A Proposal to Undertake

A Water and Sanitation Hygiene Project

In the Rural Community of

Sarurpur Kalan, UP, India

June 2014

WATER AND SANITATION HYGIENE PROJECT

TABLE OF CONTENTS

PROJECT PROPOSAL

With project leadership from two Calgary-area clubs, the Rotary Clubs of Calgary Centennial, Calgary Heritage Park and other clubs in the US and India are joining forces to fund a clean water project for the village of Sarurpur in northern India. The project, which will take advantage of facilities available from a hospital initially funded by the Rotary Club of Calgary Centennial and the Rotary Club of Calgary, will make clean drinking water and basic sanitation facilities available to villagers.

To put this project in context, it is worth remembering some basic differences between developed and developing countries.

In developed countries, clean drinking water arrives from large, complex centralized facilities through networks of underground pipelines to homes, businesses and public facilities. Sanitation facilities are much the same, taking sewage from place of origin to centralized treatment facilities. Because these facilities require substantial financial resources, have high maintenance and operational costs, and require technical and management skills for proper operation and maintenance, this approach is not the answer to clean water issues in rural India.

This project is aimed at addressing basic water and sanitation issues in the village of Sarurpur as described below. The proponents have done a great deal of research to determine the best technologies and approaches for this project, although some plan changes may be necessary once implementation begins.

The Rotary clubs behind this project expect to raise $220,000 for this project, with Canadian funds coming from the following sources:

1.	Funding from Canadian Sources		$ 70,000
	▪ Rotary Club of Calgary Centennial and Heritage Park	$20,000	
	▪ Other Calgary local Rotary Club(s)	$10,000	
	▪ Community Initiative Program	$20,000	
	▪ Federal Grant	$10,000	
	▪ DDF (District 5360)	$10,000	
2.	Funding from US and other Sources (Rotary Clubs and DDF)		$ 70,000
3.	TRF (100% of DDF and 50% of the rest)		$ 80,000
	Total		$ 220,000

PROJECT DESCRIPTION

SANITATION

In developed countries, the standard practice for the sanitary disposal of human waste is sewerage. Due to financial constraints and exorbitant maintenance and operational costs, sewerage is not the answer at present to solve the problem of human waste management in rural India. Moreover, it requires skilled persons and good management for operation and maintenance. It also requires over 2 gallons of water to clean human excreta; water which is not readily available.

The septic tank system is also expensive and requires a large volume of water for flushing. There is shortage of drinking water in almost all urban and rural areas; hence water has to be conserved. Septic tank has other problems like periodic cleaning and disposal of sludge. Inadequate effluent disposal is a source of foul smell, mosquito breeding and health hazards.

Sulabh International Social Service Organisation, a non-profit voluntary social organisation founded in India in 1970, is dedicated to achieving success in the field of cost-effective sanitation, prevention of environmental pollution and development of non-conventional sources of energy. Environmental friendly two-pit, pour-flush compost toilet known as Sulabh Shauchalaya that is socially acceptable, economically affordable, technologically appropriate has been implemented in more than 1.2 million houses all over India.

The Sulabh flush compost toilet is an indigenous technology and the toilet can easily be constructed by local labour and materials. It provides health benefits by safe disposal of human excreta on-site. It consists of a pan with a steep slope of 25°-28° and an especially designed trap with 20 millimetre water-seal requiring only 1 to 1.5 litres of water for flushing, thus helping conserve water. There are two pits of varying size and capacity depending on the number of users. The capacity of each pit is normally designed for 3 years' usage. Both pits are used alternately. When one pit is full, incoming excreta are diverted into the second pit. In about two years, the sludge gets digested and is almost dry and pathogen free, thus safe for handling as manure. Digested sludge is odourless and is a good manure and soil-conditioner. It can be dug out easily and used for agricultural purposes.

Sulabh flush compost toilets do not cause water pollution. When constructed in homogeneous soil, horizontally, bacteria do not travel more than three metres, and vertically the seepage is not more than one metre. That said, the toilet must be built at a safe distance from water sources. If there is a nearby tube-well or hand-pump sunk, the first joint should be lower than the limit of the vertical seepage. No vent pipe is needed since the gas gets absorbed in the soil facing the chamber, as the brick lining inside is in lattice formation. This system fulfills the seven conditions of a sanitary latrine laid down by the World Health Organization:

The method used should be simple, inexpensive in construction and operation. This approach seems to be the right approach for current project in the rural community of Sarurpur. This project would involve the construction of four to eight public sanitation centres based on Sulabh technology. Each sanitation centre would include six to ten private toilets and a corresponding two-pit system; a bore-well and water tank; a hand-washing facility; storage for cleaning supplies; and solar bulbs for each toilet. Each sanitation centre will be built on public land owned by the rural community.

