



“CURRICULUM VITAE” (RESUMÉE)

- Born the 10th March 1947, at Rio de Janeiro (RJ), Brazil
 - Middle and High School: Colégio Andrews (1958/60) and Colégio de Aplicação da Faculdade Nacional de Filosofia (1961/65), Rio de Janeiro.
 - Civil Engineering – Specialization in Hydraulics and Sanitation, National School of Engineering EE/UFRJ (1966/70)
 - Post Graduate Irrigation Engineering, Hydrology School at the Institute of Hydrology, Madrid, Spain (1976)
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- Law, National Faculty of Law FND / UFRJ up to 6th of 10 periods (1979/81).
 - CREA-RJ Registration No 18.676-D, (valid em: SP, MG, GO, SC, AM, CE, PE, SE) (CREA is the legal agency for inscription to work as engineer in Brazil)
 - Languages (Portuguese): Spanish, good; English and French, reasonable
 - Membership: Instituto de Engenharia (São Paulo), since 1971, Clube de Engenharia (Rio de Janeiro) since 1970, WPCF (Water Pollution Control Federation, now WEF) since 1971, AWWA (American Water Works Association) since 1975, AIDIS-ABES (Brazilian Association of Sanitary and Environmental Engineering) since 1971, being a member of the Managing Board for 5 terms, and ABID (Brazilian Association of Irrigation and Drainage since 1986
 - 2nd Lieutenant of the Brazilian Navy through EFORM, with Armed-Deck & Navigation specialty
 - USIS (United States Information Service) Scholar on the theme “Problems of Big Cities”, participated in courses and seminars in Brazil and USA (1971)
 - Participated in various courses in the areas of Hydraulics, Sanitation and the Environment as a student
 - Teacher of Hydraulics at the Civil Engineering Course, Catholic University of Rio de Janeiro (PUC-Rio, 1982/83 and 1994/95)
 - Participated in various Brazilian and international conferences in the areas of Hydraulics, Sanitation and the Environment, Industries, Petroleum and Petrochemicals, as attendee, author of technical works, debater and panels coordinator
 - Participated in the preparation of Brazilian standards for steel pipes, for water treatment plant and water supply systems design at the ABNT (Brazilian Standards Institute) 1973 -1975..
Danish Hydraulic Institute (exclusive Brazilian partner 1.985 – 2.000)

PROFESSIONAL EXPERIENCE

1969/70 - MONTREAL Engenharia S.A – as Trainee, participated in: budgetting for proposals, planning and control of various civil construction works and industrial assembly. Worked in the construction and installation of the factories of the Cia de Cimento Portland Goiás (GO) and the Cia de Cimento Portland Alvorada (RJ). To the Methods Division, wrote the “Sliding Molds Manual”, at the Design Division, in the Water Treatment Plants for Sao Joao del Rey (MG) and for Refinaria do Planalto PETROBRAS-REPLAN, in Paulinea (SP).

1971/72 - ENCIBRA S.A. (Engineering-Science Brazil, consulting engineers from Pasadena, CA: a)_ the Executive Design of the Metropolitan Sao Paulo Water Distribution System ± 65km of pipes (250 -1,500 mm diameter), 11 reservoirs (up to 30,000 m3) b)_ Basic Design of the complete sewage system to the city of Amparo (SP); c)_ feasibility study for a water integrated Water Supply System for 8 cities around Londrina (PR); d)_ trainee at the New York and Washington offices of Engineering Science Inc., ENCIBRA's stock-holder.

1972/75 - COMASP - Metropolitan Water Company of Sao Paulo, currently SABESP) – Permanent Engineer -Specialist, working in design, in the supervising design and construction services, in the operation and maintenance of the water supply system of Greater Sao Paulo.

