



Photo credit: Holly Kluender



ENGINEERS WITHOUT BORDERS USA UNIVERSITY OF NEVADA LAS VEGAS CHAPTER



Photo credit: Andre Ibarra

Partners

EWB-USA LAS VEGAS PROFESSIONAL CHAPTER
Partner since the student chapter was created in 2011. The professional chapter provides mentorship and design experience for the project.

BIONIC
Partner since 2013. Our local NGO, acts as a liaison between the community and the student chapter.

SAN FRANCISCO LIBRE MUNICIPALITY
Partner since 2013. The mayor and city engineer provide invaluable support and direct communication with the community.

Community Involvement

ARACELLY ESPINOZA
Aracelly lives and works in San Francisco Libre. She assists with logistics, such as arranging housing for the travel team, and coordinating meetings with community members when we visit.

COMMUNITY MEMBERS
Hard-working and enthusiastic. Eager to help and learn.



Chapter members and local workers. Photo credit: David Turner



Latrine education. Photo credit: David Turner

Sustainability

CONSTRUCTION MATERIALS
Local, replaceable, long-lasting, corrosion protected

COMPOSTING AID MATERIALS
Local, inexpensive, readily available

EDUCATION
Establishing local experts for construction and latrine maintenance, workshops for all families

Community Need

COUNTRY: NICARAGUA
CITY: SAN FRANCISCO LIBRE
NEIGHBORHOOD: LOMAS DEL SOL

As a result of floods in 2010 and 2011, numerous families in the area lost their homes along Lake Managua. With government assistance, they were relocated to higher elevation. However, the new homes had no latrines. Residents would have to walk a significant distance to share a relative's latrine or attempt to build their own latrine. Others practiced open-defecation.

In order to improve the health and quality of life for the community members, reliable and sustainable sanitation is needed.



Map of Nicaragua, 2015 Google



Flooded home near Lake Managua. Photo credit: Katie Hanten



Make-shift latrine built by a family. Photo credit: Katie Hanten

Lomas del Sol Sanitary Improvements Project

Seven sanitation alternatives and a baseline solution (pit latrine) were proposed during the design phase. There were five sanitation options deemed suitable for the community, and they were compared using a Pugh Matrix to determine which design was best. The criteria for the Pugh Matrix included: safety of structure, potential for disease, ease of construction, sustainability, maintenance, ease of use, aesthetics/size, and cost. Community input and the results of the Pugh Matrix were used to determine the best sanitation option.

Ultimately, the two-pit composting latrine was chosen:

- Sustainable
- Fits with the government's initiative to move away from simple pit latrines
- Lower risk for pathogen exposure compared to the continuous composting latrine

Sanitation Alternatives
Pit Latrine
Pit Latrine with waste removal
Continuous composting latrine
Two-pit composting latrine
Eco-toilet with compost bin

Project Timeline and Photos

Task	Completion Date
Program Initiated	January 2013
Program Approved	June 2013
Assessment Trip	August 2013
Alternatives Analysis	February 2014
Preliminary Design	March 2014
Final Design	April 2014
1st Implementation Trip (7 Latrines)	August 2014
2nd Implementation Trip (11 Latrines)	August 2015



Foundation Form, Photo credit: Victor Oliva



Foundation, Photo credit: Eddie Lopez



Pit walls, Photo credit: Victor Oliva



Photo credit: Andre Ibarra



Photo credit: David Turner



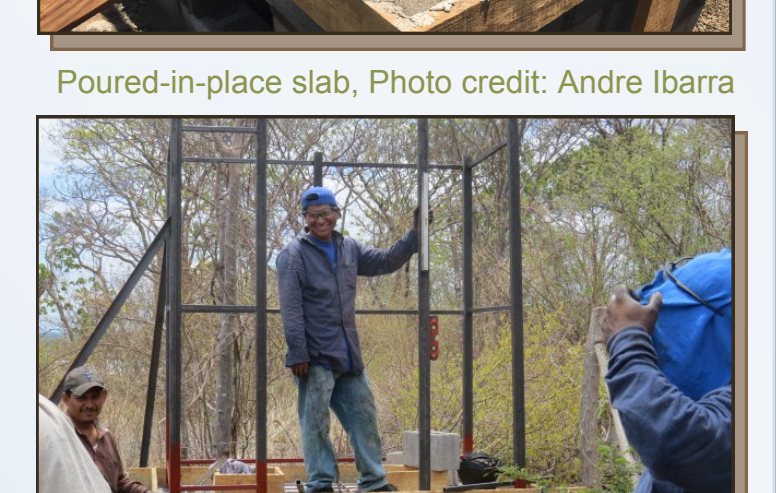
Poured-in-place slab, Photo credit: Andre Ibarra



Photo credit: David Turner



Photo credit: Eddie Lopez



Welding the structure, Photo credit: Marco Velarde

Future Work

- Continue implementation trips until the 40 needed latrines are built.
- Initiate dialogue to determine the next community need.

Contact Information

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