09May2025

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Engineers Without Borders Research Triangle Professionals Chapter (EWB RTP): International Projects Brief

http://ewb-usa.org
https://ewb-rtp.org/
https://support.ewb-usa.org/WaterForChiquiguital
https://www.facebook.com/ewbusa.rtp

Objectives of this presentation

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Review information about Engineers Without Borders (EWB)
  - EWB Mission, Core Values and Impact
  - Our professional chapter in Raleigh NC
- Update progress on our water supply improvement projects in the community of Caserio Chipozo in Alta Verapaz, Guatemala
  - *And impacts of Rotary contributions 2021-2024*
- Provide information about the new EWB RTP water supply improvement projects in the community of Chiquiguital in Alta Verapaz, Guatemala

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Engineers Without Borders USA is a 501c(3) tax-exempt organization

For more info, please visit:
https://www.ewb-usa.org/

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

OUR WORLD TODAY

GLOBAL CHALLENGES

748 MILLION

LACK CLEAN WATER

1.1 BILLION

LACK ACCESS TO ELECTRICITY

2.5 BILLION

LACK ADEQUATE SANITATION

2.7 BILLION

RELY ON BIOMASS ENERGY FOR COOKING

EWB USA

Where We Work

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

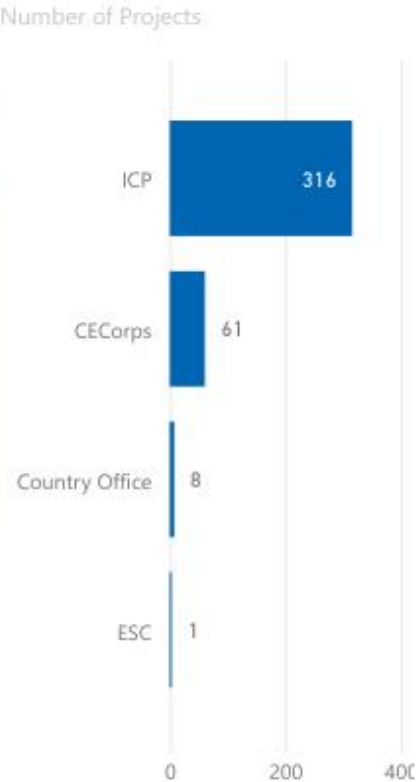
PROJECTS 386

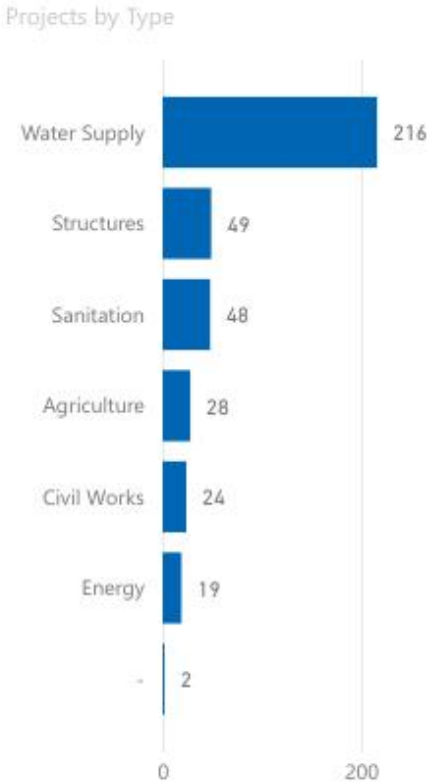
Listed (or Associated) Volunteers

4384

Potential Beneficiaries

1,843,077





Lead Program: All

Country: All

Chapter: All

EWB USA

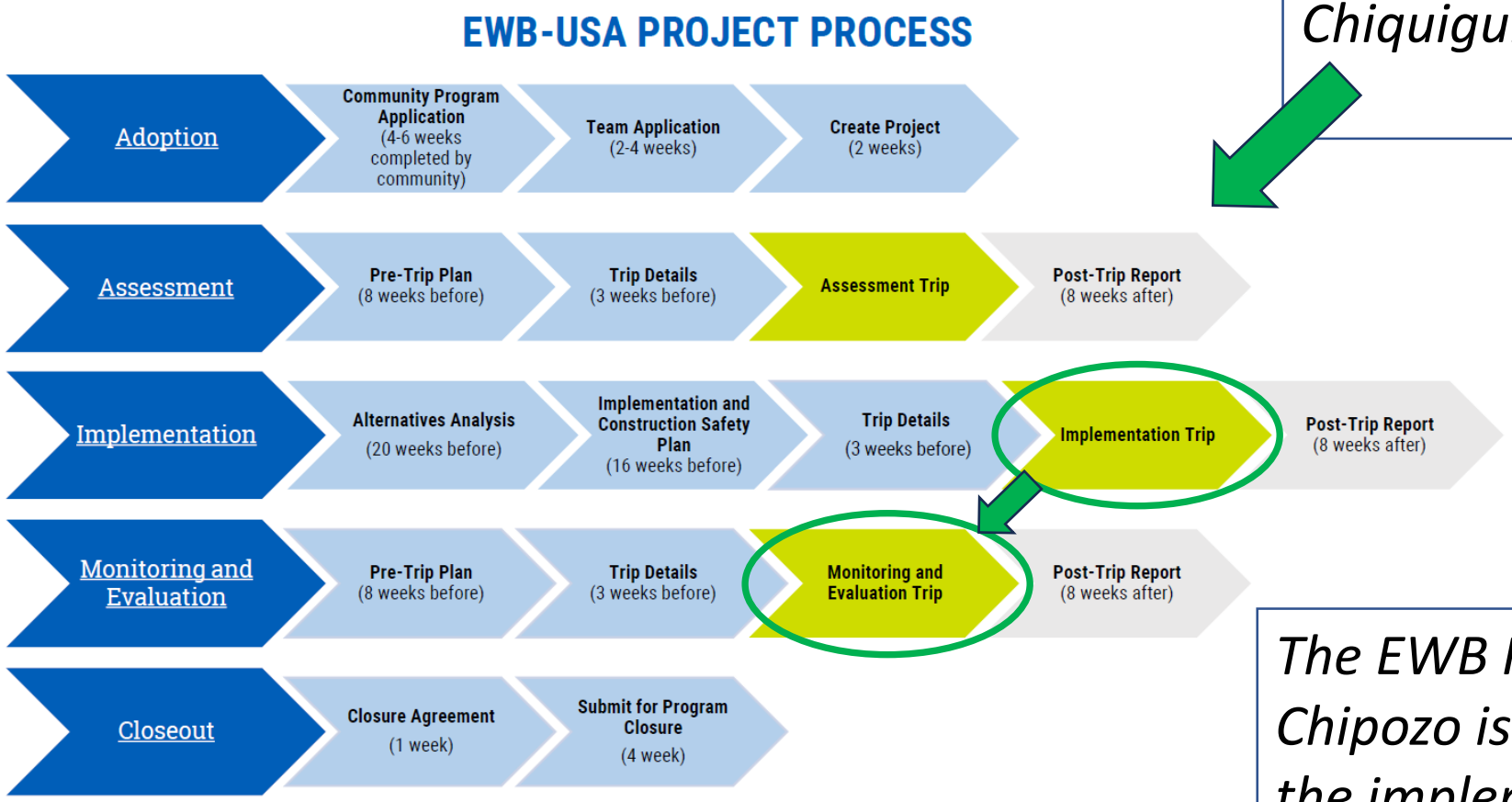
Building a Better World

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

EWB USA

Building a Better World

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter



The EWB RTP water supply project in Chiquiguital is in the Assessment Phase

The EWB RTP water supply project in Chipozo is transitioning from the implementation stage to the Monitoring Stage.

EWB RTP Water Supply Project Locations near San Cristobal AltaVerapaz Guatemala

Engineers Without Borders Research Triangle Professional Chapter	Project Name: Chipozo, Guatemala – Water Supply Improvement (Phase 1)	Drawing Name: General Location	Notes: Date: 24March2019 Page 2 of 10

OUR MOTIVATION

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

In Guatemala …

7.91 million (~46%) people do not have access to safe drinking water facilities [1].

15.6 deaths per 100,000 people yearly result from unsafe water sources [2].

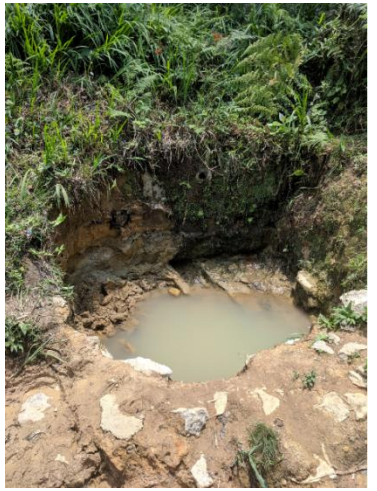
[1] Defined as an "improved source located on premises, available when needed, and free from microbiological and priority chemical contamination. Source: WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation.