SANITATION PROJECT BUDGET

Assumptions:

1. Size of each latrine will be approximately 4'x5' = 20 square feet
2. Each sanitation centre will have about 12 latrines
3. Common area for hallway, storing cleaning supplies and chair for cleaner = 100 square feet
4. Total covered area = 20 x 12 + 100 = 340 square feet

Cost:

1. Cost of building ($24/sf) = $8,160
2. Platform around the building = $2,000
3. Two large pits or more smaller pits = $2,000
4. Bore-well (submersible pump) = $400
5. Water tanks (2) = $200
6. Hand washing facility (4 stations) = $500
7. Solar power bulbs = $2,000

Estimated Total = $15,260
Contingency (15%) = $2,290
Total Cost for each Public Sanitation Centre = $17,550
Assuming six such centres are built, the cost would be $105,300

CLEAN WATER

Among the competing technologies available for providing clean drinking water, for this project two technologies would be suitable and necessary.

1. Centralized water purification plant(s)
2. Decentralized bio-sand water filters

WaterHealth, a commercial enterprise operating in social sector, provides an off-the-shelf modern technology for purifying water in a rural setting. The technology has the advantages of being cheaper and having better quality control. However, it does require electricity to operate the plant. Furthermore, water has to be transported from the plant site, which is practical only in densely populated areas.

The Centre for Affordable Water and Sanitation Technology (CAWST), a Calgary-based organization, has been very successful in developing bio-sand water filters. While the technology has the advantage of being used in remote areas and does not require electricity, its main disadvantage is water quality control.

We are proposing a dual approach as the most optimum solution. We are proposing a centralized water purification facility for the densely populated area of the community and decentralized bio-sand water filters for remote parts of the community. The balance between the two approaches will be finalized after further consultation with the community.

WaterHealth: One part of this project will use a technology provided by WaterHealth, a commercial enterprise operating in the social sector. It constructs and runs decentralized WaterHealth Centres, a sustainable water purification plant to provide rapid access to safe and affordable water. Each plant can produce from 1,000 to 6,000 litres of water per hour. It maintains a centralized real-time monitoring and quality control system to guarantee an immediate and agile response to system- or water-quality issues. The seven-step filtration process delivers water that meets World Health Organization quality standards. Rigorous and extensive purification tests in third-party laboratories have verified the efficacy of these systems against a broad range of bacteria, viruses, and parasites.

The company has created a business model which is sustainable in the long-term. Water is 'sold' at a nominal charge under the brand of Dr. Water. Charges are sufficient to cover the operating, maintenance and quality control costs. This creates a sustainable community solution that improves lives, facilitates growth and enriches local economies.

Communities not only realize immediate benefits from improved health and wellbeing brought by clean water, they also benefit economically by sharing in a portion of a Centre's net earnings and ultimately by vesting in full ownership of that Centre. This unique win-win relationship means that access to safe, reliable water can become a reality for large number of people – creating a bridge today to a better tomorrow. The company's worldwide headquarter is in California; its international offices are in India and Ghana.

Proactive education of the benefits associated with the use of Dr. Water's "always pure" water is a mission for WaterHealth once it enters a community. The organization communicates two key messages to people in the community: 1) the health and hygiene benefits of using safe water and 2) the community participation benefits of supporting the WaterHealth Centre in which the community has an ownership interest.

The Centre for Affordable Water and Sanitation Technology (CAWST): CAWST is a non-profit organization that provides training and consulting to organizations that work directly with populations in developing countries who lack access to clean water and basic sanitation. CAWST "walks beside" hundreds

of organizations – government agencies, community groups, and local and international NGOs of all sizes – in 63 countries as they develop their capacities to deliver water and sanitation programs locally.

