water committees) for long-term monitoring, management and maintenance of the infrastructure;
- Addressing diverse cultural practices in terms of hygiene and sanitation using local facilitators fluent in the local languages and from the specific district;
- Conducting a high number of geophysical surveys and using data from previous phases of drilling to manage the number of failed boreholes drilled; and
- Focusing on gender as an integral issue throughout the project, including encouraging women to hold key decision-making positions on the water committees.



## SOCIAL AND ECONOMIC BENEFITS

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The health benefits resulting from improved water, sanitation and hygiene habits are well documented. Every day 6,000 children die around the world from water-related diseases such as diarrhoea. Moreover, the economic benefits area also well known. For example, the WHO has estimated that for every \$1 invested in water and sanitation, the returns range from \$5 to \$28. Through this project, 315,000 people now have access to water and sanitation, combined with improved hygiene habits such as hand washing, greatly improving their health and well-being.

The economic benefits of the project may not be as evident, however are just as real. As the health of family members improves, women – the caretakers of the family - are able to spend more time on productive activities. The new water sources are closer than those previously used and so result in time savings for women, whose role it is traditionally to collect water for the family's needs several times a day. In some cases, families have decided to increase the size of land they use for agricultural activities, increasing the amount of food for both personal consumption and for sale. Some communities decided to create community gardens near the water points to enable vegetables to be grown during the dry season using water from the water point.

These benefits were illustrated in an MCA Mozambique newsletter (April 2012): *Ermelinda Watita said that the project had brought great improvements to her life and her family. Before having the hand pump in her village, she was obliged to spend 2 to 3 hours a day to collect muddy water from a small stream about 3 km away. Now that she has water in the village, she can spend more time in her field and she hopes that the size of her farming plots will increase in the coming years as a result.*

## ENVIRONMENTAL BENEFITS

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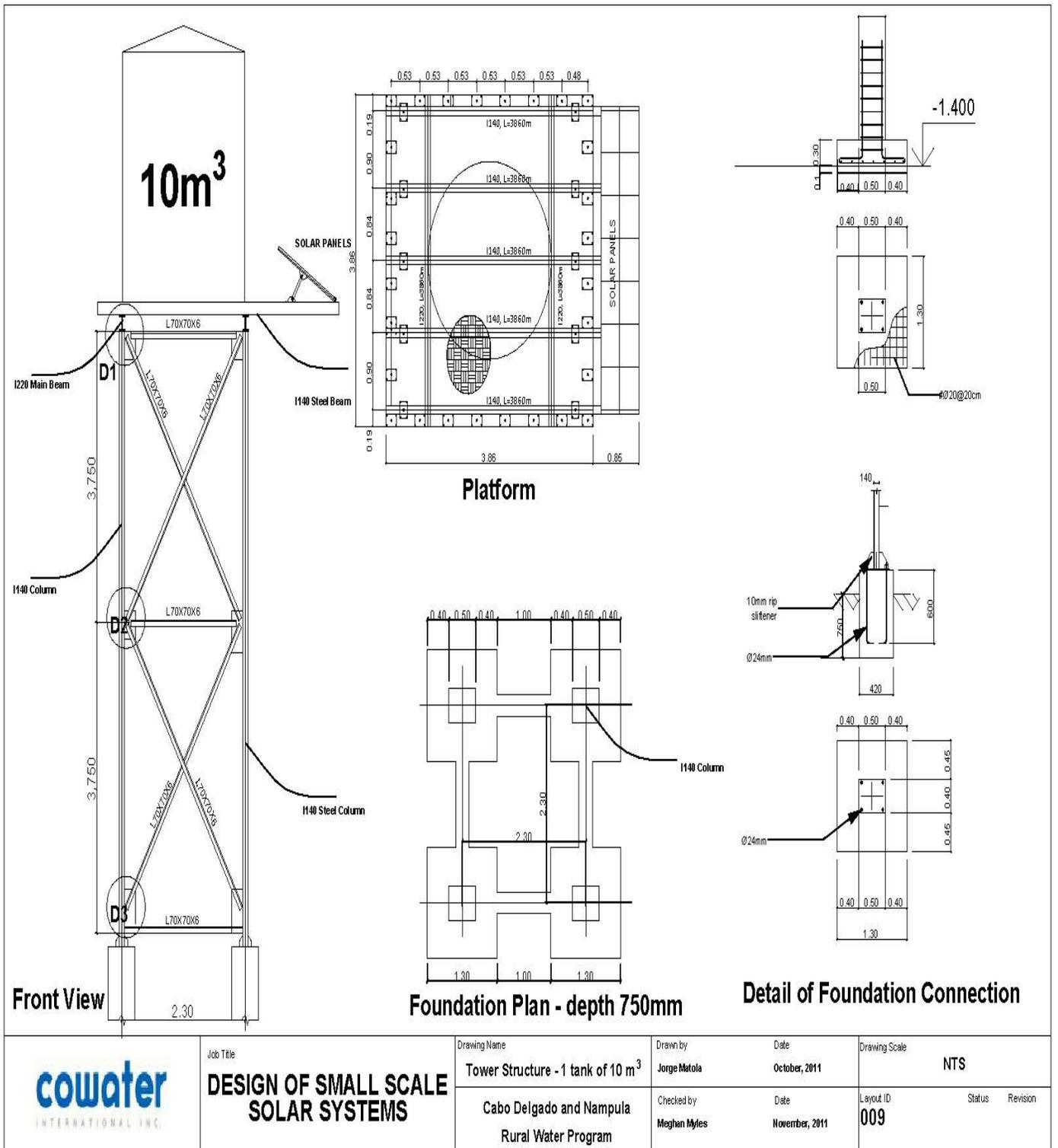
The environmental benefits of improvements in sanitation are also evident. Within the beneficiary communities there is now less defecation in open spaces, which was previously common practice. Water sources are less likely to become contaminated and disease is less likely to be spread through vectors such as flies when latrines with covers are being used. Having a water source near to the community allows the production of mud bricks, improving the quality of house construction, a further social benefit to the project. To avoid and minimize adverse social and environmental impacts Cowater ensured compliance with MCC's Environmental Guidelines as well as the GoM's environmental legislation. Assessments were conducted to identify site-specific environmental risks and propose corresponding mitigation measures; these were documented in an Environmental Management Plan (EMP), included in the bidding documents for works construction. The project successfully mitigated all major environmental risks (e.g. health & safety, pollution of water points from pit latrines, depletion of groundwater sources, habitat degradation due to construction, poor drainage around water points) by having the Resident Engineer perform start-up inspections according to the EMP, and having Supervisors perform routine compliance inspections during the execution of works.