[2] Source: IHME, Global Burden of Disease (2019). More on data sources at OurWorldInData.org/water-access

Overview of the EWB RTP Water Supply Improvement Project in Chipozo Guatemala

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- **Problem**: The ~~95~~ 151 families in the Mayan (Pokomchi) village of Chipozo do not have a dependable clean water source
  - Current sources are largely unimproved springs which are not clean or are water catchment on houses which do not supply water in the dry season
- **Opportunity**: The community identified a spring in a remote area which can support sufficient and clean water flow all year
  - But is a rugged and steep path of over 1km in distance and 180meters elevation change to location of upper distribution tank
- **Solution**: Build a sustainable solar-powered water distribution system from the spring to the community
- **Current Partners** in the project are:
  - Community-Based Organization (CBO): Chipozo COCODE
  - Non-Governmental Organization (NGO): CECEP (http://www.cecep.cosmosmaya.info/)



Typical unimproved springs

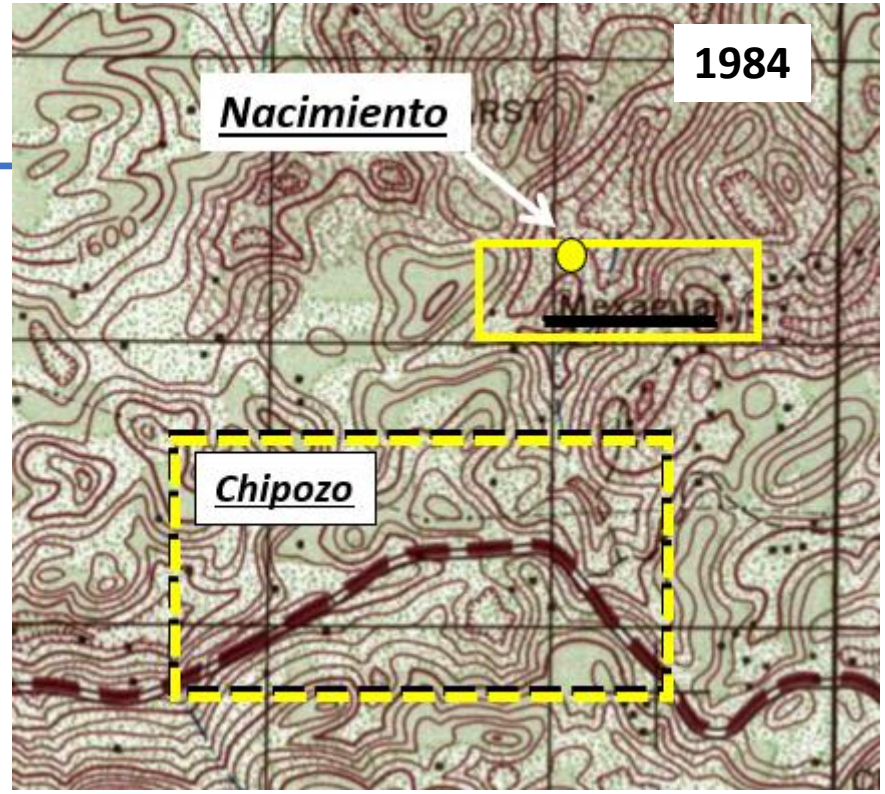
New tank which we have already built to collect water from the spring

The people we want to help

Historical Context

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Mayan communities historically centered around water sources
  - This 1984 still shows the name Mexagua as the name of a community at the location of the spring we are using in our project, and village elders remember when this was the case
- The Guatemalan Civil War* (1960-1996) displaced and disrupted many Mayan communities
- The Chixoy Hydroelectric project (started in 1976) built a major road through the region of what is now Chipozo, and the community largely relocated along the road
- ***End result: Inadequate water resources for the current community***

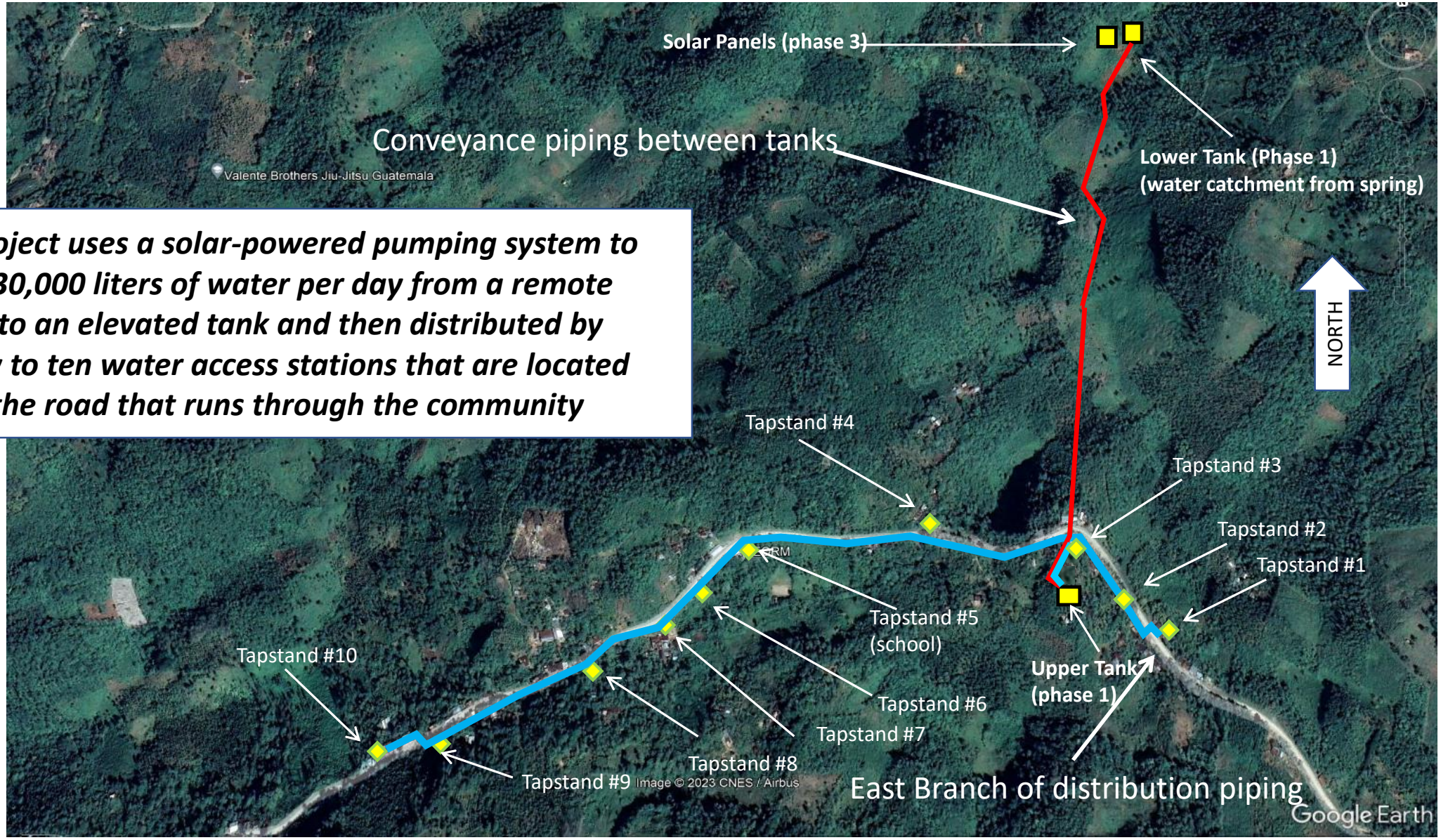


** Read about the Guatemalan Civil War here: https://en.wikipedia.org/wiki/Guatemalan_Civil_War*

Plan View of Chipozo Project

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

The project uses a solar-powered pumping system to pump 30,000 liters of water per day from a remote spring to an elevated tank and then distributed by gravity to ten water access stations that are located along the road that runs through the community