One of the main products of CAWST is a bio-sand filter purifying water. A bio-sand filter (BSF) is an adaptation of the traditional slow sand filter, which has been used for community drinking water treatment for 200 years. The bio-sand filter is smaller (about 1 m tall, 0.3 m wide on each side) and adapted so that it does not flow continuously, making it suitable for use in people's homes. The filter container can be made of concrete or plastic. It is filled with layers of specially selected and prepared sand and gravel. The sand removes pathogens and suspended solids from contaminated drinking water. (Pathogens are micro-organisms in water that make people sick.) A biological community of bacteria and other micro-organisms grows in the top 2 cm of sand. This is called the bio-layer. The micro-organisms in the bio-layer eat many of the pathogens in the water, improving the water treatment.

Any kind of water can be used in the bio-sand filter – well water, borehole water, pond or river water, tap-stand water, or rainwater. This makes it very convenient for people because they can use whichever water source is closest to home, make it safe to drink. The water must not have been chlorinated though, or the chlorine will kill the bio-layer. The water should also not contain any dangerous chemicals, because the bio-sand filter cannot remove most chemicals from water.

Contaminated water is poured into the top of the bio-sand filter at least once per day (but not continuously). The water poured into the top of the filter slowly drips through the holes in the diffuser, and flows down through the sand and gravel. Treated water flows out of the outlet tube. No power is required - the filter works by gravity. It should take about 1 hour to get 12-18 litres of filtered drinking water.

Pathogens and suspended solids are removed through biological and physical processes that take place in the sand. These processes include: mechanical trapping, predation, adsorption, and natural death.

Clean Water Project Budget

The budget for the water part of the project is based on four assumptions, based on information provided by CHILD Foundation. First, the community population to be served has a population of 25,000, in 4,000 households. Second, we assumed that 30% of the households in the community would use the new system – mostly in the densely populated part of the village. This is based on WaterHealth's experience in similar communities in India, and suggests that in Phase I of the program 1,200 households would use the system. Third, about 300 households are remotely located and cannot be served by a centralized water purification plant. Fourth, we assumed that water consumption for each family of six for drinking and cooking would be 20 litres per day. This suggested the community would need 24,000 litres per day. Since electricity is only available for about 6 h per day, then the plant capacity would need to be about 4,000 litres per h.

WaterHealth System: Since the cost of a standard 1,000 litre per hour plant is $38,000, either one plant of large capacity or four plants of smaller capacity would be needed to supply the community. The cost would therefore total $152,000. (Please note that as utilization within the community improves, plants will have the capacity to provide clean drinking water to more households by operating longer.) WaterHealth would

share in the capital costs, which it would recover through charges to the community. Assuming 50/50 sharing, Rotary's costs would be $76,000.

CAWST: The cost of each biosand filter is about $80, which means the cost of 300 filters would total $24,000. CAWST would provide technology and training, but no capital assistance. Thus, the total cost of both the WaterHealth plant and CAWST's bio-sand filters would be about $100,000.

Other Costs: The project would need to allow for two trips to India, for a total of $5,000. The sanitation project would require an inventory of cleaning supplies; the WaterHealth project would require bottles; the CAWST project would require an inventory of sands, frames, and so on; these incidental costs would be about $5,000.

The Bottom Line: Using Sulabh technology for sanitation and WaterHealth's for centralized water purification plant and CAWST bio-sand water filters for remote locations, the project cost would be $215,000 - $220,000.