1975/1985 - MONTREAL Engenharia S.A. (Brazilian EPC with 25.000 workers) – Design Division, manager/engineer in several contracts such as: Infrastructure of the Fazenda Laranjeiras Realty project in Parati (RJ); Nitrocarbano S.A a caprolactama factory in Camacari (BA); METRO-RJ - garage and maintenance centers in Av. Presidente Vargas and in Acari; SABESP –Operational Control System Center of the water network to the Big Sao Paulo Metropolitan area (12million people); PETROBRAS – Compressor & Pump of Carmapolis oil field (SE); PETROBRAS – first off shore petroleum platform in Brazil; SKOL-CARACU – industrial waste treatment system to the beer factory in Guarulhos (SP); Cia. Paraibuna de Metais – water supply of the zinc plant in Juiz de Fora (MG). In the end of 1976, become the Chief of the Hydraulic Projects Section of Montreal S.A.; in **1977**, MONTREAL assumed ownership control of **IESA - Internacional de Engenharia S.A. (from Morrisson-Knudsen Inc.)**, came to this firm taking care of the Rio de Janeiro South Zone Sewage Pumping Station Project, with an estimated flow of 12 m3/s. Was designated as the principal technical responsible person in civil engineering for the the IESA jobs (2.500 technicians staff) at CREAs. By the end of 1977, assumed in parallel, the position of Commercial Manager with some special jobs: a)_ the Bayovar project – petrochemical / chemical, fertilizer / port center to the north of Peru, which resulted in winning the international competition (BIRD) and b)_ technical supervision for the pipes supply winner proposal to the new 250km Water Pipelineproject for Calama Antofagasta (north Chile); c)_ basic design manager for the “Water and Sewage System of Project Rio”, involving 2 waste water treatment plants for an amount of 24 m3/s; d)_ the Rio de Janeiro Metropolitan Region's Water Supply Master Plan the 1st phase (10 millions

people). e)_ coordinated the "Programa de Despoluição da Baía de Guanabara (Guanabara Bay Clean-up Program)" casted by the Ministry of the Interior in January 1982; f)_ pollution control studies & design for the liquid effluent from coal mining regions at SC state; g)_ georeferenced census with field survey for technical and commercial objectives of users of water and sewage services at Ilha do Governador (300,000 people) for CEDAE; h)_ principal in the design of Water Distribution System of Goiania (GO) for a population of 2.5 million people; i)_ manager of the proposal and modeling (math model) the water distribution system of Montevideo. j)- the water intake and pumping system for the Candiota III Thermoelectric Power Plant (RS); k)_ technical-economic feasibility for a project in Sao Paulo city, involving a garbage incinerator with a thermoelectric power plant; l)_ a Realty Tourist Center at Santana do Itimirim (RJ), etc.

1985/90 - TECNOSOLO S.A. – headed the establishment of a new department for consultancy, design and project management which started with about 15 people and reached 300 people in less than one year, working on the following operations: a)- Project management of an investment of US\$70 million in water, sewage and road system in the state of Amazonas, specially in Manaus; - Design of Water Mains, Water Treatment Plants and Water Master Plan for Manaus (for 2.4 million people in 2005); b)- raw water intake, pumping, treatment and storage systems for PETROBRAS to Macaé Port for offshore activities (RJ); c)- Management /supervising CEDAE investments in the water and sewage networks at S. Goncalo (RJ); d)- Guapi-Açú dam, Soarinho dam and Iconha dam projects design, for the water-supply of Niterói and nearby areas; e)- Design of the second water main line from Sao Francisco river to Aracaju (92 km, DN 1200mm); f)- Conception and complete design of the intake, pumping, treatment, storage and distribution of water for Ibiapaba region in Ceara (700 l/s and 150 km of pipes); g)- design coordinator for improvements and expansions projects for the airports of Brasília, Salvador, Recife, Rio de Janeiro and Fortaleza for INFRAERO.