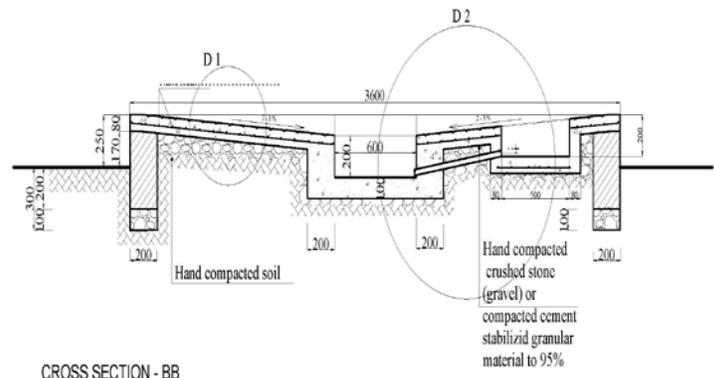
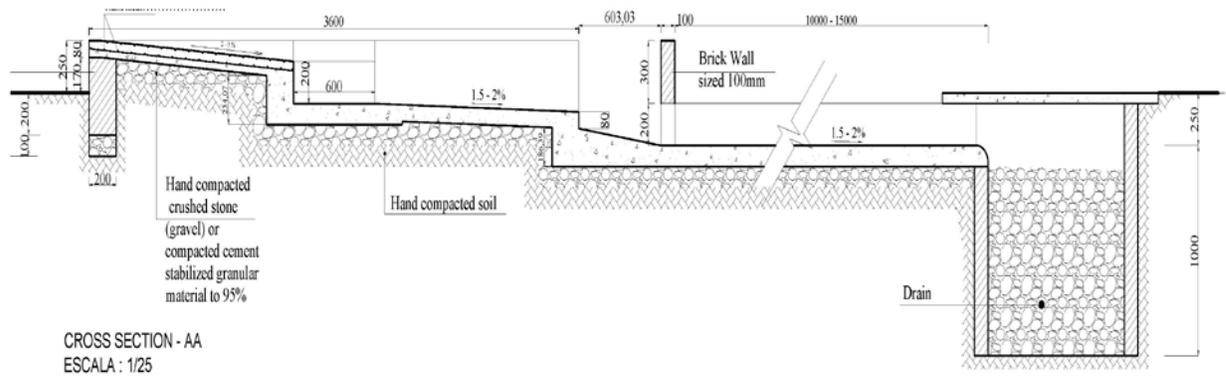
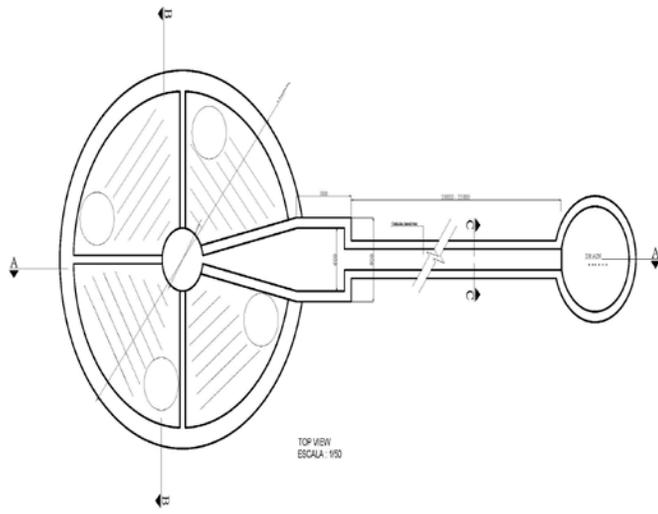
**Community members gathered to discuss the project achievements**



