Ethiopia team 2014-2015 Project Activity Summary

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TECHNION
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Technion
Israel Institute of
Technology

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About us…

Engineers Without Borders is a non-profit humanitarian organization established to partner with developing communities worldwide in order to improve their quality of life. This partnership involves the implementation of sustainable engineering projects, while involving and training internationally responsible engineers and engineering students.

EWB Technion - Israel involves students, faculty and staff of different engineering departments. The Technion group is currently involved in projects in Israel and in Nepal and is active at the regional level in the middle-east.

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About us…

Nimrod Polonsky, Environmental Engineering – Head of Group
Anna Boim, Architecture
Bernadette Bouwer, Environmental Science
Carmi Ben Zaken, Civil Engineering
Eitam Shafran, Environmental Engineering
Gal Avioz, Environmental Engineering
Lotem Buchbinder, Material Engineering
Matan Segman, Civil Engineering
Michael Kuflic, Environmental Engineering
Michal Kisra, Environmental Engineering
Moti Ben-Shabatt, Water Engineering
Nachman Malciel, Civil Engineering
Ofri Talesnick, Civil Engineering
Orit Aviran, Science Education and Chemical Engineering
Popi (Galit) Rajchman, Civil Engineering
Rachel Katriel, Soil Engineering
Shai Moshenberg, Environmental Engineering
Tal Dana, Architecture
Yael Meyouhas, Environmental Engineering and Science Education

Team Fields of Activity

During 2014-2015 the team focused in the implementation and development of 2 main areas:

1. **Planning and construction of rain water harvesting system in the school of a village called Maskel Kristos in northern Ethiopia.**

2. **Studying and developing the technique of stabilized Compressed Earth Blocks as a building method for water storage tanks.**

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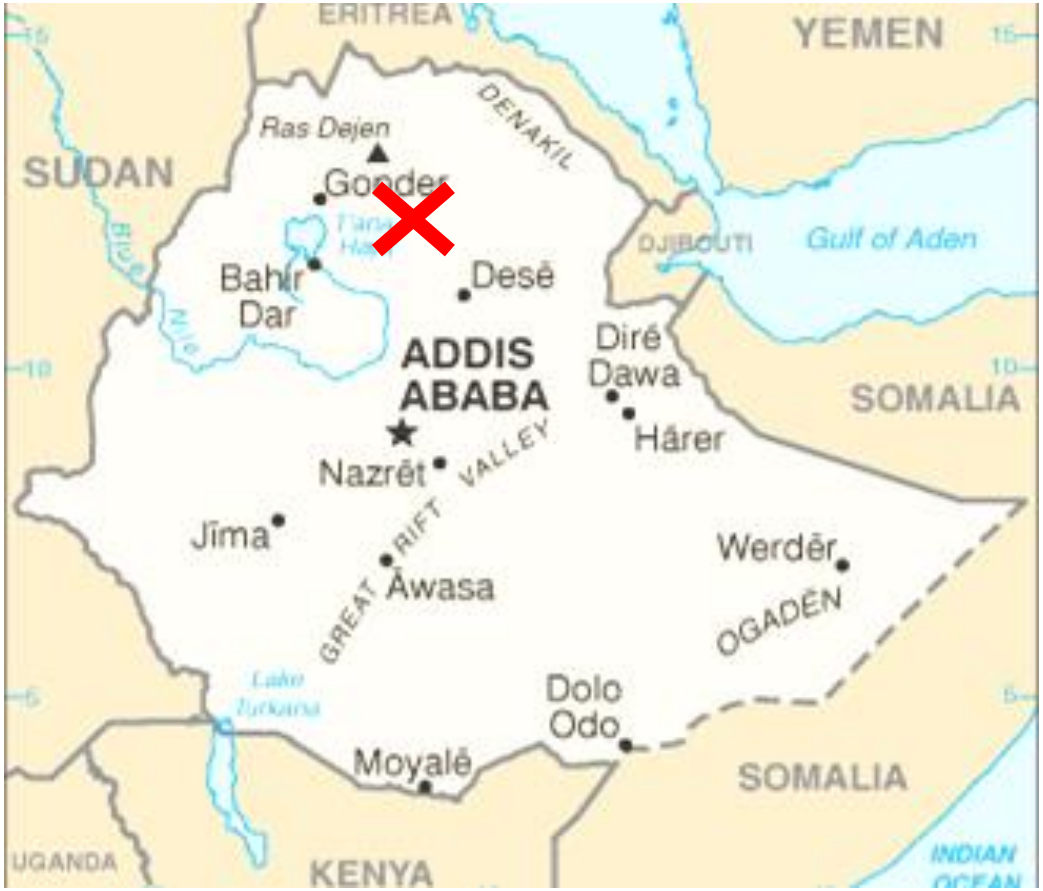
Ethiopia – Meskele Kristos