1983 to Date – AQUACON Consulting Engineers – Founder and Managing Partner, # a_ several services for Construction Companies with confidential clause for proposals (bidding), for construction methods, for design changes, for supervision and technical support; # b_ design review of the principal water mains on the first stage of the new Water Distribution System of Goiania; # c_ Basic and Executive Design of the new water main line of La Paz (Hampaturi-Pampahasi), at Bolivia (DN 800, L = 12 km, PN40); # d_ Design of interlinking the Penstocks of the Hydroelectric Plant of Lages (Rio-Light) for auxiliary turbine activation, in PN40, # e_ Report on the water supply in the new petroleum drilling and exploration region of Uruçu (AM), located at the center of the amazon jungle, for PETROBRAS; # f_ Consultancy in the analysis of big irrigation pumping projects NE Brazil, for DNOS; # g_ Integrated solution for the Clean-up Program of Guanabara Bay, PDBG91, for A.Gutierrez; # h_ Technical assistance services provided to SHELL Brazil and TEXACO Brazil; # i_ Sanitary Drainage Designs to Vila Anchieta, to Parque Raio de Sol and to Vila do Céu for the Municipality of the City of Rio de Janeiro; # j_ Sanitary Sewage Design of the Rio Sarapuí basin of the Fluminense Region, for CEDAE; # k_ Expansion design for the Icaraí Sewage Treatment Plant (1,1m³/s), at Niterói for CEDAE (s/c sondotecnica); # l_ Executive Design of the Sewage Collection Network of Colubande and Galo Branco in Sao Goncalo-RJ for CEDAE (s/c sondotecnica); # m_ new main booster for Baixada Fluminense (at B Roxo, 4,0m³/s, 4.000CV), full design, for CEDAE # n_ Operation Manual for the new water main Hampaturi-Pampahasi, La Paz, Bolivia for SAMAPA; # o_ design and technical support for modifications and enlargement of the valves place hub named Jaques-Acari, involving the complete interruption of all Rio City water supply with the goal to be done in less than 24hours (done in 16hours) # p_ al Hunnay Water Main - Riyadh, Saudi Arabia: Project of 156 km of 2 parallel pipes (D=1,200mm and 4 boosters of 6,600CV each, Q=4.15m³ /s), for a Brazilian contractor; design at a competition level # q_ Comodoro Rivadavia Distribution in Patagonia, Argentina: design at the competition level of supply, construction and installation, with collection at the Musters lake, raw water pumping, Water Treatment Plant, 4 pumpstations, reservoirs, distribution main lines with (L=250km, D=1200mm to 400mm), electric sub-stations and transmission lines for a Brazilian contractor; # r_ basic design sanitary sewage system enlargement at the city of Boituva (53,000 people by 2010), for SABESP; # s_ expansion and sectorization design for the water network at Sao Goncalo county (big Niterói metropolis), with more than 150km of new pipes and average total flow of 3.5 m³/s for CEDAE; # t_ Maricá and Silva Jardim cities: sanitary sewage network enlargement design for CEDAE; # u_ Cabo Frio and Buzios downtown: sanitary sewage system basic design with temporary "dry season intakes" and treatment at a secondary level for PMCF; # v_ Urban rain drainage hidrodinamic math simulation (Mouse, DHI software) and improvements design in the south and north zones of Rio de Janeiro city, 1995 for the City of Rio de Janeiro; # w_ technical-management evaluation (including tariffs and economic aspercts) to the water supply and sewage system for Cordeiropolis town (16,000 people) # x_ Guanabara Bay Mathematic Model for the hydrodynamic simulation of flow, transport and dispersion, DBO and colimetry, for the analysis of alternatives and scenarios, using the software MIKE 21 of DHI, for CEDAE Rio de Janeiro # y_ Marina Porto Real - Mangaratiba, RJ, Maritime hydraulic studies and provision of coastal and port engineering technology solutions