Health and Sanitation Education

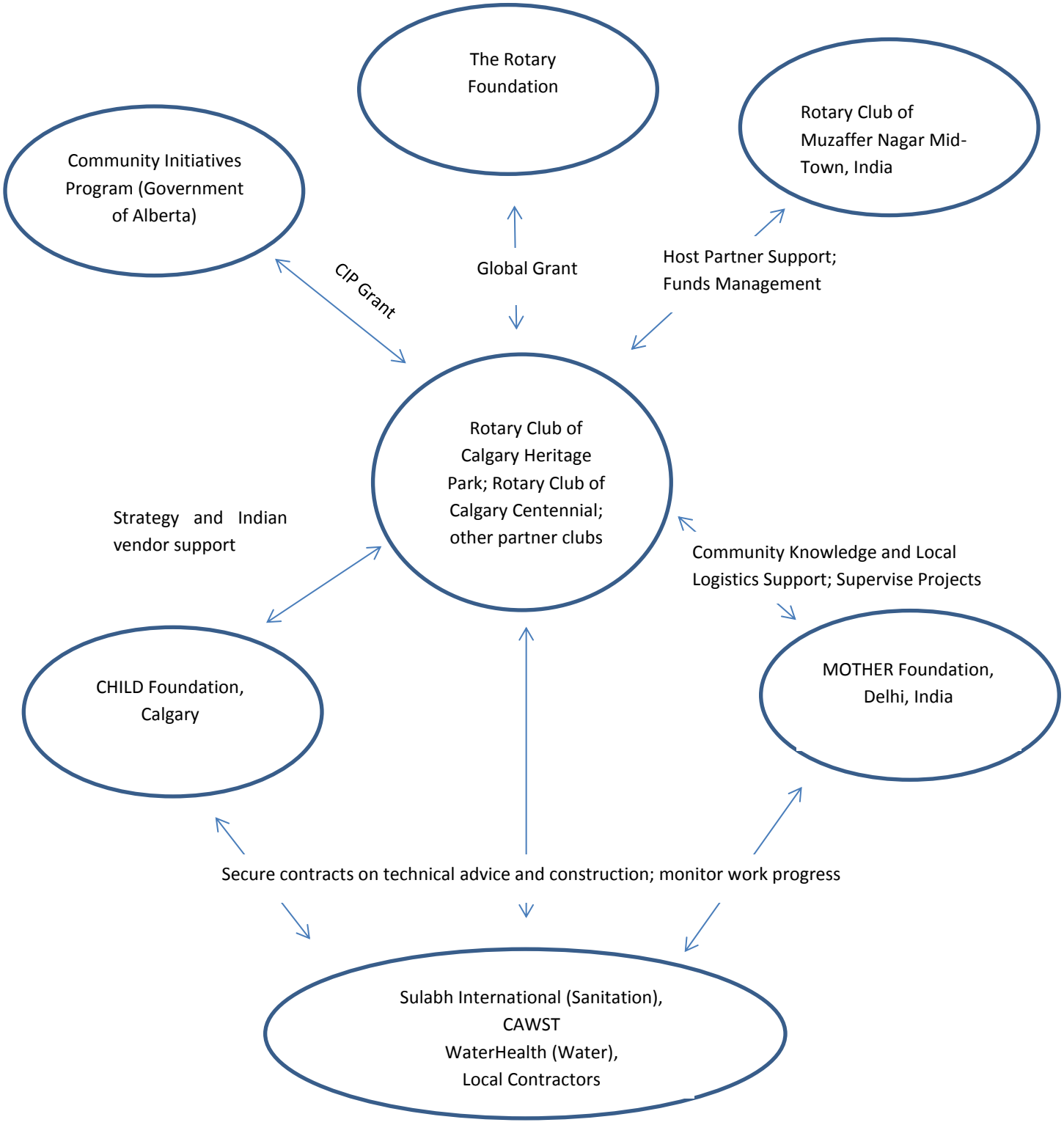
Both CAWST and WaterHealth uses an educational outreach much like the one CHILD Foundation already has in use in Sarurpur Kalan, and its efforts will contribute to this important initiative. Its work uses a multichannel approach to teaching people about sanitation – seminars, signage, pamphlets, and so on. To maximize its impact in a community, CAWST and WaterHealth seeks to partner with other on-the-ground education providers. Working in partnership with CHILD Foundation, the participating Rotary clubs could contribute to these initiatives.

The following table describes the communication objectives of the clean drinking water program.

Target Audience	Communication Objective
School Children	• Help children understand how contaminated water causes diseases and emphasize the importance of safe water • Communicate the importance of practicing correct sanitation and hygiene methods
Youth (Boys and Girls)	• Disseminate correct information on diseases spread through unsafe water • Create awareness of the benefits of safe water
Men and Women (25-60 years)	• Disseminate correct information on diseases spread through unsafe water • Create awareness of the benefits of safe water

PROJECT PARTNERS

A number of project partners would interact to deliver the project successfully.



APPENDIX 1: BACKGROUND

Water and sanitation are fundamental necessities for human health. On 28 July 2010, through Resolution 64/292, the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights. The resolution calls upon states and international organizations to provide financial resources for capacity-building and technology transfer to help communities – in particular those in developing countries – to provide safe, clean, accessible and affordable drinking water and sanitation.

The challenge to make water and sanitation accessible to all humans is immense. At any one time, close to half of all people in developing countries are suffering from health problems caused by poor water and sanitation. Taken together, unclean water and poor sanitation kill more children than anything else.