Small village in Amahara region, about 2 hour drive from Lalibella

- 4000 inhabitants
- Very limited electricity
- 1 Water hand pump and 1 small water source.
- 2 new water taps with running water

The connection with the village started in 2012 and followed by two visits in 2013 and 2014



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Map of village area

School

- 600 children
- 2 study shifts
- 15 teachers
- 4 buildings
- ~ 1 KM from village water pump
- 3 Toilets
- New water tap in the school with running water- not in use due to the cost

Learning the community's needs- Assessments

May 2013- 1st assessment visit
Visit in the village, identify NGO's and partners, create relationships

April 2014- 2nd assessment visit
In depth visit to the village, establish relationship with SYHLA, tests and surveys to check feasibility of our idea for CEB water system

SWOC

	Strengths	Weaknesses	Opportunities	Challenges
Water	Safe water in the pump and spring Water commitee	Insufficient amount Distribution system Technical knowledge	New technology Hygiene and health in the school and in general	Bureaucracy of Ayna
Energy	The village has been connected to the grid	Expensive	Use of electricity in the school	Find a way for tukuls to be connected to grid
Community	Openness School principle	Possible corruption	Partnership with SYHLA Creating the	Unclear active motivation Possible differences of project perception Communication
Agri.	Knowledge	Rain fall dependent	Use off additional water for agriculture	
Access	Reliable road Close to Lalibela	No frequent public transportation Bus only from Ayna		Technical transportation of equipment

