

Imperial College Altiplano Expedition 2009

Preliminary Report

● Expedition Members

Naomi Bessey (Expedition Leader), Harriet Kirk (Chief Engineer), Thomas Utley (Treasurer), Chris Taylor (Engineer- Structures), Pilar Samper (Translator), Ricardo Smith (Engineer, Translator), Mitch Hensman (Engineer- Foundations), James Falkingham (Engineer), Joseph Haley (Engineer), Patricia Steven (Engineer- Solar Shower).

● Summary

The Imperial College Altiplano Expedition 2009 successfully completed a 24m span steel truss footbridge and an 8m wooden footbridge. These now allow villagers from Calacala on the Bolivian Altiplano to cross two rivers and reach school and medical facilities. These rivers were previously impassable during the rainy season for weeks at a time.

All team members performed fantastically and were able to work extremely effectively to complete the bridges. A solar shower is in the final stages of construction, and two expedition members will return in the next fortnight to confirm completion.

● Preliminary

As June faded into July, six members of the Imperial College Altiplano Expedition set out for Bolivia. After a 52 hour journey via Chile they finally arrived in La Paz, Bolivia's capital, to begin two weeks of steel buying and workshop finding. A week and a half later, sitting exhausted and despondent in a sub-zero hostel room in local town Oruro with no steel and no workshop, things weren't looking good. In addition to the lack of available suppliers, steel prices had risen sharply since last year and were due to rise again.

In the last two days of the preliminary expedition a Bolivian civil engineer, Dieter, agreed to supply steel and a workshop. The steel thicknesses and lengths that were available required minor design alterations- which was made more difficult because all steel in Bolivia is supplied in a mixture of metric and imperial sizes. Multiple hasty calculations and some days later, the steel was ordered. The team returned to La Paz from Oruro to rendezvous with the rest of the Expedition members- who were flying in from the UK the next day.

2nd July
First night in Arica



4th July
Visiting Calacala



● Main Expedition

After a 24 hour journey from the UK, via a relaxing two hour sojourn on Miami beach, the rest of the team arrived in La Paz at the antisocial time of 4am. With all 10 team members reunited, the team spent two days in La Paz acclimatising and gathering tools and other supplies, the most treasured of which turned out to be peanut butter.

The expedition left La Paz by bus, and several Spanish-dubbed blood-filled war films later, arrived in Oruro to begin construction of the bridge. Armed with a significant arsenal of cleaning materials, it took the ten of us two days to clear the workshop, yard and living quarters enough to begin construction. The expedition members slept on roll mats in sleeping bags in one large room which was sub-zero at night.

With the arrival of the first steel assignment, on the 22nd of July, work began. A pillar drill, hand grinders and disc cutters were used to cut and drill sections of the bridge. For the next three weeks, the workshop was a hive of activity. Panels for the steel bridge were constructed one by one, then carried into the yard by 4 people and bolted to the main structure. Meanwhile wood was cut and treated for a wooden bridge to cross the second river at Calacala.

Obstacles to progress included lack of both skilled labour and high-powered machines, particularly for drilling and welding. With persistence on the part of Pilar and Rick, our translators, every machine and tool required. The larger issue was the sheer number of holes required for drilling- some steel members required 12 holes each, which came to over 8,000 holes including pilots. To overcome this, a punishing 12 hour drilling schedule was put in place. The early shift started at 7:30am; shifts continued through lunch and into the evening- often finishing as late as 19:30, and sometimes long into the night. Our workshop motto became - the drill never stops.

During the three weeks at the workshop, four members of the team travelled to Calacala to survey and prepare the site. Despite sleeping in tents in a makeshift camp, and through heavy snowfalls and -15 degree mornings with driving winds, work was finished in record time. The team returned triumphant 2 weeks after setting out, having completed surveying of both bridge sites, and having built the concrete abutments on which the metal bridge would rest.

With work in the workshop complete, the steel bridge was dismantled and loaded onto a truck for transport to Calacala. The bridge panels were bolted into

17th July
Reunited at last



21st July
The cleaning begins



11th August
The bridge takes shape!



modules on site according to the codes sprayed on in the workshop. The first six modules were constructed on a temporary steel structure over one abutment, and pulled half a metre towards the opposite bank using ratchet winches. Consecutive modules were added as the bridge was pulled further over, and a water tank was added as a counterweight once the bridge was complete. This allowed the bridge to balance on the temporary support like a seesaw while being winched forwards, without toppling into the river. Once almost on the opposite bank, the bridge rested on a temporary wooden structure, then a metal frame, before finally being lowered onto both abutments using hand-operated hydraulic jacks. The process of launching took three days, and was fraught with complications; however there followed a fantastic party resplendent with dancing, roasted llama and fireworks.

In parallel with the steel bridge, a smaller wooden bridge and a solar shower were prefabricated by the team and the assembly method was explained and demonstrated to the villagers. Due to time constraints, the team was not able to finish the construction of these onsite. However, two of the team returned to the village 3 weeks after the expedition and found assembly of the wooden bridge almost finished. The structure appeared extremely sound, and all that remained to be completed was installation of decking and handrails.

Similarly, construction of the solar shower was underway. As this project is more technical and may involve more complications, staff from our NGO partner CEDPAN have agreed to provide any support the villagers may need, and are able to contact us for advice on any problems.

All members of the expedition returned to La Paz, exhausted but exhilarated, for an intensive two-day 'rest and relaxation,' involving the infamous Death Road, and some white-water kayaking.

24th August
The bridge begins its journey across the river



25th August
Half way there



25th August
The party - a night to remember!



● Conclusions

The dedication and skill of expedition members made it possible to surmount obstacles of time, resources and equipment shortages to build a footbridge with an expected lifespan of 30 years, and to teach construction methods allowing the local villagers to sustain and repair both bridges. The expedition has deeply enriched the lives of its members, and that of the Bolivian communities we have had the pleasure to work with.



The expedition would like to thank Imperial College Exploration Board, The Old Centralians' Trust, The Happold Trust, Laing O'Rourke, Whitehaven Rotary Club and the Royal Engineers for their support and guidance. A full report will follow, and talks on the expedition are available- please email altiplano2009@gmail.com for more information, or see our website at www.nextexpedition.org.uk/altiplano.

