

Barrio Telchi Storm Water Drainage

2007 International Senior Design: Santa Cruz,
Bolivia

The Storm Water Problem



During the rainy season, three intersections in Barrio Telchi flood due to storm water. Students at Oscararnullfo Romero I Secondary School and Centro Social SOS are unable to get to school. Other problems created by the flooding include lost workdays, disease, and property damage. This flooding typically lasts for the duration of the rainy season, which is approximately four months.

ETC was requested to design an engineering solution to alleviate this flooding, and to redesign 7th Ring Canal to convey this drained flow.

Field work in Bolivia



Meetings were conducted with local officials and engineers regarding project details.

Survey work was conducted to gather elevation and location data necessary for the design of a drainage system on the site.

Soil Data was collected to discern drainage properties of the soil and approximate excavation costs.

Various other locals provided information about Santa Cruz useful for the project

Project Location



The project is located in Barrio Telchi, within District 10 of Santa Cruz, Bolivia.

Project Implementation

A solution was designed to best alleviate the problem with minimal negative impact to those affected by its implementation. ETC paid careful attention to the customs and means of the project community in order to provide recommendations that are both effective and sustainable.

The recommendations provided by ETC for the Barrio Telchi Storm Water Drainage Project will cost an estimated \$Bs 1.36 million (\$182,000 USD) to construct and will require about 4 months of construction to complete.



Embrace the Change (ETC) Engineering

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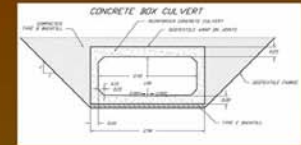


7th Ring outlet into Doble Via la Guardia



The existing outlet pipe connecting 7th Ring Canal to Doble Via la Guardia is an 80 cm corrugated plastic pipe. This pipe is in poor condition and has been disconnected from its headwall. Even under ideal outlet conditions in a 5-year storm, this pipe is significantly undersized.

ETC recommends replacing the existing culvert as the only appropriate option. A 1.0-m x 2.5-m culvert has been designed to handle the peak flow of the 5-year storm



7th Ring Canal

7th Ring Canal is an earthen canal which extends from Radial 17.5 to Doble Via la Guardia. It is intended to convey flow from Barrio Telchi and Barrio Berea south to an existing storm sewer pipe under Doble Via la Guardia. 7th Ring Canal drains an area of approximately 80 hectares.



ETC recommends cleaning the upper reach of the canal, where flow volumes are low. The lower reach should be concrete lined to handle peak flow. Both sections should be graded at a constant slope.



Tisú Road Drainage

Draining the storm water from the flooding regions is a complex problem due to the small elevation differential and large flood water volumes. Tisú Road is the lowest of the three intersections and has existing culverts, making it the best option for collecting and draining storm water.

Design options of pipe flow and road conveyance were eliminated for reasons of economics and design feasibility.

ETC recommends the construction of a rectangular roadside canal along a portion of Tisú Road extending from 'Intersection A' to 7th Ring Canal, and that this section of road be paved. The canal will be limited by the existing culverts, but will reduce the flood duration from the 5-year storm to only 18 hours.