WASH

WAter Sanitation Hygiene

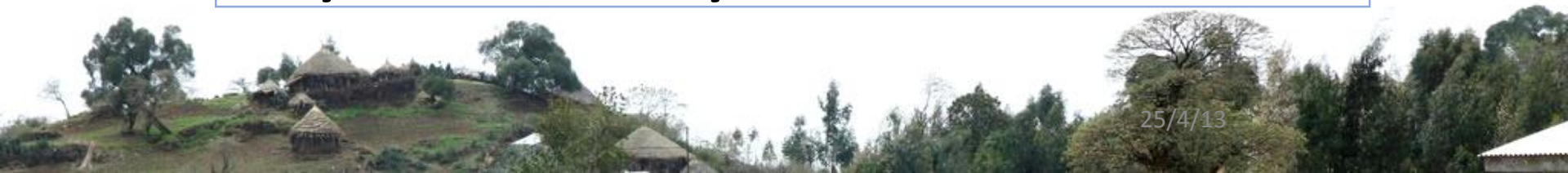
Lack of hygiene

Basic pit toilet- hardly used

Malnutrition

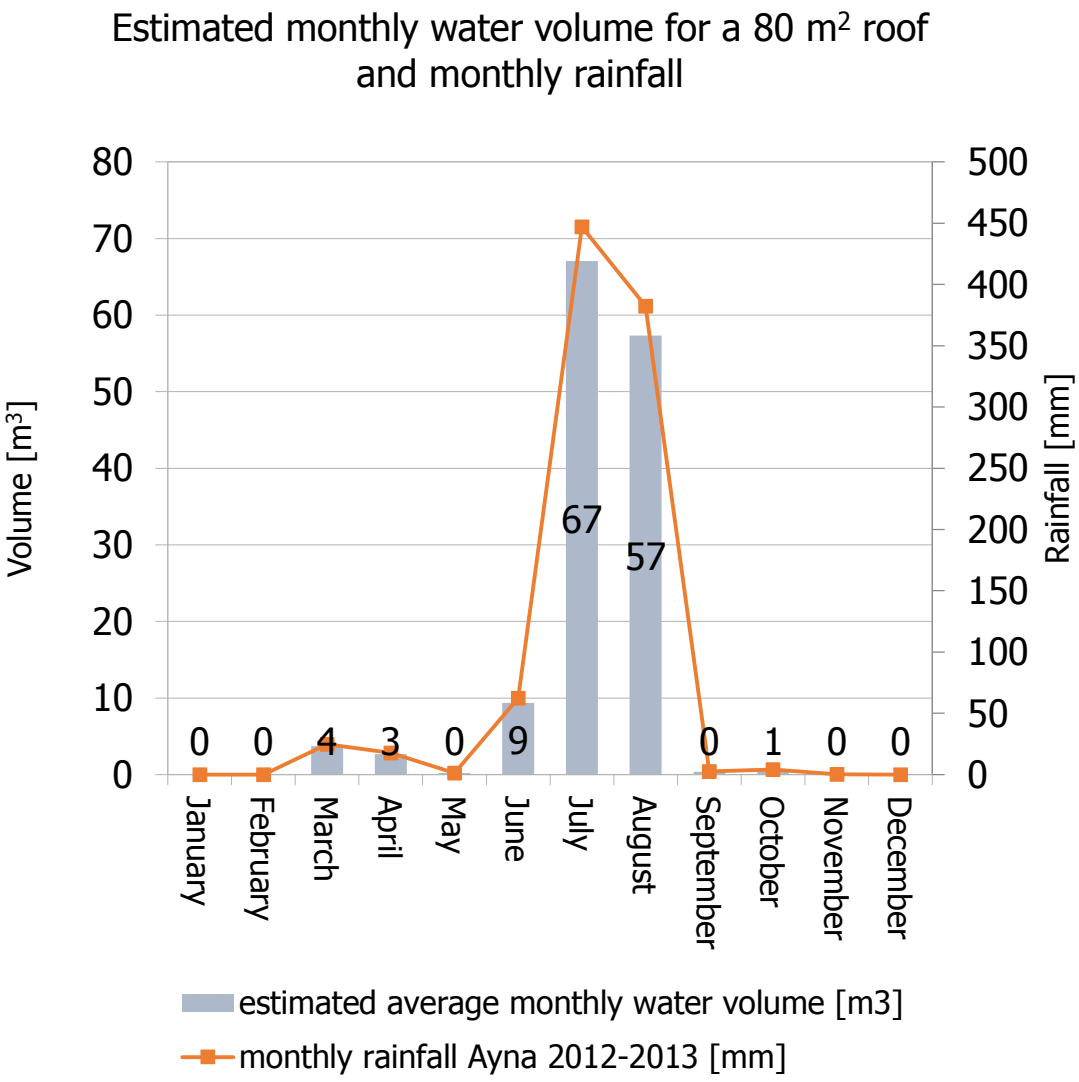
main sickness of children:

