

# Radial 16 Canal and Road Between 5th Ring and 30th de Agosto Curichi

## International Senior Design

In the Summer of 2008, 31 students from Michigan Technological University traveled to Santa Cruz, Bolivia. While in Bolivia, they worked on the construction of a local school, collected information for their senior design projects, and experienced Bolivian culture.



## Project Scope and Location

Tip Third Engineering was responsible for the design of a canal and road in the neighborhood 30th de Agosto in District 10 of Santa Cruz. The project included a canal to alleviate flooding in the area and a road on both sides along the 16th radial, between the 5th Ring and the curichi (wetland) in the neighborhood.



## Methods and Procedures

While in Santa Cruz, Bolivia, Tip Third Engineering performed soil borings, delineated the project watershed, surveyed the right of way, and met with District 10 Engineers. Upon returning to Houghton, Michigan, Tip Third Engineering performed flow calculations for canal sizing, performed fatigue and structural calculations for the road, and used computer drafting software to develop construction documents. Tip Third Engineering also developed a project cost estimate based on Bolivian prices and a project schedule.



## Existing Conditions

At the 5th Ring intersection (North East end of project), there is an existing underground storm water system. An earth road lays between this intersection and the curichi (South West end of project). The road is accompanied by an earthen canal on one side. The soil in the project location is mostly clay with sand. When the area near the curichi floods, the flood waters enter the residences, causes health problems, and complicates travel for the people.



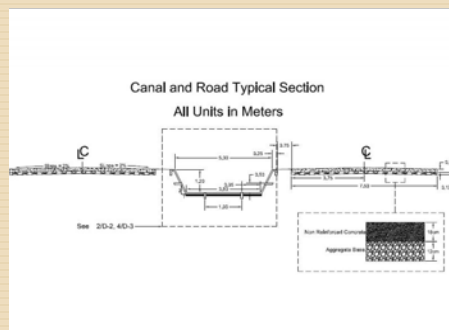
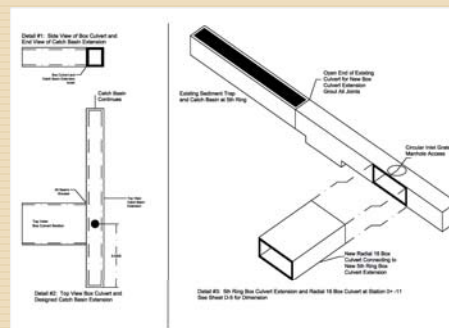
## Design Options

In designing the canal, Tip Third Engineering considered using an earthen canal, a concrete-lined canal, and underground pipes. The road options included a gravel road, an asphalt road, and a non-reinforced concrete road.



## Final Recommendation

Tip Third Engineering designed an open trapezoidal concrete lined canal, with a non-reinforced concrete road on both sides. The open canal transitions into to a box culvert to cross under the 5th Ring intersection. The existing catch basin/sediment trap at 5th Ring will be extended to allow for a connection with the new canal.



## Conclusion

Tip Third Engineering is confident that with maintenance the design will alleviate flooding, increase transportation, and improve the economic activity of the residents.



## Tip Third Engineering



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