for the breakwater works, with mathematical modelling of refraction and defraction of waves, studies of tranquilization inside the "darsena" (dock), beach stability, protective sea wall/wave deflector, of a big tourist-hotel complex, near Angra dos Reis, A Gutierrez ownership, 1996; # z_ "Passarelas Linha Amarela" – Complete design (architecture, urbanism, structure, electric, drainage) of 5 big elevated walkways for the passage of pedestrians above the so-called "yellow line" (new freeway connecting the communities of Jacarepagua and Av. Brasil in Bonsucesso, with 6 traffic lanes and central plant box, inside the urban area of Rio de Janeiro, RJ; Includes the urbanization, landscaping and urban equipment of the areas adjacent to the access to the "passarelas", for the City of Rio de Janeiro, 1996-97; # aa_ Lagos-Leste 1997 (Araruama, Armação dos Buzios, Arraial do Cabo, Cabo Frio, Iguaba Grande, Saquarema, São Pedro d'Aldeia, Casimiro de Abreu countys) "East-Lagos" - Diagnosis of the existing water and sewage systems, related infra-structure, socio-economic and demografic studies, conception of the solutions to be adopted to the implementation of new systems and improvements in the existing ones, basic design to the solutions adopted, cost estimations to establish the new units and systems and for operation & maintenance (during 30 years), evaluation of incomes and expenses (budgets), losses (leakages), debits, reposicion of materials & equipments, unities useful lifes, etc., with the evaluation of the tariff to cover costs (including financial and opportunity money costs). Preparations of the bidding Technical proposal for the "Concession of the water and sewage services to the urban counties areas" population in 1997: ±250.000 (residents) and ±700.000 in summertime (peak days). Complete assistance in the technical and commercial proposal to "consortium Pro-Lagos" (Hochtief-Preussag-MASA-PEM-COPE), bidding hold by State of Rio de Janeiro - Winner proposal, in private operation since 1998; # bb_ Management and construction supervision to 80 km of sewage collection pipes, at São Gonçalo county (RJ), to ETEP/CEDAE; # cc_ Guandu-Macacos Model - Rio de Janeiro, RJ – mathematical model for operational control of the principal part of the water main system of the metropolitan region of Rio de Janeiro (30m³/s), including the tunnel-canal Guandu-Macacos, with 35km, 80 derivations, the interlinkages with the water mainline named "H Novaes" (Q=5m³/s, L=30km), for Emissao-CEDAE, 1996 # dd_ Porto Pecem - Pecem (CE)- Sedimentation and evolution studies of the coast for the construction of the big Port along the Cearense coast, usinga mathematical hydrodynamic simulation model, with the collection of oceanographic data of the area (current, waves and sediments), in association with DHI – Danish Hydraulic Institute, for INPH-CDRJ – Transport Department of Ceara (1996-97); # ee_ Baixada Viva - Chatuba - Improvements urban program in some districts without infrastructure at Big Rio de Janeiro metropolitan area periphery. Complete design for: 35km of streets geometry and paving; 1,25m³/s sewage pump station; enlargement of another sewage pump station from existing 163 l/s to 279 l/s; 5,8 km sewage interceptors (DN 600 to 1.500mm); 2 water distribution reservoirs (7.500m³ and 10.000m³); soil investigations and topography to the State of Rio, 1996 (**IDB project**); # ff_ Basic and Executive design for a sewage treatment plant named "Pavuna", with chemical precipitation at the primary settling and secondary treatment by activated sludge, final capacity 3,0m³/s, sewage collection pipes network at S.J.Meriti and D.Caxias counties, population basin 360.000 inhabitants (71.000 connections), 400km of colecting pipes, 15km of interceptors / main lines, 9 sewage