Dysentery Diarrhea



Developing a Solution

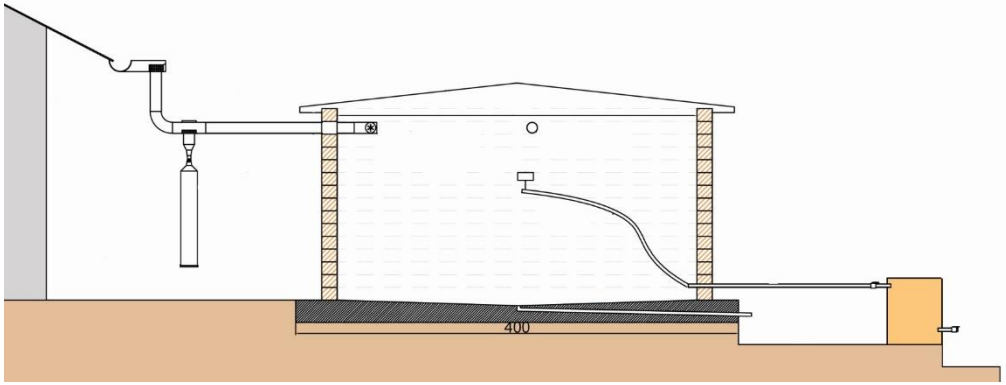
After learning the community needs and wants, the team decides to address the water shortage problem. The final solution suggested was building a Rain water harvesting system from school's roofs.



Building a System Prototype

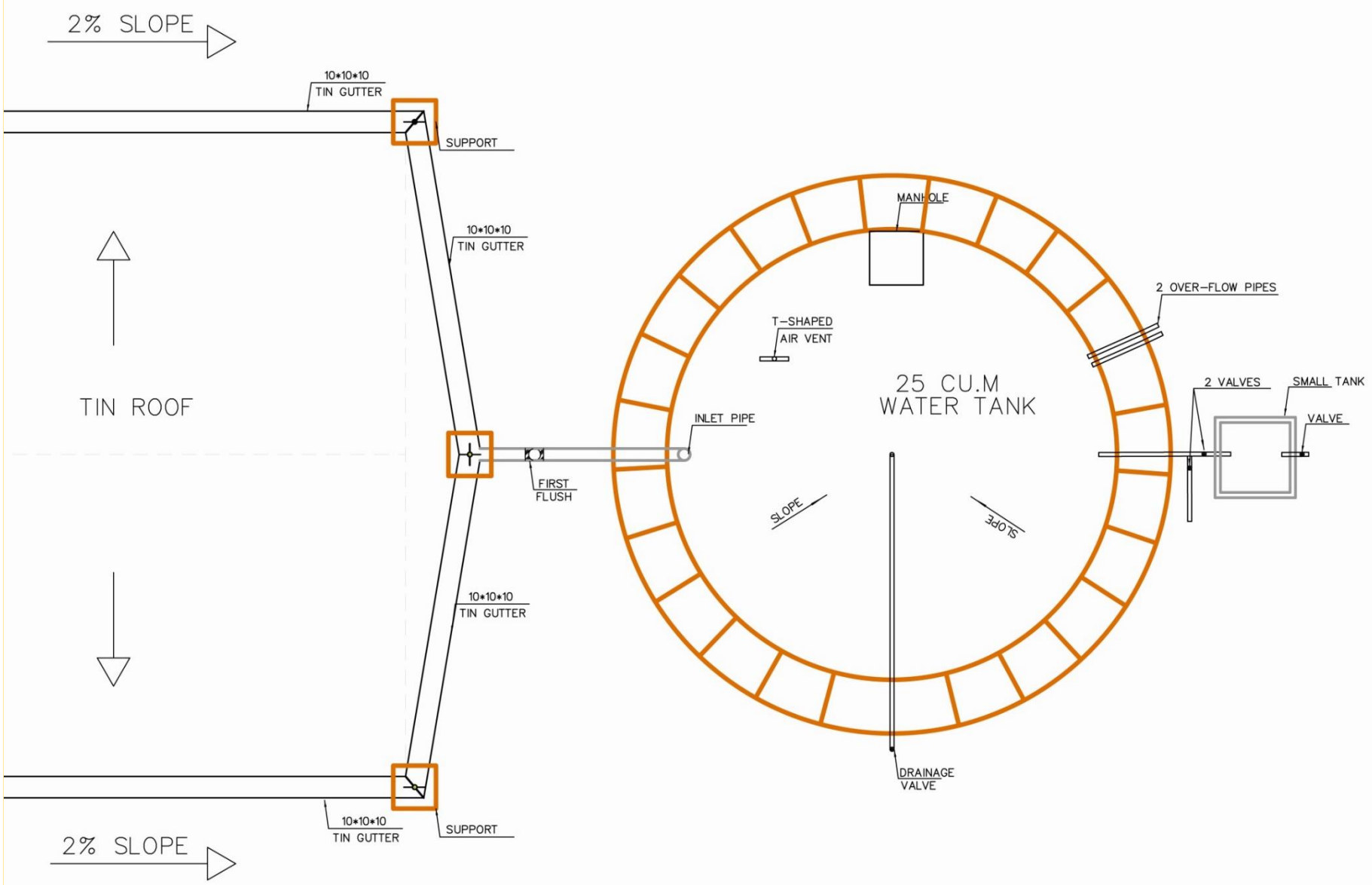
The team planned, designed and built a prototype in the Technion.