Chipozo Water Supply Top-level Design Schematic and Phases

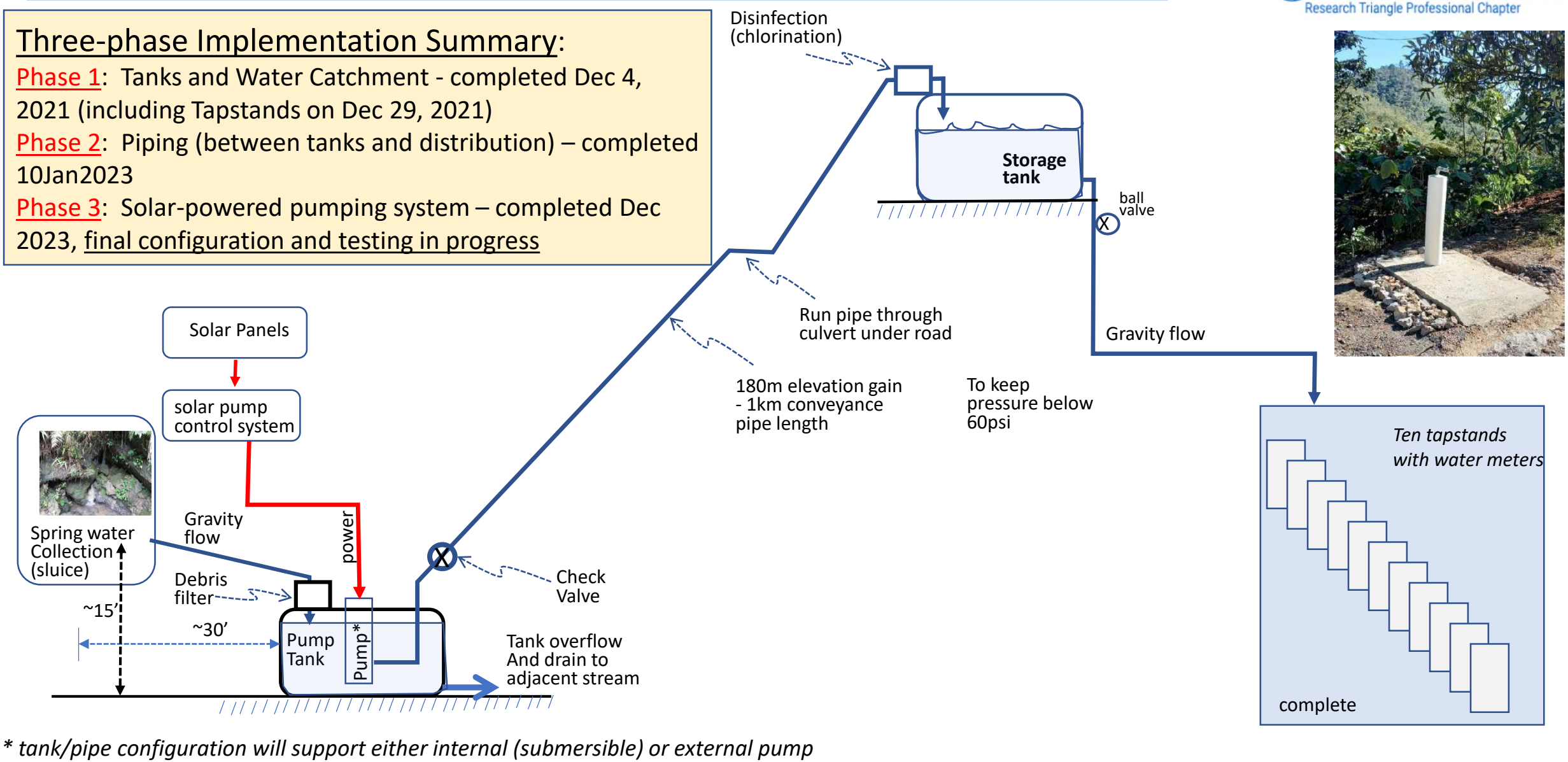
ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Three-phase Implementation Summary:

Phase 1: Tanks and Water Catchment - completed Dec 4, 2021 (including Tapstands on Dec 29, 2021)

Phase 2: Piping (between tanks and distribution) – completed 10Jan2023

Phase 3: Solar-powered pumping system – completed Dec 2023, final configuration and testing in progress



** tank/pipe configuration will support either internal (submersible) or external pump*

Engineers Without Borders Research Triangle Professional Chapter	Project Name: Chipozo, Guatemala – Water Supply Improvement	Drawing Name: Top-level Design Overview	Date: 17May2020 Page 7 of 27

The Chipozo Project Team in Guatemala

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Don Carlos Hooper

Sucely Ical Lem

CECEP

Municipalidad

EWB Guatemala

Steve and Waleska Crowe

Tatiana Maldonado

Humberto Rodas

Marcelo Us

Rudy Lem

Rodrigo (abanil)

Nestor Cal

CECEP Team

Don Ricardo
(COCODE President)

Cricenzio

Caserio Chipozo (Community)

The elected water committee

Not pictured: Rodrigo (abanil)

About CECEP (our NGO partner)-

http://www.cecep.cosmosmaya.info/menu_02.htm
https://www.facebook.com/museo.katinamit

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Centro Educativo Comunitario Pokomchí (CECEP) was founded in 1993 through the united efforts of local and international people with the objective of exposing and stregthening the Pokomchí culture.

For this purpose we work in translation (pokomchí-spanish), alphabetization, exhibition of our culture, promotion and distribution of Pokomchí literature and cultural strengthening. Furthermore we work with national and international associations supporting and reinforcing our community through our projects. We manage a community tourism alliance, educational workshops, volunteers, tours around the town, a store of handicrafts made by local artisans, and a school for the languages Spanish and Pokomchí.

With Museo Katinamit (opened in 2001) we offer the unique exhibition of Pokomchí culture, presenting our lifestyle which is considered among one of the oldest in the world and still living.

EWB RTP Rotary Club Involvement

- 2024-2025 District Grant led by Rotary Club of Garner continues our successful efforts!!

- 2021: Individual Club Contributions by Cary-Kildaire Rotary ($2000) and Knightdale Rotary Club ($500)
- 2022: District 7710 matching Grant of $4500 from the following Rotary Club Partners, for a total of $9000:
  - Garner-Morningside, Cary-Kildaire, Knightdale, and direct donation from Cary-Kildaire Global Run For Water fund of $7500 for water pump
- ***2023: District 7710 grant: total of $19,400***:
  - Garner
  - Chapel Hill/Carrboro
  - Cary/MacGregor Int'l
  - Central Johnson Cty
  - Warrenton
  - Wakefield/Wake Forest
  - Raleigh/Midtown
  - Dunn Erwin
  - Crabtree
  - Cary-Page
  - West Raleigh
  - ***This grant enabled us to procure and install the solar pumping system and put the water system in operation!***

- ***2024-2025: District 7710 grant:***
- ***Total $19041***
- Cleveland School
- Garner:
- Cary-Page
- Chapel Hill-Carrboro
- North Raleigh
- Henderson
- East Chapel Hill
- Cary Macgregor
- Apex
- Cary Central
- Cary

- ***This 2024 grant fully funds the current Chipozo Phase 4 efforts!***

Thank You!!

Our Guatemala Rotary Club Partner- Club Rotario Del Valle de Guatemala

Phase 1 (Jun 2000 – Dec 2021): Upper and Lower Tanks and Water Catchment

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Built water catchment box and 29,000 liter collection tank at spring
- Built 65,000 liter storage and distribution tank above the community (elevation gain 188 meters, distance 1100m)
  - *Effort slowed by COVID and Hurricane Eta*
- Built the 10 tapstands (moved forward from Phase 2)

Tapstand

Upper Tank

Side view of lower tank and catchment

Phase 1: Establishment of Chipozo Water Committee

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Humberto (EWB) leading the election process

The community votes

The elected water committee

MIEMBROS DEL COMITÉ DE AGUA DE LA COMUNIDAD DE CHIPOZO.

ELECCION DEL COMITÉ SE REALIZAO EL SABADO 27 DE MARZO DEL 2021.