The Millennium Development Goals of the United Nations called for a reduction of child mortality by two thirds between 1990 and 2015. Although there has been some progress, much more remains to be done. Nearly nine million children under five years of age die each year. Diarrhoea is second only to pneumonia as the cause of these deaths. Why is diarrhoea, an easily preventable and treatable disease, causing an estimated 1.5 million under-five deaths every year?

Because some 2.5 billion people lack decent sanitation facilities, and nearly one billion people do not have access to safe drinking water. These conditions allow diarrhoea-causing pathogens to spread more easily. Addressing sanitation and water issues is a worldwide priority.

Community

Sarurpur Kalan is a village located about 50 km north of New Delhi in the district of Baghpat, province of Uttar Pradesh, India. The village has a population of about 25,000 (4,000 households). Another 6-7 villages are located within 4-5 km radius. This whole rural community with a combined population of exceeding 50,000 lacks the very basic sanitation, water, and medical facilities.

In 2010, a Calgary-based charity (CHILD Foundation) constructed its first hospital – Maya Devi Charitable Hospital – in this rural community of Sarurpur Kalan. The foundation was supported by two Rotary Clubs in Calgary, number of corporations, and the Government of Alberta through its Community Initiative Program. The hospital opened for service in October 2011.

Through first-hand experience, hospital's medical personnel have confirmed the negative impact of poor water and sanitation on the community's health. A majority of illnesses suffered by children under the age of five years is traced to poor sanitation and water.

In India out of a total population of 1.2 billion, 814 million people lack basic sanitation facilities. This has resulted in high mortality and morbidity rates. Low sanitation coverage in India is primarily due to insufficient motivation/awareness of people and lack of affordable sanitation technology. People (mostly from lower economic strata) are generally not aware of environment benefits of sanitation and it is still not a "felt need" for them, resulting in absence of people's participation in sanitation programmes. Non-availability of a choice of toilet designs, area specific technologies, inadequate supporting delivery systems

and absence of trained masons, skilled workers and technical manpower are also reasons for low coverage. By tradition, the Indian society and culture values personal hygiene, but gives little importance to clean and healthy community environment. Human excreta is regarded as the most hated object and anything connected with the latrine is considered so defiling that one is supposed to take a bath immediately after coming out of the toilet and before going into the kitchen– due to psychological and religious taboos. Sanitation is, therefore, regarded as a matter of individual initiative and not a collective obligation of the community. In this socio-cultural background, the environmental sanitation has sadly been given the lowest priority.

A 2008 Ministry of Minority Affairs report on Baghpat district, in which this rural community is located, concluded that "the present status of households with sanitation facilities in rural areas of Baghpat district is miserably poor, when compared with all-India estimates. The Baseline survey has shown that only 35.56 per cent of the rural households are provided with sanitation facilities." Therefore, open defecation is a very serious issue in this community which affects people's health.

The same report concluded that "the maximum number of households in Baghpat district depends for the drinking water on Hand-pumps. In rural areas of the district, 64.76 per cent households were using hand pumps for drinking water. While the community has access to water through hand-pumps, bore-wells are irrevocably contaminated or, in many cases, dried up. A safe, clean and sustainable water supply is the only effective solution."

The electricity situation is equally appalling. Though the electricity connection reaches all villages, only 62% of the total households have electricity connections. Furthermore, power supply is poor at the village level – only 4.6 hours/day.