- Roof (Tin)
- Gutter (Tin, 100 mm.)
- First Flush (PVC)
- Water collection tank (SCEB, 1.5 m^3)
- Small tank (plastic, 100 l.)



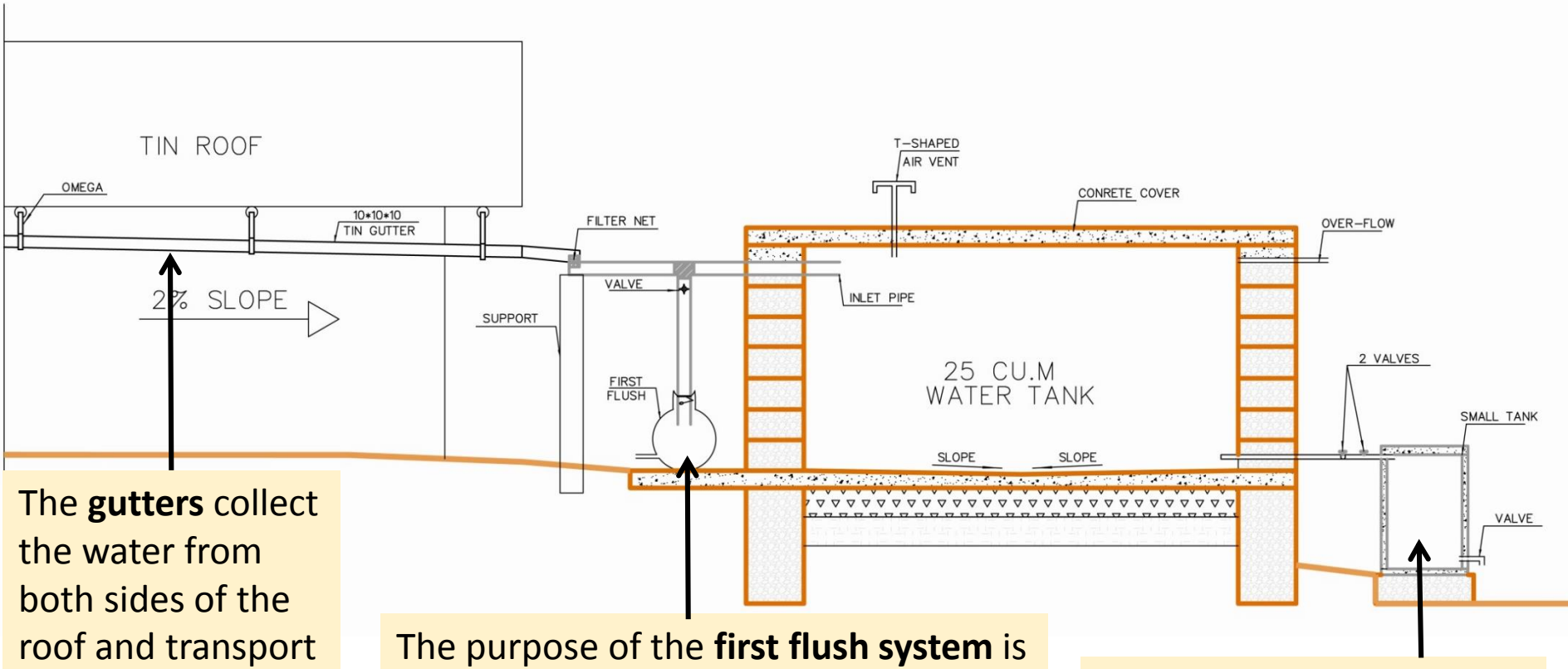
Implementation Design

Plan



Implementation Design

Section Cut



The **gutters** collect the water from both sides of the roof and transport it into the system. They run along the 2 long roof edges and connect to the pipes at heir lower end.