No	Nombre	Cargo
1	Ricardo Laj	Presidente
2	Emilio Laj	vicepresidente
3	Jorge Antonio Cal	tesorero
4	Angelica Cal Laj	Secretaria
5	Eugenia Cojoc	Vocal I
6	Guillermo Laj	Vocal II
7	Cresencio Mo.	Vocal III

Phase 2 (June-Dec 2022 remote)

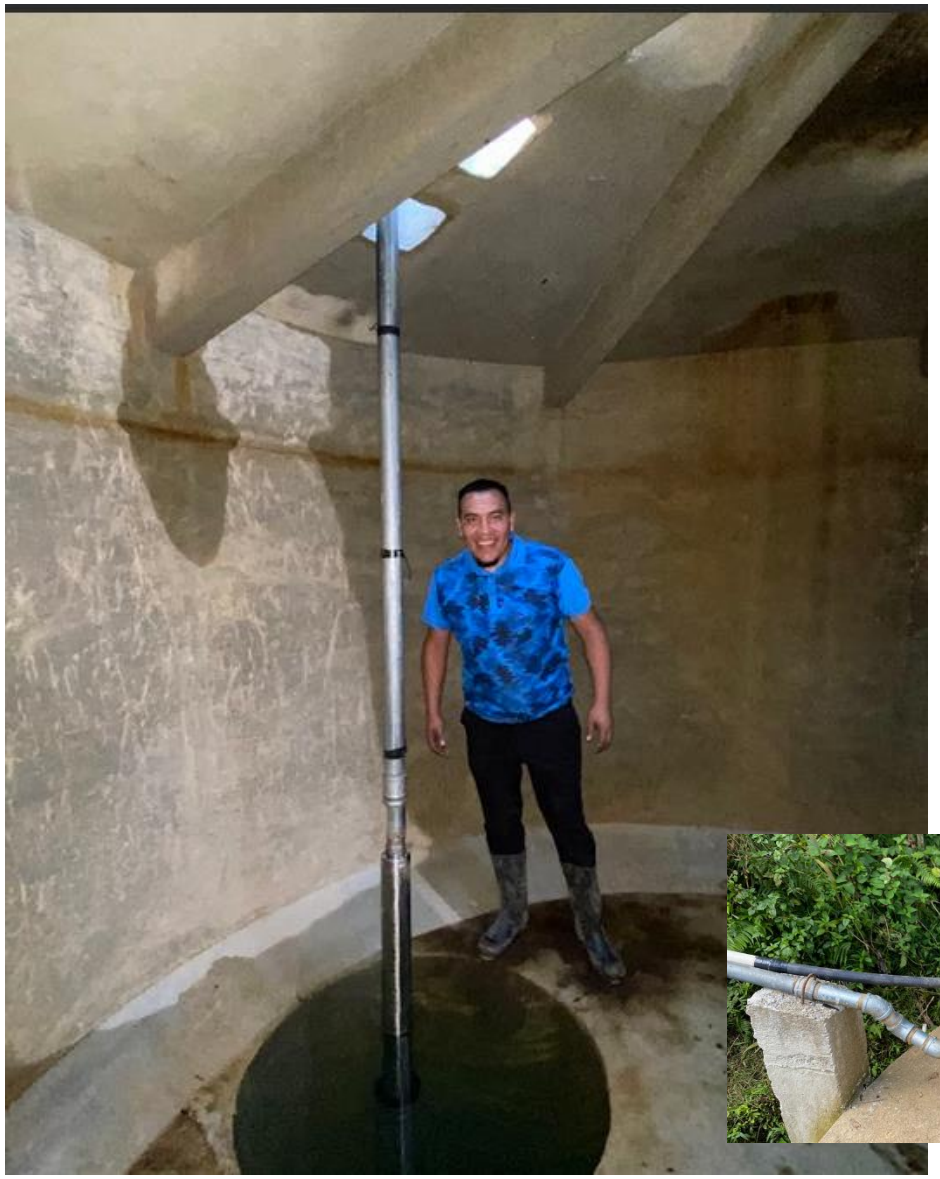
- Metal Conveyance Pipeline Between The Tanks
- PVC distribution pipeline from upper tank to the ten tapstands

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Phase 3 (30Nov-14Dec) – Trip by EWB-RTP Team

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Built pump controls equipment house
- installed 48 solar panels and installed/configured the solar pumping system
  - by Vendor Guatemala Solar
- Installed chlorinator at upper tank
- ***System operational at end of Phase 3***



Phase 3 (30Nov-14Dec) – Trip by EWB-RTP Team

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Installed the Solar Panels - COMPLETE

The Phase 3 team on the lower tank after installing the pump

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Phase 3 (30Nov-14Dec) – Trip by EWB-RTP Team

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- System Operational! 30,000 liters/day

Chipozo Phase 4

(funded by 2024-2025 Rotary District Grant)

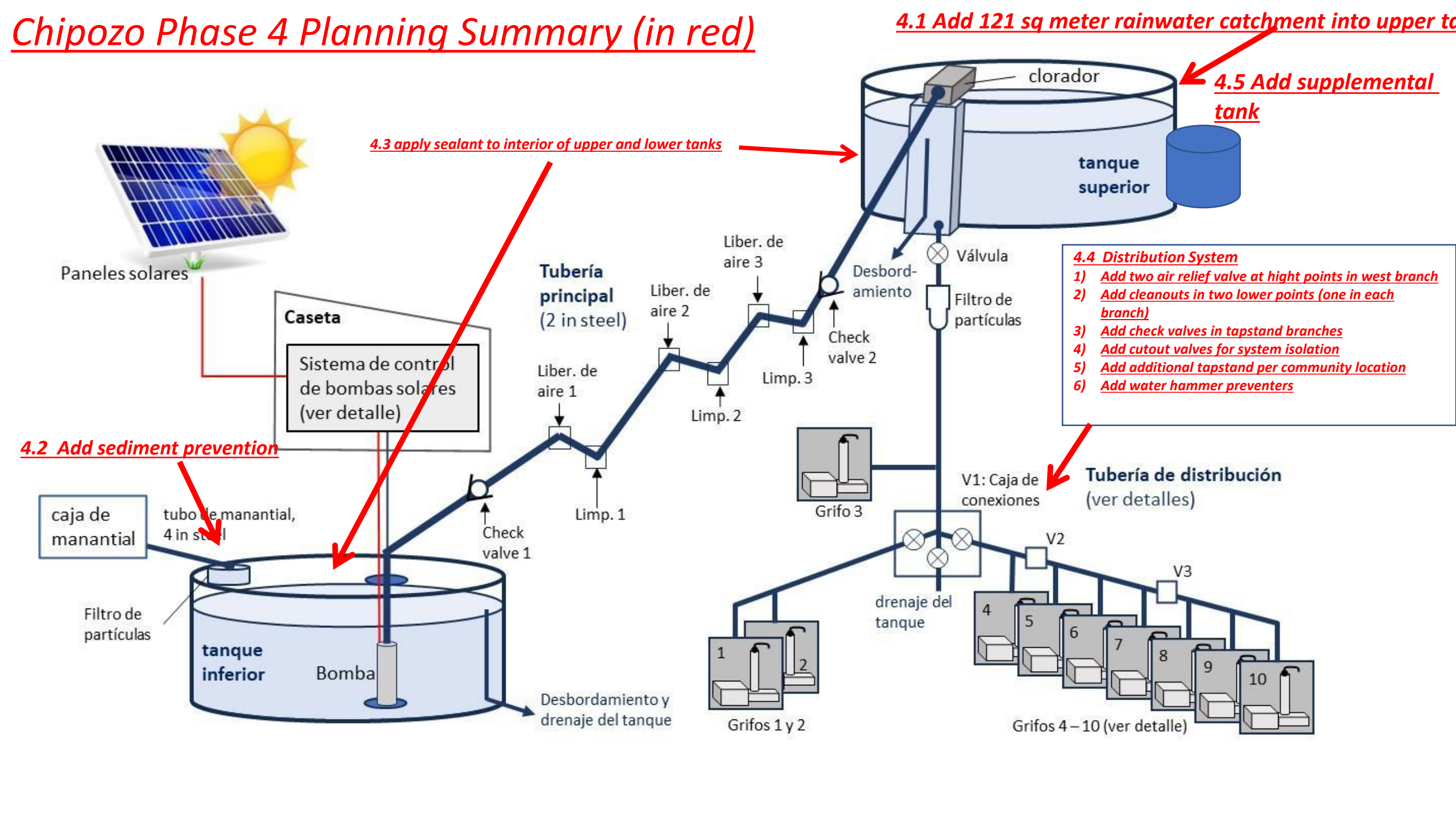
ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

4.1 Upper Tank Rainwater Catchment
4.2 Sediment Reduction in Lower Tank
4.3 Seal interiors of Tanks
4.4 Improvements to Water Distribution System
4.5 Addition of new tank to augment upper tank