pump stations, in the "Guanabara bay despolution program", to CEDAE / ADEG / JICA , in AQUACON, Tecnosan, ECOPLAN, MAGNA joint-venture named consórcio PAVUNA; # gg_ with the beginning of PROLAGOS (east lagos water & sewage company) operation in 1998, incharged of all full design and field supervision with "as built" draws: >>gg01: rehabilitation to "Juturnaiba 1" Water Treatment Plant (now "Prolagos" WTP) from 180 l/s to 600 l/s; >>gg02 the new DN 700mm 13,7km pipeline; >>gg03 the Buzios Main-line (DN300mm, L=28,2km, 3 boosters); >>gg04: water system main lines Operation Manual; >> gg05_ Campo Redondo Pump Station (existing booster) adapt to the new configuration of the distribution main lines network with 3 pumps Q=175 l/s, AMT=54m.w.c. each; >>gg06_ a Valves Hub Operation Center named Vinhateiro. # hh_ Itú County, Sao Paulo: Technical-Management diagnosis to the water & sewage systems with a master plan draft for 30 years, tariff evaluations, modelling of institucional and management alternatives, regarding eventual "concession", to the city of Itú (SP), with a final population estimated in 180.000 inh, with FGV-IBRE, 2.000; # hh_ two years (1998-2001) fistic rehabilitation field jobs, operation and maintenance services to the Juturnaiba Dam, with 16km of crest between Araruama & S. Jardim counties for Prolagos; # ii_ Recreio dos Bandeirantes district: develop a method and softwares for make census records and files, mapping, with GPS coordinates for each sewage connection, for register pipes, billing the sewage service for more than 4.000 conectionis, fit for water & sewage and other purposes as real-estate taxes and 3 months test-drive billing operation, to Rio de Janeiro municipality, 2.000 # jj_ Math Hydrodynamic Modeling for the lúiu irrigation perimeter network channels design (25km, 32,75m³/s max. flow), located at theright side of the Sao Francisco River, Bahia State, for CODEVASF, 2001; # kk_ Armação do Pântano do Sul Beach, at south-west Florianópolis Island, SC Recovery Project study for hydraulic landfill and shore protection against erosion, with some improvements as a pier and dock for fishing and turism boats, dredging the boats operation área, rock breakewares – guide for sand tide-flows, etc.), shore urbanization, with the help of softwares for ocean hidrodinamic math modeling to evaluate the shore sediment-transport, to SC State Works Department, 2001; # ll_ Picos - PI – Rural Water & Sewage Program sponsored by german agency KfW, supervision and investments gidelines at 72 small towns around Picos county, involving construction and community training for operate and maintenance, with 5 years duration (2000 – 2005) # mm_ "Nova Baixada Program"- Urban recovering design at four periferic sub-urban districts at Rio metropolitan area involving field surveyng (topografy and soil investigations), streets re-definition profiles and sections, water, sewage, rain water drainage, urban equipamentos urbanos (creches, postos de saúde, praças, centros comunitários, etc. (IDB project) – SEPDET –RJ; # nn_ Guandu Mirim basin 500.000 inhabitants– Field surveys (topography and soil investigations); full design for sewage network and sewage treatment plant at district, west side of Rio de Janeiro county (Sepetiba bay drainage basin)), for CEDAE: # oo_ Joinville city, south Brazil, dry-season water intakes at drainage system Rio Cachoeira (10km) basin to improve water quality of this small river until sewage systems will be done SC – 2003; # pp_ Palmas Island, Guanabara Bay, Rio: technical – economic feasibility for water & electricity supply from continental shore instead of having generators and rain collectors for Yacht Club RJ 2004/2005 (*) # qq_ Water & Sewage Tarif Studies for Santa Catarina State (SC), south Brazil: "Subsidy Program Definition for Water & Sewage systems in SC" – cross-subsidy, internal subsidy, external subsidy, social tariff limits (break-even), social-economics studies, for Banco Mundial – World Bank (WE, BIRD), AQUACON with ICF (2005 - 2007) # rr_ Math-Computer Modeling of big Belo Horizonte Urban Water sistyem (pipes network) for Operational Simulations, nd real-time supervision, using softwar MikeUrban (DHI), in a supply-construction-package for Tele-mesurements, Tele-comands, and