The purpose of the **first flush system** is to collect the water after the first rain that collects dust and other debris and allow it to sink rather than enter the system. This helps lower the turbidity of the water and prevents unwanted solids from entering the system.

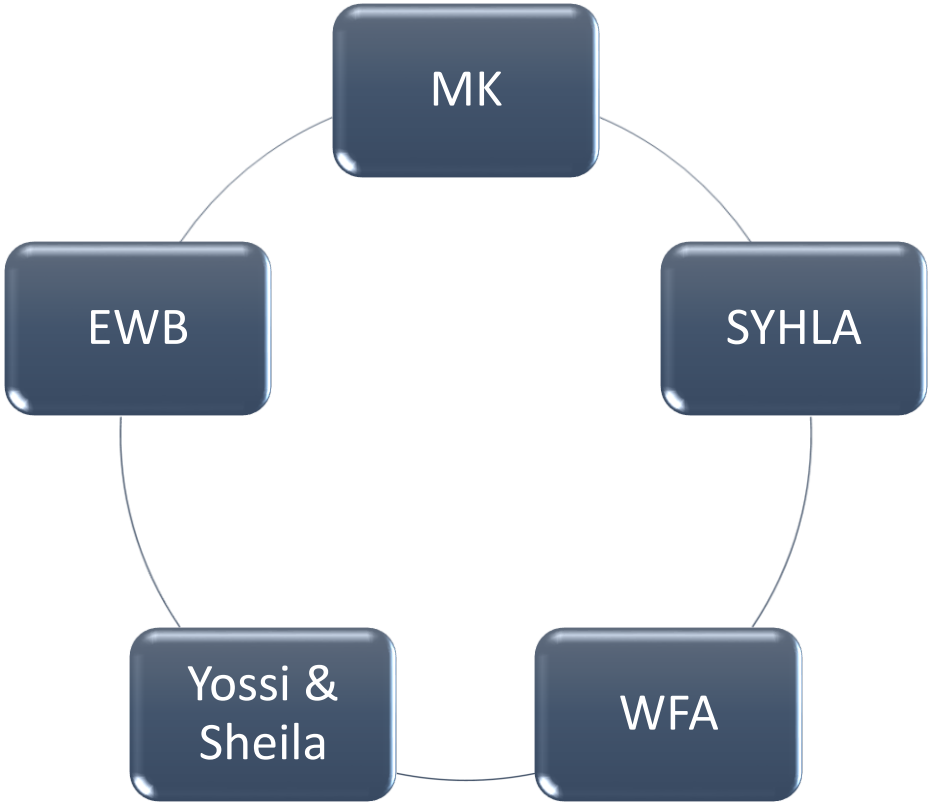
The **small tank** is also called "drinking tank" because it holds the water that is treated for drinking and its valve is the endpoint of the system.