Meeting with community in December 2024 to plan for Phase 4

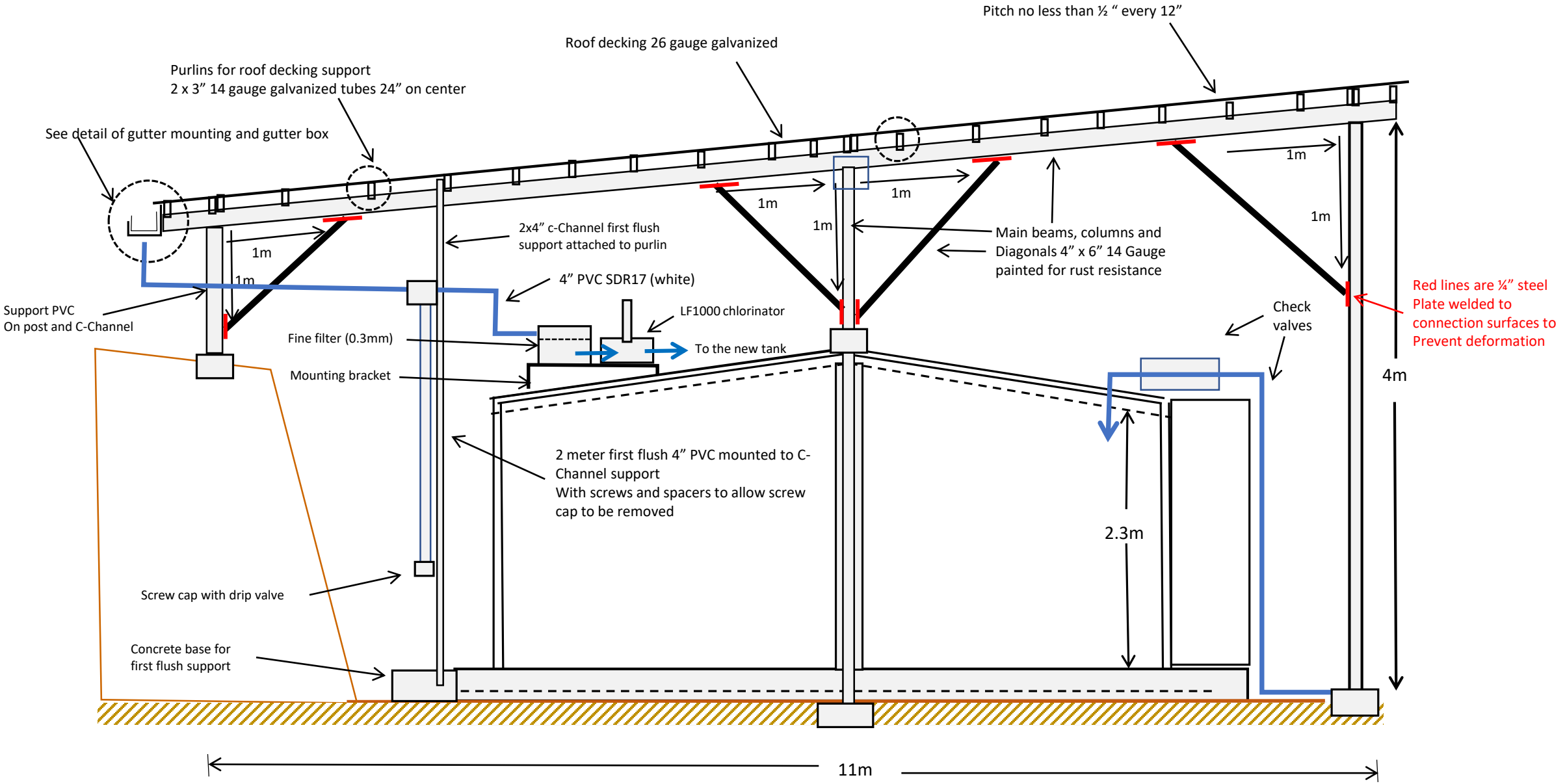
New tapstand for underserved section of Chipozo (built during Phase 4)

Chipozo Phase 4 Planning Summary (in red)



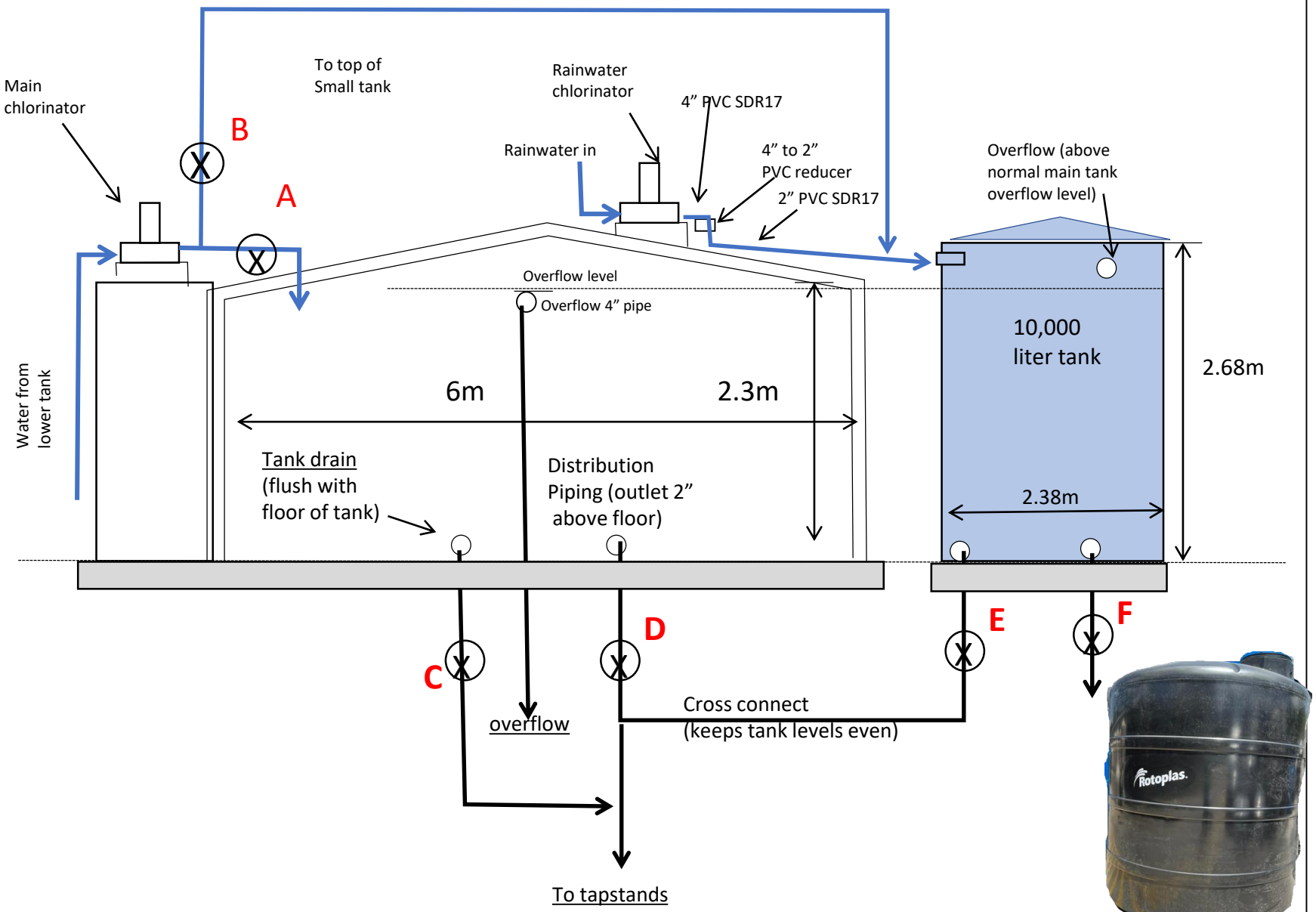
Rainwater Catchment Design Elevation View (North Side)

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter



Additional 10,000 liter Rotoplas Tank – configuration and plumbing details

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter



In normal operations

- Valves A, D and E are open
- Valves B, C, and F are closed
- Main tank and small tank stay at same level via cross-connect
- Net size of two tanks is 75,000 liters

When Main tank is being serviced:

- Valves B, C and E are open
- Valves A, D, and F are closed
- water pumped from lower tank goes directly into small tank
- water distribution system supported by small tank

When small tank is being serviced:

- Valves A, D, and F are open
- Valves B, C, and E are closed
- Main tank provides water to the system
- *Note: Service the small tank when it is not raining*

Upper Tank Improvements:
Water Catchment and additional water tank

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- 121 square meter water catchment added over upper tank which will provide water service when rainy conditions prevents solar-powered pumping
- 10,000 liter Rotoplas tank being added to increase storage capacity by 15% and also to enable maintenance of the main ferrocement tank without interruption of water service to the community