**A girl washes her clothes with the new water system**

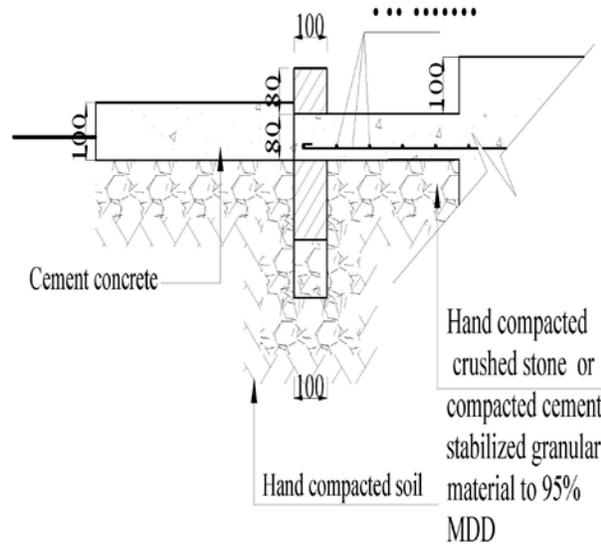
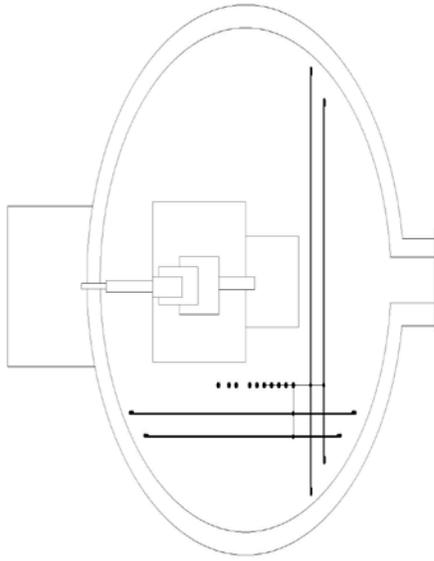


	Job Title	Drawing Name	Drawn by	Date	Drawing Scale
	<b>DESIGN OF SMALL SCALE SOLAR SYSTEMS</b>	Tower Structure - 1 tank of 10 m <sup>3</sup>	Jorge Matola	October, 2011	NTS
		Cabo Delgado and Nampula Rural Water Program	Checked by Meghan Myles	Date November, 2011	Layout ID 009
					Status Revision



