

Bypass Itaipu dam (Brazil/Paraguay)



Witteveen+Bos has carried out a feasibility study into a bypass along the Itaipu dam. This bypass in a canal has a length of 5 kilometers where a height difference of more than 125 m is overcome. This bypass allows ship traffic across the headwaters of the Paraná River on the border between Brazil and Paraguay. This may offer great potential for the development of the economy and making logistics more sustainable for five South American countries.

The Itaipu dam, completed in 1984, is the largest hydroelectric power plant in the world in terms of energy production. Hydropower turbines produced 103 MWh of renewable energy in 2016, which is sufficient for 75% of Paraguay's national energy needs and 17% of Brazil's total energy needs. To date, the dam has been an obstacle to shipping.

The feasibility study concerned a study into the technical, economic, ecological and social feasibility of this bypass next to the dam in front of the Paraná River. The project consisted of a technical design, an analysis of the environmental and social impact and an economic cost-benefit analysis.

The technical study consisted of:

- assessment of nautical safety based on, among other things, fast-time simulations (MARIN);
- a variant study of route variants
- functional design of the levelling system of the locks to be able to level safely for more than 125 m, including the necessary facilities to ensure navigability and water balance in the bypass (with spillways and dams).
- technical preliminary design of 4 locks, dams, spillways, access channel and reservoirs.
- LCC-cost estimates

For the economic cost-benefit analyses, an update of transport forecasts has been made based on field research (STC-Nestra/Gistran)

Client: Itaipu Binacional

Implementation period 2017-2018

Cost of services: 450.000,- USD

(estimated) construction costs: more than 1.3 billion USD

Assignment name: Feasibility study Itaipu-bypass	Approx. value of the contract: EUR 400.000
Country: Paraguay/Brazil Location within country: Itaipu	Duration of assignment (months): 6
Name of Client: Itaipu Binacional	Total Nº of staff-months of assignment: 5
Address of Client: Avenida España N° 850 e/ Perú y Padre Pucheu Casilla de correo N° 691 - Codigo Postal: 1526 ASUNCIÓN PARAGUAY	Approx. value of the services provided by your firm under the contract: EUR 400.000
Start date: February 2018 Completion date: July 2018	Nº of professional staff-months provided by associated Consultants: 2
Name of associated Consultants, if any: MARIN STC-Nestra	Name of senior professional staff of your firm involved and functions performed: R.A. de Heij MSc: Project director P. Ravenstijn MSc: Project manager, hydraulic expert A.L. de Jongste MSc: hydraulic expert W. Ridderinkhof PhD, hydraulic expert M. Versluis MSc: structural lock expert J. Vlaanderen MSc: geotechnical expert A.W. Burgers MSc: Senior economist J. Ritsema MA: Senior ESIA expert A. Knipping MA: ESIA expert
Narrative description of the Project: The Itaipudam is the largest sustainable hydroelectric power station in the world and one of the seven engineering wonders of the modern world. The dam was built between 1975 and 1983 (under a treaty between Brazil and Paraguay that runs until 2023) and 7.7 kilometers long. The dam contains 10 Brazilian and 10 Paraguayan hydroelectric turbines (of which 18 are in use) and these produced a total of 103 MWh of sustainable energy in 2016, sufficient for 75% of the Paraguayan and 17% of Brazilian energy requirements. A bypass for shipping alongside the Itaipu dam potentially offers great potential for the development of the economy and the sustainability of logistics (transport by water instead of by road and by rail) for five countries: Paraguay , Brazil, Argentina, Uruguay and Bolivia.	
Description of actual services provided by your staff within the assignment: The services of Witteveen+Bos for the feasibility study consisted of the following: <ul style="list-style-type: none"> - Technical part: in the sketch design, the height difference of 125 meters is bridged by a 6 km channel with four locks (second and third locks form a flight) to enable ship passage from the top to the downstream of the dam. A nautical fast-time analysis showed that a 160x16 m barge convoy can safely approach the locks despite the high flow rates downstream. The construction costs of the project are estimated at 1.3 to 1.8 Billion USD. - Environmental and social part: A preliminary environmental and social impact assessment is performed. The additional environmental and social effects can be mitigated. - Economical part: In the economic analysis, the potential benefits from expected cargo flow were investigated and compared with the investment and maintenance costs of the bypass. The future benefits generated by the bypass are sufficient to justify the investment. In the coming months preparations will be made for the next project phases towards the realization of this project. 	
Firm's Name: Witteveen+Bos International Projects B.V.	



E/CO.DF/041328/19

Asuncion, october 15th 2019

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CERTIFICATE OF PROVIDED SERVICES

We certify for the proper purposes and at the request of the interested party that the company **WITTEVEEN+BOS INTERNATIONAL PROJECTS B.V.**, performed the services contracted by ITAIPU, registered in the RUC N° 80013737-0, under the global price regime, in accordance with specified below, there being nothing to discredit it in the scope of this contract.

International Order Service N° 4500045587/2017

Contract validity: 30 (thirty) days counted from 2017.10.31.

Description: Services of consultancy in relation to the preliminary phase of the feasibility study of the locks in the Paraná River next to the Itaipu dam.

Provided services: (i) Review existing studies and data; (ii) Basis of design; (iii) Risk and mitigation measures assessment; (iv) Plan of approach feasibility study.

Contract N° 4500047797/2018

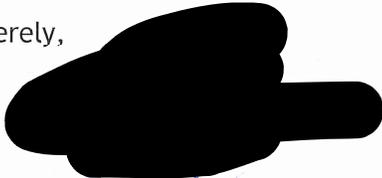
Contract validity: 5 (five) months counted from 2018.04.03.

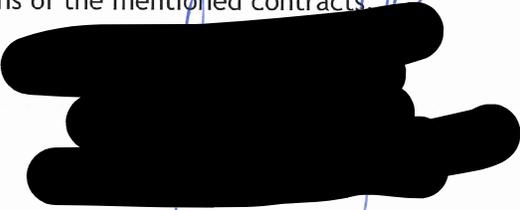
Description: Services of technical, economic, environmental and social feasibility of locks and channels in the Paraná River for the transposition of the Itaipu dam, draft project and complementary surveys of the safety of the navigation upstream and downstream to the Itaipu hydroelectric power plant.

Provided services: (i) Determination of the design ship; (ii) Nautical safety downstream; (iii) Basis of design; (iv) Technical design; (v) Social and environmental study; (vi) Economic study; (vii) Economic cost-benefit analysis; (viii) Selection most favorable alternative; (ix) Symposium countries in the river basin of the Paraná River.

We inform that the company **WITTEVEEN + BOS INTERNATIONAL PROJECTS B.V.**, carried out the work according to the technical specifications of the mentioned contracts.

Sincerely,


Blás Sixto Mazacotte Centurión
Superintendente Adjunto de Compras



Fernando Souto Dos Santos
Superintendente de Obras y Desarrollo