65,000 ferrocement tank built during Phase 1 in 2021

More Chipozo Phase 4 photos

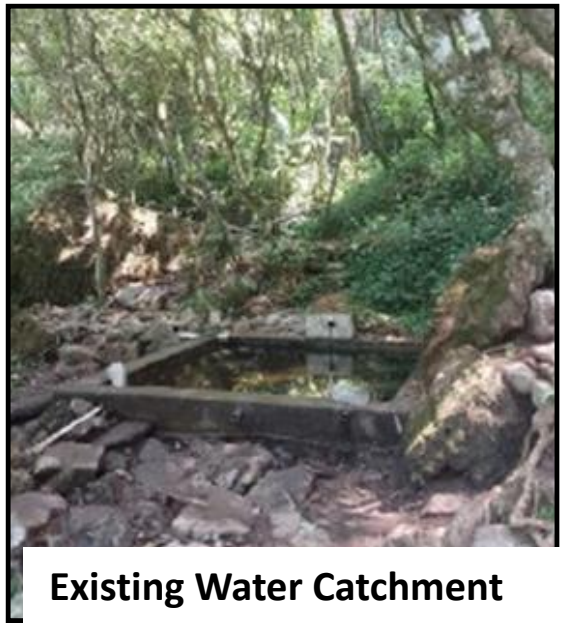
ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

New tapstand for underserved section of Chipozo (built during Phase 4)

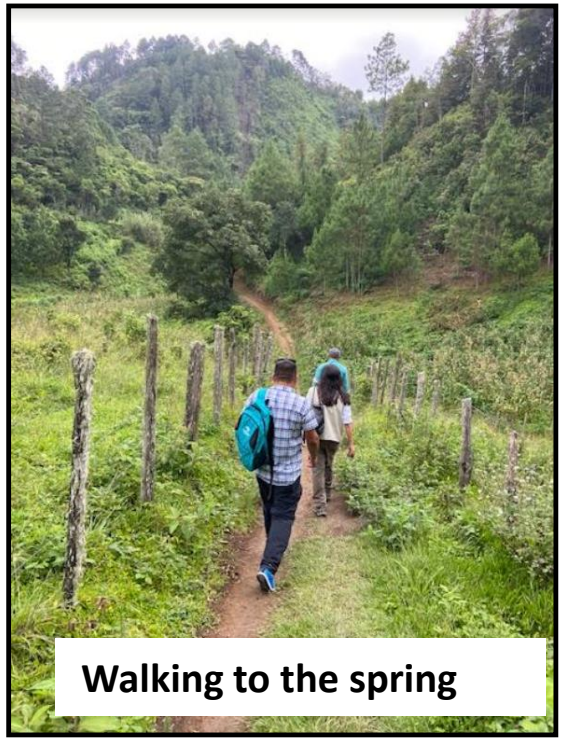
New filter to reduce sediment going into lower tank

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

New Project:
Chiquiguital Water Supply
(like Chipozo project on a smaller scale)



Existing Water Catchment



Walking to the spring

Group shot with community, CeCEP, and Mayor of Santa Cruz

Young supervisor

Chiquiguital community basics

- based on adoption docs and on visits 13Aug2024, 15 Aug2024 and 17Feb2025

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

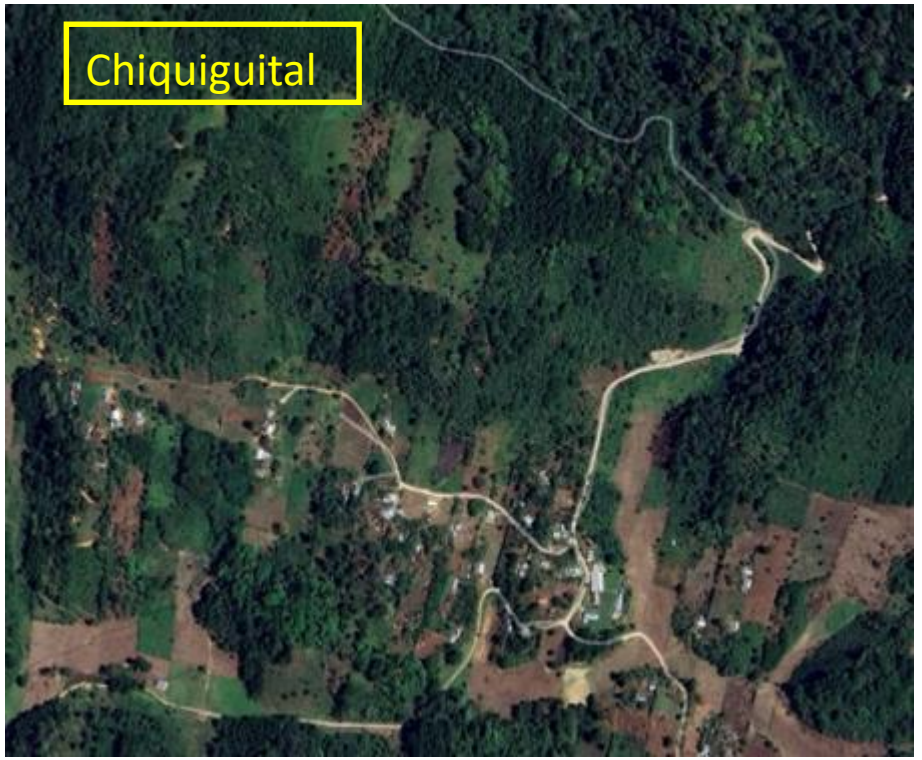
- Size of community: 50 families, 350 people
- Economic situation: subsistence economy
  - Plan to ask COCODE about sources of outside income during assessment trip
- Need for potable water – how do they manage now?
  - Carry water from the existing springs that is accessible at the pilas as shown in the map
  - COCODE president Alfonso says that 20 homes have rainwater catchment, we will validate during assessment trip
- Community organization: COCODE, but no official water committee. Alfonso stated that the reason there is no official water committee is that it would require legal action to do the formal establishment. *This needs to be resolved*
- Location / accessibility: 15°17'58.69"N and 90°25'40.26"W, see KML in GIS folder
  - Community accessible by good dirt road but is step and requires 4wd
- Relationship with Municipality of Santa Cruz: Very Good
- School: 37 students and one teacher who communtes daily by motocycle
- Religion: 100% Catholic (Chipozo was 50/50 Catholic and Evangenlical)
- Education level: Believe 6th grade at school, will verify during assessment trip
- Amount of Spanish Spoken: Some, will verify during assessment trip
- Where do they go for basic medical needs?
  - Santa Cruz
- Infrastructure –
  - No electricity (some solar panels), No internet
  - Sanitation: Some latrines at school which are in poor condition

Alfonso (COCODE President)

Alfonso's wife

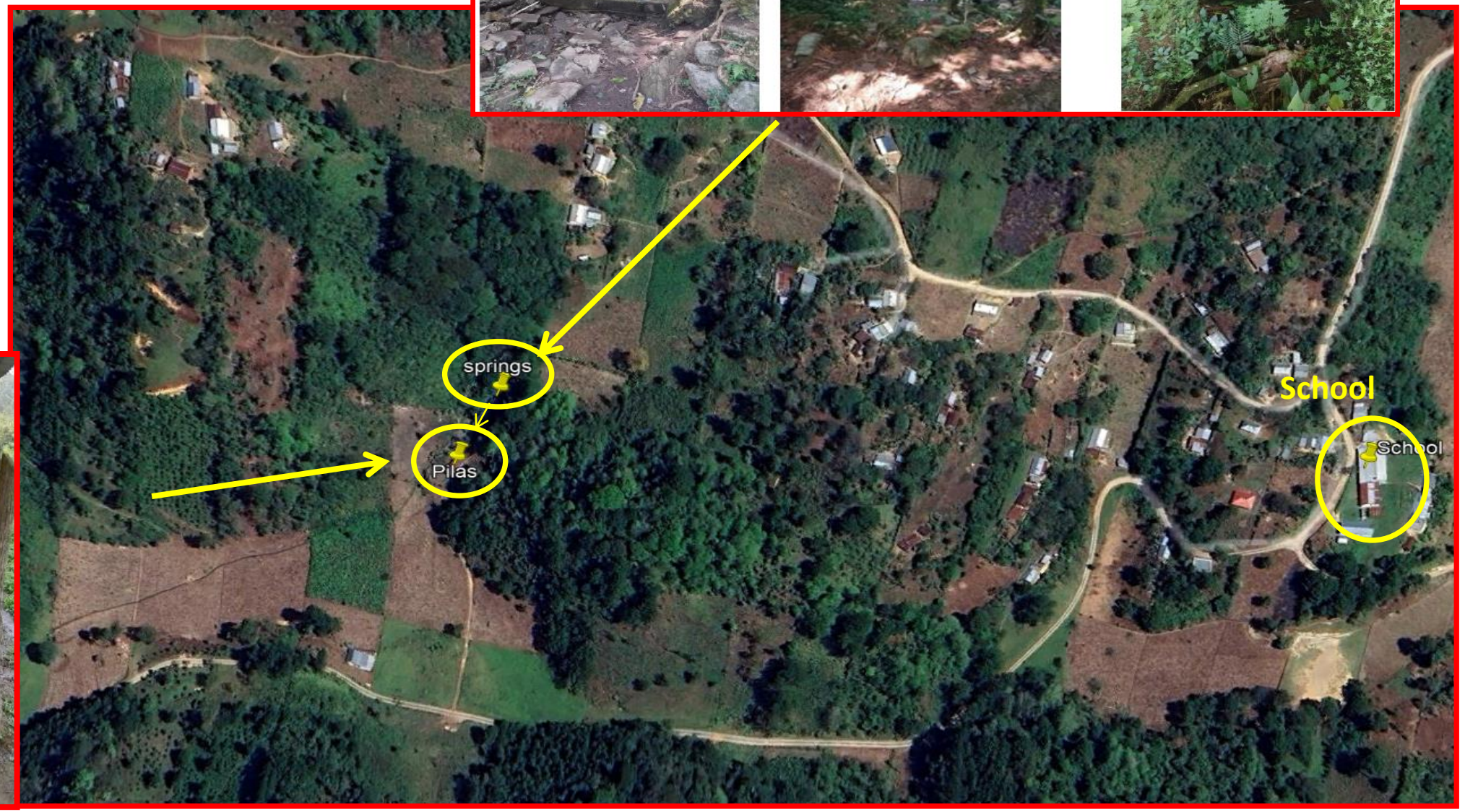
ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Chiquiguital: Where is it?



ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Chiquiguital Water Project: current configuration



ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Chiquiguital: The School (37 students, one teacher) and the Church

Chiquiguital Community Leaders

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

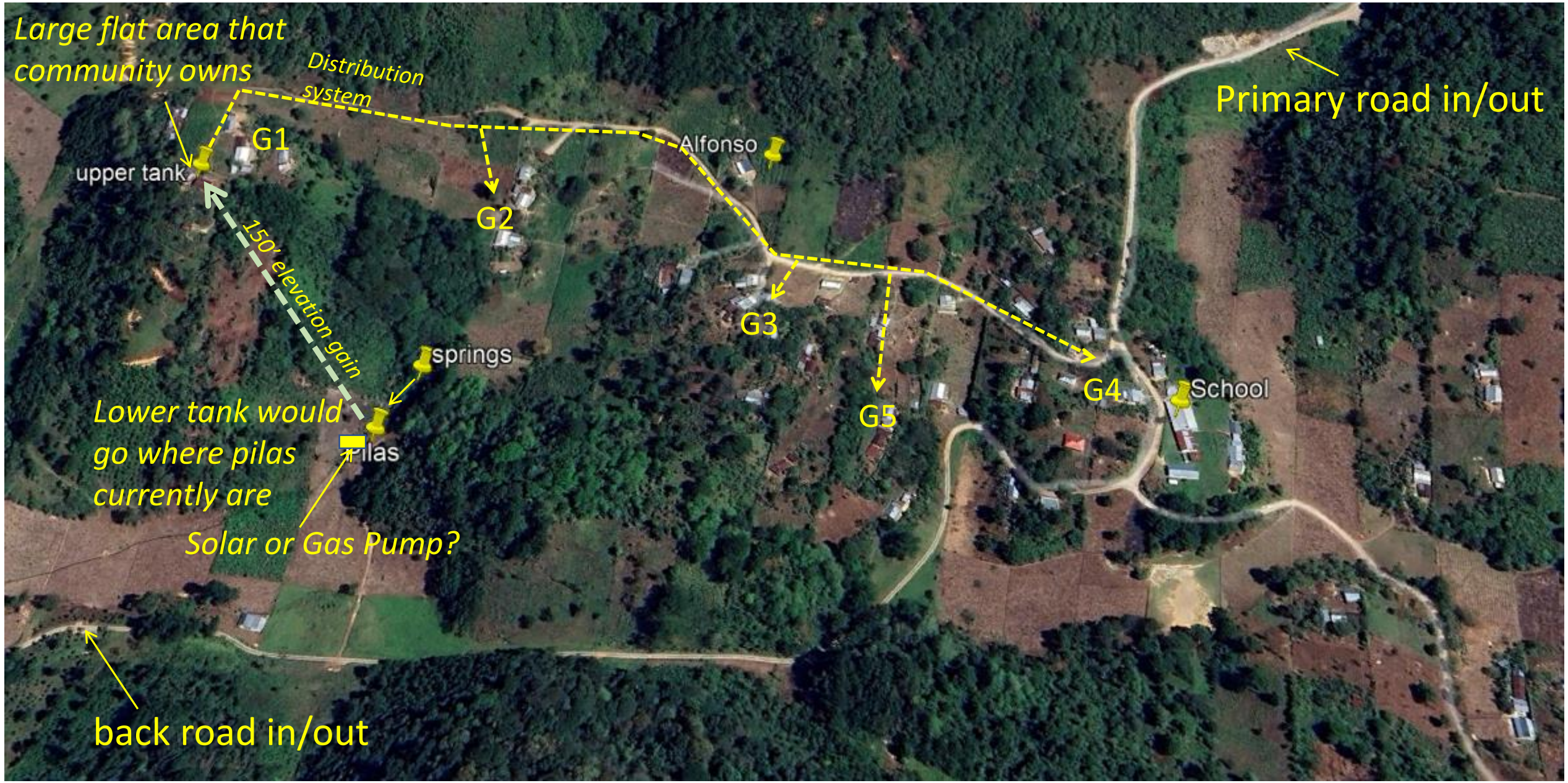
Reviewing the draft Project Partnership Agreement with Alfonso (COCODE President)

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Sucely Ical Lem,
director of our NGO Partner CeCEP)

Photo 16Feb2025

Chiquiguital notional layout for pumped system option



ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

How much water does the community need?

- The WHO “basic” per person = 20 liters/day
- Population = 350 people
  - Double for growth = 700 people
- 20 liters/day/person -→ 14,000 liters/day
  - Double this to achieve WHO “intermediate access” = 28,000 liters/day needed
- How much water does the spring provide?
  - Measurement made during visit on Aug 15th 2024 was 20 seconds to fill 5 gallon bucket. This equates to ~82,000 liters/day
  - Flow observed during Feb 2025 was about the same
  - Flow measured during 27Aug visit after eight weeks with no rain was 38,000 liters/day
- The plan is to size the tanks and pumping capacity to provide 40 liters/person/day