Telesupervision (named 3T-COPASA, MG, with GIS and SCADA interfaces), for Telvent-ABENGOA, (jun06 a mar07); # ss_ Corumbá, water supply alternatives for arrive with water in 3 points (3 x 55 l/s) for mining – metallurgy activities, decided by water intake in one point at Paraguay river, than the basic design with, pumping (Q~135 l/s H_{man} ~150mca) and pipeline (~27,5km) for MMX at Corumbá, MS, (para MMX, jul2006-set2007); # tt_ Mearim 1 Maranhão, MA, thecnic-economic feasibility with alternatives formulation, water cost (m3), for a project named Siderúrgica do Mearim, to Aurizonia group (1,3 m³/s intake, 18km pipes DN 1.000mm), jan a mai07; # uu_ PROLAGOS-CIBE _ Consultancy and Advisory to make a proposal to buy the PROLAGOS Company (5 countyes, ~350.000 resident ±800.000 peak days people) to CIBE, operation finished with success, including suggestions for scheduling investmens for the first 24months in order to improve benefits to accounts without thetechnical problems (ja07 a fev08); # vv_ Corumbá 2 - Projeto Básico da captação no Rio Paraguai, bombeamentos (Q~270 l/s H_{man} ~250mca) e da adução (~30km) de água para as Minas da MMX em Corumbá, MS, set07 – jul2008; # ww_ Barra da Tijuca submarine sewage outfall pipe (collecting all Jacarepaguá basin, 2.000.000 inhabitants)_ monitoring and modeling the nearby – planning and making the monitoring sea water and meteorogy data, bio-fisiclaboratory analysis, to warrant the balneability at the beach, document eventual "biota" changes around the outfall point at ±5 km from littoral shore line, open sea ±30m deep with boat, navigation, samples, survey, to CEDAE, out06 a jun08 (*); # xx_ - TK-CSA _ Quality Control for Design, suply and construction of the water units: raw, industrial, demineralized, refrigeration, potable and reuse (CSAThiesen Krupp, Atlantic Steel Mill at Rio de Janeiro), with 0,56m³/s raw water intake and lfsupport to Contractor Builder "OAS" – Dez2007 to set2008 (*); # yy_ Açú hydraulic landfill for embankment of Porto do ACU back-area (3,270,000 m³) with sand from the seabed, dredged and transported by an auto-propel dredge from a deposit at ±10m deep, ±18 nautical miles distance to the connection buoy – design, details and establishment of the method and sequence for landfill construction and environmental care; construction supervision during the dredging / landfill works, for AngloFerrousBrasil, 2008 – 2011; # zz_ USIMINAS-HAZTEC, conception design for a Turn-Key proposal for the expansion of water supply in More 160 l/s (raw Water) and 25 l/s (treated Water) on the steel mill in Ipatinga-MG; # aaa_ South WTP: Engineering Support to adapt the filter design to the manufacture parts supplier (160 l/s, 4x16m²), Jaraguá, SC, 2009/2010(*); #.bbb_- Mearim 5- Support in water, hydrology, sanitary and industrial sewers and drainage to the Environmental licences for the Liquid Bulk Mearim port terminal (2010); # ccc_ Sao João da Barra county (RJ) - Complete sewage and urban drainage system design (net pipe colectors, pumping, treatments and outfalls) to the central district headquarters, for a final population of 37.000 Inhabitants, for SEA-RJ (2009-2011); # ddd_ Taquaril Tunnel – Idealization and development of the idea for a conceptual level of design for an alternative water supply project to the metropolitan regions of the great Rio de Janeiro and the great Niterói with a 47km tunnel and a 30m³/s. The intake and tunnel operates by gravity and the idea Includes a hidro-eletic generation plant for ±100.000HP or 75MW (estimated project budget US\$ 2billion), for private Client (2010/2011) # eee_ Itaocara County sewage system: complete design to the urban area (pipes, pumping, treatments and river outfall) for a final population 17,000 inhabitants, for SEA-RJ (2010-2011); # fff_ AP5-Diagnoses of existing sanitary sewage systems, population and socio-economic projection studies, related infrastructure, design of solutions to be adopted for the implementation of new systems and improvements of existing systems, preparation and Edition of the technical and budget proposal for bidding "Concession of the public service of sanitary exhaustion in the nº 5 planning area (AP5) of the municipality of Rio de Janeiro-RJ" (2011-2012), For construction company Camargo Corrêa