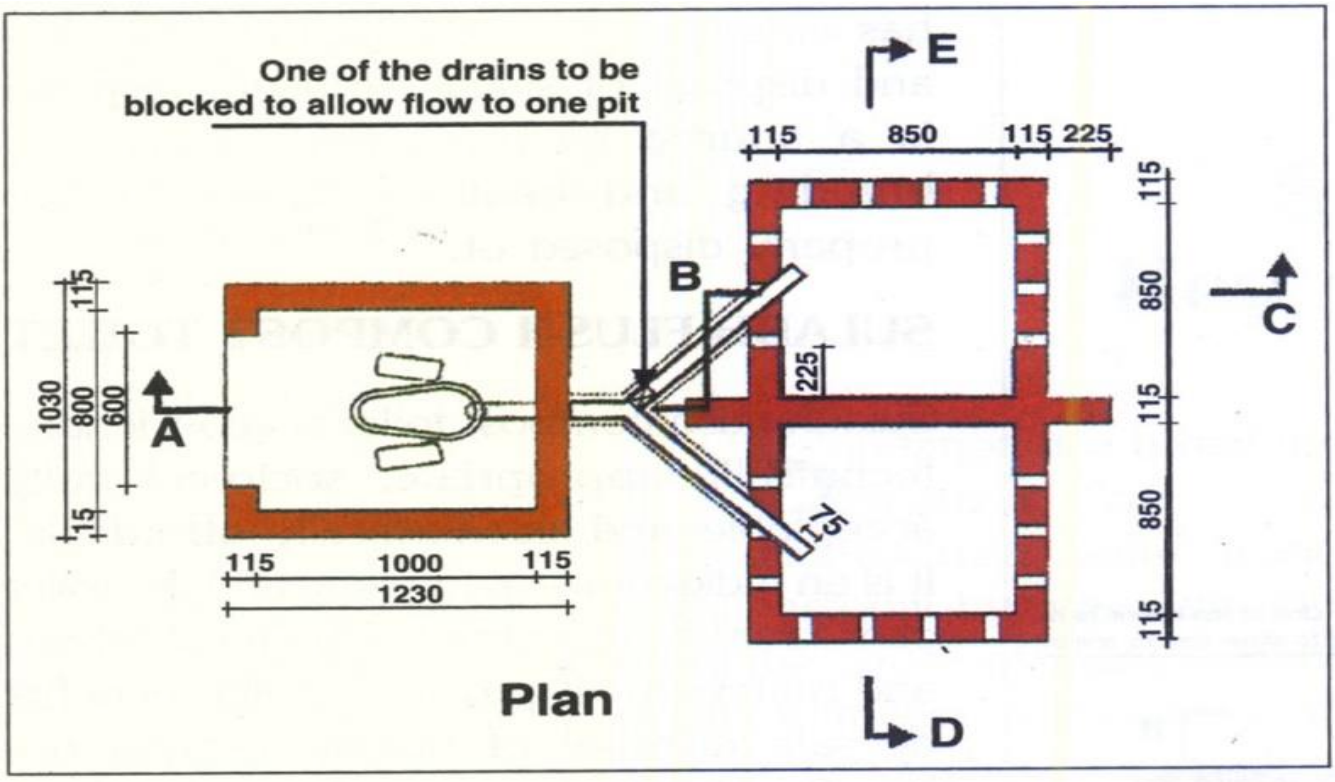
APPENDIX 2: IMPLEMENTATION PLAN

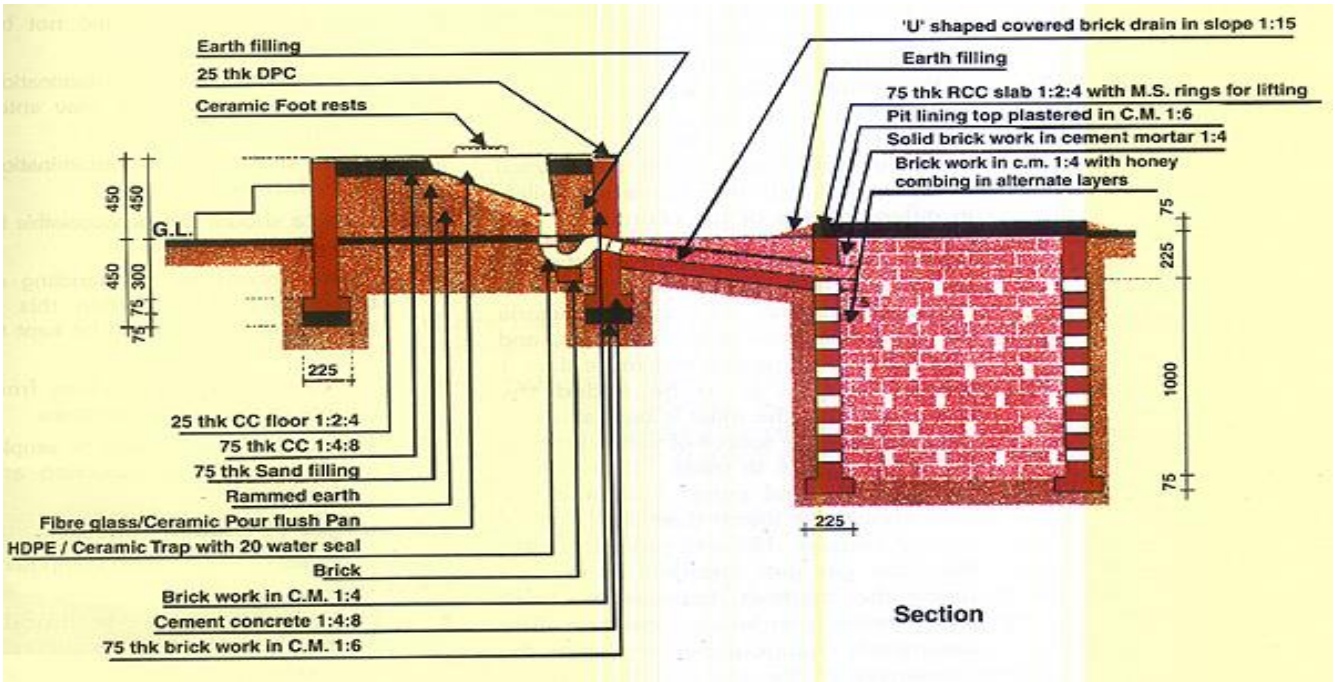
No.	Action	Who	When
1.	Funding by Rotary Club of Calgary Centennial	Anil Jain / Tom Kerwin	Done
2.	Finalize project report	Anil Jain / Peter McKenzie-Brown	June 30, 2014
3.	Presentations to other Rotary Clubs – secure commitment	Anil Jain / Peter McKenzie-Brown	Aug. 31, 2014
4.	Apply for CIP funding	Tom Kerwin or Peter McKenzie-Brown	Sept 15, 2014
5.	Apply for AGLC Approval (Centennial)	Tom Kerwin	July 31, 2014
6.	Initiate water testing in the village	Anil Jain	July 31, 2014
7.	Finalize selection of water technology	Anil Jain / Peter McKenzie-Brown / Tom Kerwin	Aug 31, 2014
8.	Secure sites for water and sanitation centres	Anil Jain / MOTHER Foundation	Aug 31, 2014
9.	Apply for corporate donations / federal grant	Anil Jain / Peter McKenzie-Brown	Aug 31, 2014
10.	Secure CIP, Corporate and Federal funds	Tom Kerwin / Peter McKenzie-Brown	Dec 31, 2014
11.	Apply for DDF and TRF	Peter McKenzie-Brown	Dec 31, 2014
12.	Negotiate technical advice contracts with Sulabh and WaterHealth / CAWST	Anil Jain / MOTHER Foundation	Dec 31, 2014
13.	Negotiate construction contracts	Anil Jain / MOTHER	March 31, 2015

		Foundation	
14.	Secure DDF and TRF approval	Peter McKenzie-Brown	March 31, 2015
15.	Visit India; approve construction contracts	Peter McKenzie-Brown	March 31, 2015