Pre Implementation- involving the community

Implementation

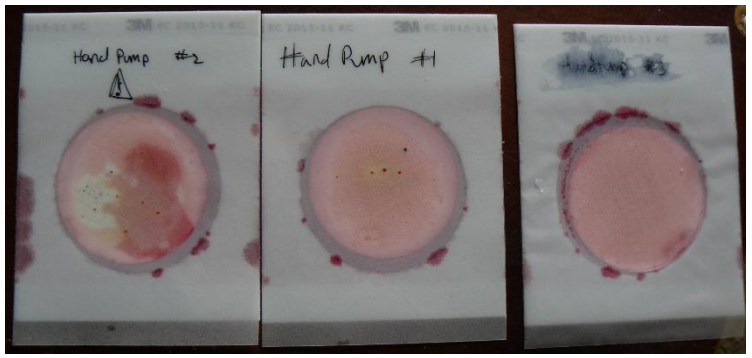
Partnership

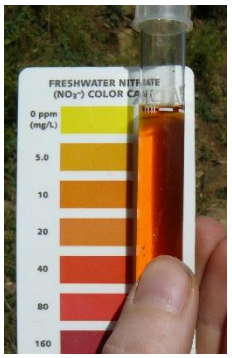
1. Long term partnership
2. Participatory approach
3. Interdisciplinary action



Additional Activities while in the village

1. Water quality testing and treatment methods
2. Educational activities
3. Surveying- conducting family and focus group surveys to for future projects
4. Strengthening connections with the community and other partners





Stabilized Compressed Earth Blocks (sCEB)

Studying the technique as an alternative building method for developing communities

Stabilized Compressed Earth Blocks (sCEB)

Soil tests and mini-brick samples in Meskele Kristos

Materials Research and Testing Center
Certificate No. **24003**
Sample No. **138629-634**

Ethiopian Institute of Architecture, Building Construction and City Development
Addis Ababa University

Client	:	Daniel Kefyalew (EWBT)
Test Object	:	18 Mud Blocks
Sampled by	:	The client
Date Received	:	09/06/2014
Working Site	:	Around Lalibela
Test Specified by	:	Daniel Kefyalew
Kind of Test	:	Compressive Strength

TEST RESULTS

Sample No.	Client's Marking	*Date Poured	Date of Test	Age in Days	Dimensions (cm) L	B	H	Unit Weight (kg/dm³)	Compressive Strength (Kg/cm²)
138629	*Sample N° 4*	28/04/14	09/06/14	42	11.5	3.0	5.5	1.59	29
138629	*Sample N° 4*	"	"	42	11.5	3.0	5.5	1.59	29
138629	*Sample N° 4*	"	"	42	11.5	3.0	5.5	1.55	29
						Average		1.58	29
138630	*Sample N° 5*	28/04/14	09/06/14	42	11.5	3.0	5.5	2.15	29
138630	*Sample N° 5*	"	"	42	11.5	3.0	5.5	2.06	15
138630	*Sample N° 5*	"	"	42	11.5	3.0	5.5	1.90	15
						Average		2.04	20
138629	*Sample N° 6*	28/04/14	09/06/14	42	11.5	3.0	5.5	1.76	29
138629	*Sample N° 6*	"	"	42	11.5	3.0	5.5	1.81	29
138629	*Sample N° 6*	"	"	42	11.5	3.0	5.5	1.78	29
						Average		1.78	29
138630	*Sample N° 7*	28/04/14	09/06/14	42	11.5	3.0	5.5	1.79	58
138630	*Sample N° 7*	"	"	42	11.5	3.0	5.5	1.84	29
138630	*Sample N° 7*	"	"	42	11.5	3.0	5.5	1.87	29
						Average		1.83	39
138629	*Sample N° 8*	28/04/14	09/06/14	42	11.5	3.1	5.4	1.87	28
138629	*Sample N° 8*	"	"	42	11.5	3.0	5.4	1.89	42
138629	*Sample N° 8*	"	"	42	11.5	3.0	5.4	1.91	56
						Average		1.89	42

EIABC

Stabilized Compressed Earth Blocks (sCEB)

Using sCEBs in building the Tank for the prototype





Thank You

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Questions?