interested in the privatization of this services; # ggg_ Itapetinga WTP – 0,4m³/s; rehabilitation of four potable water filters bottom, executive design, assistance during the reconstruction and departure using inox steel (“Johnson screen” similar) indirect contact with sand for SABESP (2011-2012); # hhh_ Italva county (RJ) design for a project regarding the mitigation of Muriaé River floods along 6,5km of river, 6.500km² basin calculation of the maximum flow for a return period of 100 years >1,5 m³/s). Profile simulation using HEC-RAS (US army Corps of Engineering software). Parallel designs supporting Irrigation and tourism development (2012-2014), for the SEA-RJ; #-iii_ PortoRio- infrastructure design quality control of about 500 documents, for the joint-venture Consortium builder (CNO + CCN + OAS) for rehabilitation the Rio de Janeiro Docs & Port area named Porto Maravilha (2011-2012); # jji_ Jacarépaguá and Barra da Tijuca district water distribution system at the city of Rio de Janeiro, with about 80km main lines pipes (between 500 and 2.000 mm diameter). executive design and technical daily construction support, for EIT Constructors / CEDAE. (2012-2015); # kkk_ Engineering consulting services for an economic suitable solution for enlargement / rehabilitation / modernization of WTP Juturnaiba 1 ETA from 1,5m³/s to 2,0m³/s for PROLAGOS (2013-2014); # lll_ Necuto, Cabinda, Angola, Full design Water Supply System for 100m³/h (intake, treatment, pumping, about 50km of distribution network and reservation tanks) for Angola’s Constructor Company (2013-2015); # mmm_ - New Guandú Water System (24m³/s) – Complete basic design with intake, pre-treatment units (grids & sand settlers), Raw Water Pumps (~12,5m high), Complete Conventional Treatment Complete (floculators, horizontal decanters, auto-washing filters, treated water reservoir, treated water pumps (~150m piezometric elevation high), ~4km main lines (steel, 2 x DN2500mm) and reservation (4 x 52.500 m³), water-hammer analysis, up hill reservoirs for 4 x 27.500m³, all support units for chemical products, laboratories, administrative offices, maintenance buildings, electricity systems high and low tension, sludge effluents treatment / recovery units, landscape & architecture, etc., for SEOBRAS-RJ / CEDAE, Rio water & sewage state company (2014-2017); # nnn_ Rio de Janeiro city Western water distribution system (400,000 km² área) with forecasting demands, supply sectors definition, 70km main pipes mathematical modeling with 60 knots and basic network & reservoirs, for CEDAE / Seobras-RJ (2014-2016);