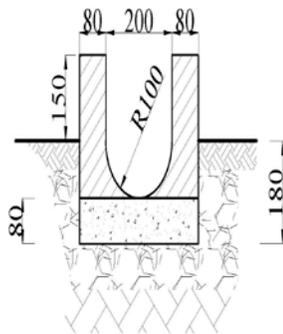
PROJECT:	MCA - CABO DELGADO AND NAMAPULA RURAL WATER POINT INSTALLATION PROGRAM	SCALE:	MCA-003
TITLE:	DRAWING DETAILS FOR CONSTRUCTION WASHING BASIN - OPTION 2	SCALE:	1:25
CONSULTANTS:	 	DESIGNED BY:	NELSON MATSINHE
		DRAWN BY:	NELSON MATSINHE
		DATE:	Jan 2010
		CLIENT:	MILLENNIUM CHALLENGE ACCOUNT MOZAMBIQUE





DETAIL 2

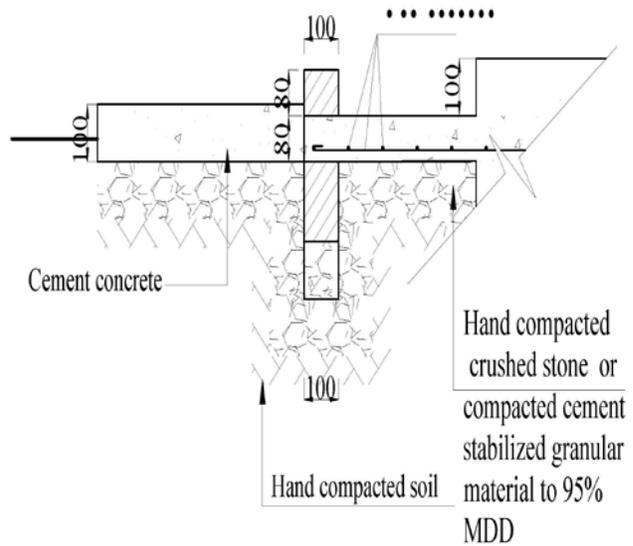
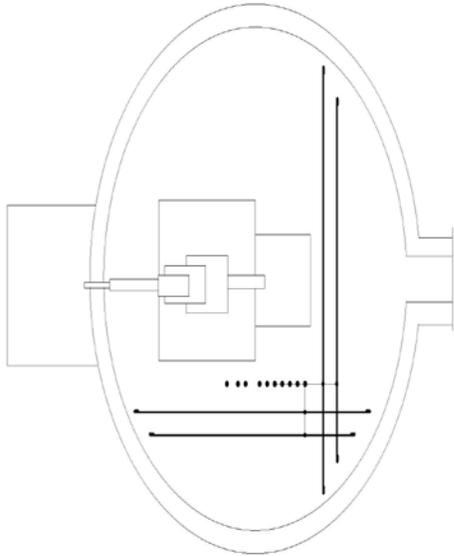
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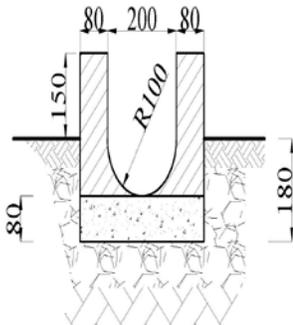
CROSS SECTION-BB

SCALE: 1/10

PROJECT: MCA - CASO DEL GARDI AND NAMPILA RURAL WATER POINT INSTALLATION PROGRAM		PROJECT: MCA-10041
TITLE: TYPICAL HANDPUMP INSTALLATION WITH APRON		SCALE: 1/25
CONSULTANTS: <b>Salomon Ltd.</b> PO Box 100 Tel: +265 17 9110 Fax: +265 17 9111 E-mail: info@salomon.co.zw	DESIGNED BY: NELSON MATSINHE	CHECKED BY: NELSON MATSINHE
DATE: 10 Dec 2009	DATE: 10 Dec 2009	DATE: Jan, 2010
PROJECT: MILENNIUM CHALLENGE ACCOUNT MOZAMBIQUE		



DETAIL 2  
SCALE: 1/10



CROSS SECTION-BB  
SCALE: 1/10

SUBJECT: MCA - CASO DELGADO AND NAMIPULA RURAL WATER POINT INSTALLATION PROGRAM		MCA-004-1	
TITLE: TYPICAL HANDPUMP INSTALLATION WITH APRON		SCALE: 1/25	
CONSULTANTS: Salomon Ltda. cowater		DESIGNER: NELSON MATSINWE	DATE: Jan. 2010
		CHECKER: NELSON MATSINWE	CLIENT: MILLENNIUM CHALLENGE ACCOUNT MOZAMBIQUE