16.	Start construction of sanitation and water project	Contractors	April 1, 2015
17.	Supervise construction; complete sanitation centres	MOTHER Foundation / Contractors	Aug 31, 2015
18A.	Supervise construction; complete water project (if WaterHealth)	WaterHealth	June 30, 2015
18B.	Supervise construction; complete water project (if CAWST); 4 filters/day x 300 days plus ramp-up time	Local contractor / CAWST	June 30, 2016
19.	Prepare final reports – CIP and TRF	Peter McKenzie-Brown, Tom Kerwin, Anil Jain	Sept 30, 2105 or Sept 30, 2016 (depending upon water technology)

APPENDIX 3: PHOTO GALLERY

Health Centre in Sulabh Complex, Harinagar, New Delhi


One of the drains to be blocked to allow flow to one pit
E
115
850
115
225
115
850
115
850
115
C
B
225
A
1030
800
600
115
15
115
1000
115
1230
Plan
D


'U' shaped covered brick drain in slope 1:15
Earth filling
25 thk DPC
Ceramic Foot rests
Earth filling
75 thk RCC slab 1:2:4 with M.S. rings for lifting
Pit lining top plastered in C.M. 1:6
Solid brick work in cement mortar 1:4
Brick work in c.m. 1:4 with honey combing in alternate layers
450
450
G.L.
450
300
75
75
225
75
225
1000
75
225
25 thk CC floor 1:2:4
75 thk CC 1:4:8
75 thk Sand filling
Rammed earth
Fibre glass/Ceramic Pour flush Pan
HDPE / Ceramic Trap with 20 water seal
Brick
Brick work in C.M. 1:4
Cement concrete 1:4:8
75 thk brick work in C.M. 1:6
Section

Appendix B: Bio-Sand Filters (CAWST)

Appendix C: WaterHealth Centre