Origin of Spring 100 feet from upper collection box

Water flowing into upper collection box

Next Step: Chiquiguital Assessment Trip

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

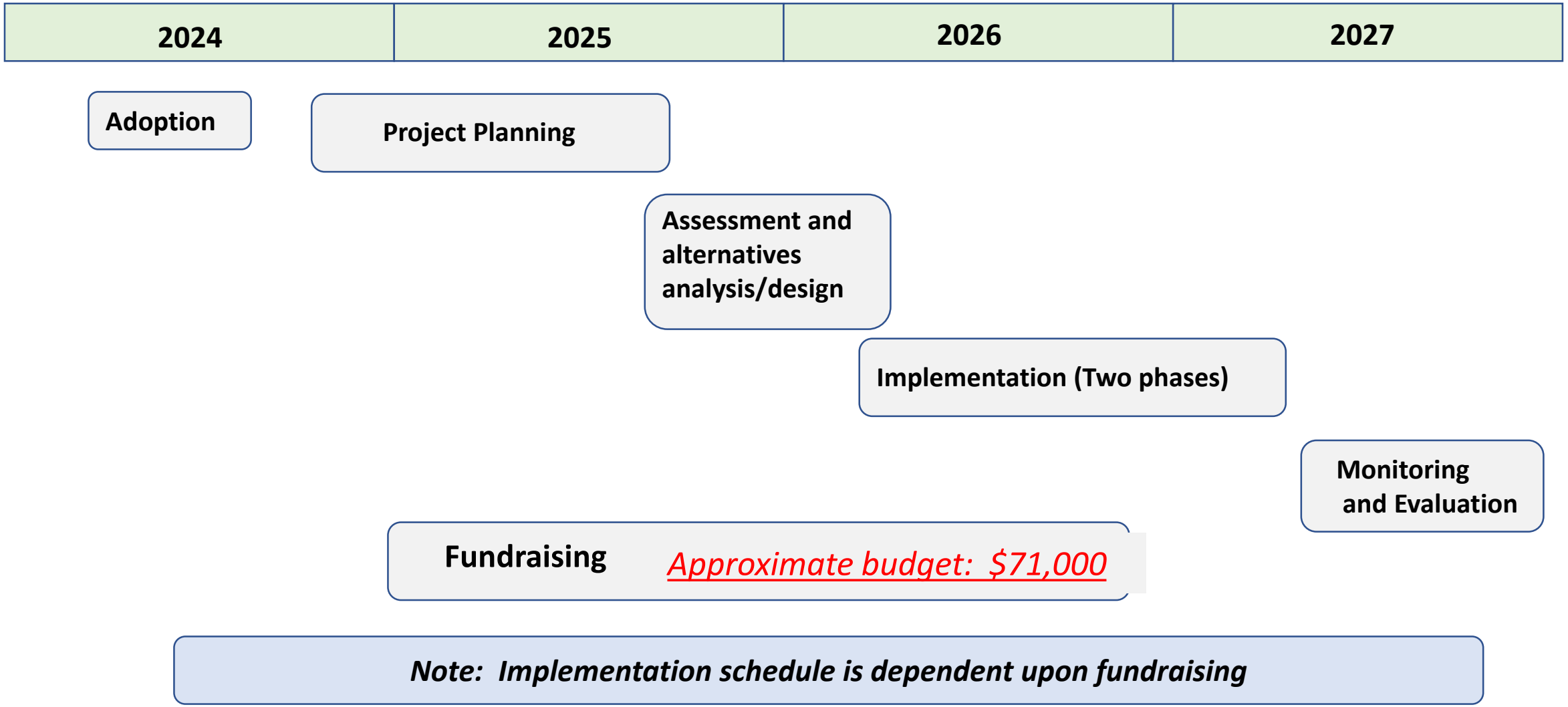
- 16-24 August 2025

	SCHEDULE			Day	(10-18 December 2024)							
Number	Task	Resource	1	2	3	4	5	6	7	8	9
1	General Health and Saftey Considerations	EWB/Community/CECEP									
2	Travel to Guatemala	EWB									
3	Kickoff meeting at CeCEP	community/CECEP		AM							
4	Meet with Chiquiguital COCODE (review plan for visit)			PM							
5	Meet with Chiquiguital COCODE (Community Partnership review)										
6	Meet with Chiquiguital COCODE (Community Partnership signing)										
7	Conduct GIS survey of springs, planned water tanks and tapstands										
8	Take water samples from spring	EWB									
9	water sample testing	community/CECEP									
10	Measure spring flow rate										
11	conduct household surveys										
12	Meet with contractors and vendors										
12	Visit with Mayor of Santa Cruz (sign partnership plan)										
13	Travel to Guatemala City										AM
14	Return to US										PM

- Assessment Trip will gather all information necessary for design
  - Will also finalize the Project Pertnership Agreement (with signatures by COCODE, Muni, CECEP and EWB)
- *Project will then progress to implementation*
- *Fundraising is key activity, work on 2025-2026 Rotary District Grant*

Chiquiguital Water Supply: *Notional* Project Schedule

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter



Preliminary Cost Estimate and Funding

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Cost Estimate
  - Water Catchment upgrade: $3,300
  - Tanks (upper and lower): $21,000
  - Solar Pumping system: $23,000
  - Distribution Piping: $9,000
  - Ten Tapstands: $6,000
  - Chlorination: $700
  - Production Management by CeCEP and engineer: $8,000
  - Total cost estimate so far: $71,000

- Funding sources/status
  - Municipality of Santa Cruz AV: 30% toward materials = $21,300
  - Planned Rotary District Grant: $10,000
  - Contribution from EWB Central Ohio Chapter: $10,000
  - Funds on hand: $3,000
  - Fundraising to be accomplished for full funding: $26,700

How Can You Help?

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

- Join us in investing in the Mayan Community in Chiquiguital, Guatemala
  - Individual tax deductible donations can made via our web site: https://support.ewb-usa.org/waterforchiquiguital
  - Donations can also be made directly by check to the EWB RTP account in EWB USA using this form
- Contact us at ewb.usa.rtp@gmail.com for more information

From this → to this

ENGINEERS WITHOUT BORDERS USA

YOUR DONATION

I would like to make a donation of ☐$300 ☐$150 ☐$50 ☐$____

☒ Check payable to EWB-USA

ALLOCATE YOUR DONATION

☐ Allocate my donation to the EWB-USA General Fund to be used where it is needed most.

☒ Allocate my donation to this chapter: EWB RTP

DONOR INFORMATION

Name

Address

City State Zip

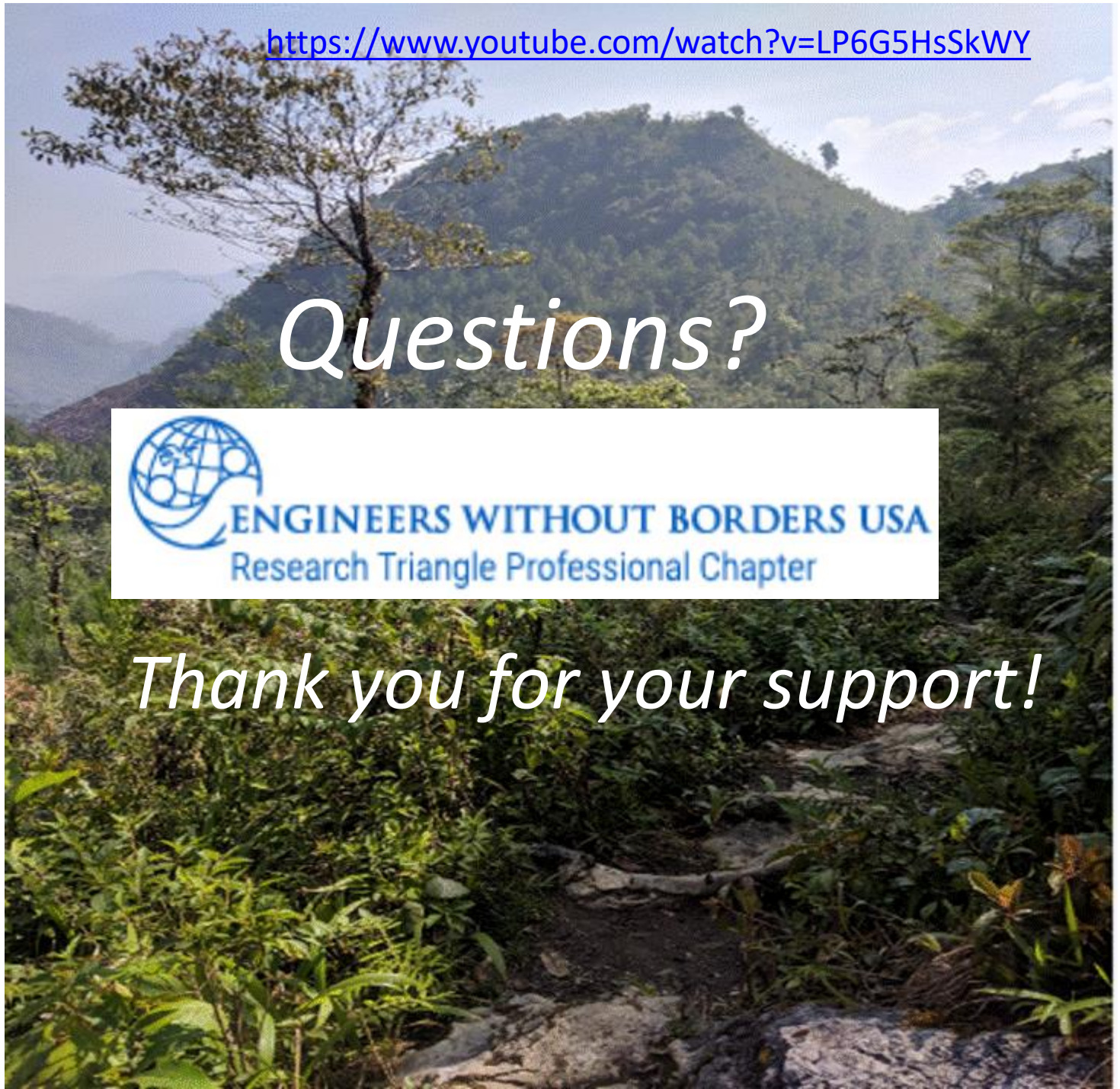
Phone

Email

Please return this completed form with your enclosed check to:
EWB-USA
1031 33rd Street Suite 210
Denver CO 80205

Thank you for your contribution!

https://www.youtube.com/watch?v=LP6G5HsSkWY



Questions?

ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Thank you for your support!