AS "INDEPENDENT" PROFESSIONAL

- 001_ northern Paraná, Report about expansion of the water supply system of the towns of Nova Fátima, Santa Mariana and Cornélio Procopio for the SOTEP - SANEPAR (Water & sewage Paraná state company (1972);
- 002_ delta-scientific-equipment manual’s translation of the manuals of equipment Delta SCIENTIFIC (water quality analysis and control instruments) for Geosan, representative in Brazil (1973).
- 003_ Maranhão state small towns: simplified-standard system water supply design (beginning from 1,200 / 2,500 inhabitants to 2.400 / 5.000 inhabitants horizon) where subterranean (underground) water could be find, with economic analysis of the implementation program for each town OESA-CAEMA (1973) (*)
- 004_ Our Lady of Mercy allotment, São Paulo, SP, Santo Amaro District: Full hydraulic drainage design to the luxurious housing subdivision, with approximately 45ha (owner: São Luiz College) (1973). (*)
- 005_ some investigations / reports / opinions, helps, forensic engineering, costs, engineering disagreements arbitration, proposals etc. most with private or confidential aspects allways related with water (1971 to now)
- 006_ Hidroquímica Engenharia e Laboratorios Ltda., water & sewage laboratories and pilot plants, founder and partner (1971 – 2006)
- 007_ POLYARM S.A – Fiberglass Pipes and Equipments Industry – Consultant Manager for national marketing and sale activities.
- 008_ Capivari (SP), 35.000 to 75.000 people and Pirapora do Bom Jesus (SP), 10,000 to 15.000 people: technical and managing evaluation of the water and sanitary sewage system of the cities of with evaluation of the tariff, for the respective Municipal Governments, interested in evaluating the hypothesis of service concessions (1994 - 1995)
- 009_ Vema Engenharia: Draft Designs and budgets for municipal urban and rural infrastructures construction works, for Torrinhas County(SP), dez94-dez95
- 010_ Laranjal Water Treatment Plant expansion design from 2,0m³/second to 4,5m³/sec. Laranjal WTP water goes to Niterói and São Gonçalo Counties, helping pH Engineering to perform the complete design (basic and executive) to Transpavi-Codrasa S.A (construction company) as technical responsible at CREA / CEDAE (1981/82). (*)
- 011_ POTOSI, Bolivia, "project San Juan": new complete water system for 0,200m³/second (water intake at 4.200m over the sea level, 52km gravity pipeline working by gravity, for potable purposes; Engineering services for relocation the pipeline tracing “in field” (Andes mountains), review of the existing design, redesign the water outlet. For the government of bolivia, 1994(*) probably the higher system in the world !
- 011_ POTOSI, Bolivia: the “San Juan” project delivering 200 l/s by gravity for 52km, with intake at level 4.200m over the sea and arrival at level 4.050, analysis of existing designs for the intake, transportation main pipeline and treatment (disinfection) for potable purposes of, resulting in significant cost reductions and operational improvements for CORDEPO, bolivian agency (1994);
- 012_ Upstream Iguassu River – PR- Supervision of the monitoring program and hidrodinamic and qualitative mathematical models for the upper Iguassu River basin, including the Curitiba Metropolitan area-PR, for the joint venture DHI (Danish Hidraulic Institute) & INTERTECHNE Brazilian Design Consultants Co. (final client: SUDERHSA- PR - Paraná State Government agency). The program comprised: implantation and calibration of the hydrodynamic computational model and the simulation of water quality, proposition of methodology for the evaluation of Non-punctual polluting loads; Resizing of the hidrosedimentométrica and water quality monitoring network; redefinition of the model for full-time forecasting; Real-time flood alert operating system Organization. With The World Bank financing help – (1996-97)

- **013_ Water and Sewage Operation / Managing Modelling Systems** - Diagnosis of existing situation, forecast of evolution, modeling of costs and revenues for 25 - 30 years, involving investments, operation, maintenance, tariffs, etc., for 14 Brazilian counties/cities (in addition to those explained in this curriculum), with population Ranging between, 15,000 and 1,200.000 inhabitants, and 05 non-urban systems, with a confidentiality clause towards the Contractor (1994 – 2016)
- **014_ WTP rehabilitation** evaluation plus preliminary design. for the following municipalities: Jacareí (SP); Hortolândia (SP); Ubatuba (SP); Casa Branca (SP); São Bento do Sul (SC); Joinville (SC); Várzea do Quartel, Barra Mansa (RJ); Guandú Velho (RJ), etc (92 WTP) for equipment supplier.
- **015 SENHA Engenharia**: -engineering expert consultant, since 2003 to now, with suggestions for water & sewage system improvements: # 01_ Caldas Novas county (GO): water & sewage managing and systems improvements suggestions; # 02_ Catalão county (GO): water & sewage managing and system improvements suggestions (GO); # 03_ Goiânia city (GO) “João Leite water sistem” enlargement (from 4 to 8 m³/s) design suggestions and supervision; # 04_ Anápolis county (GO): water system enlargement from 0,8 to 1.2 m³/s; design suggestions
- **016_ Prices Courves** - for the implantation (construction turn key), operation and maintenance of water supply units and systems, looking for standardize the estimates for preliminary studies, licensing, sustainability assessment, etc. for the ANA – Nacional Waters Agency / UNESCO (2005-2006)
- **017_ Benghazi, Libya** – Technical-commercial support searching a commercial opportunity for the sale of infrastructure services and urban rehabilitation for the government of Libya in the region of Benghazi, for Brazilian construction Company. The service was signed with this contractor CQG (2007).
- **0187_ Grande Belo Horizonte – Drinking water distribution system**; Computational model for the simulation of the network, using the Softwater MikeUrban (DHI software house), part of a package of implant remote telemetering, remote control, telesupervision (called 3T-copasa-MG and the conforming of GIS and SCADA), for Telvent-ABENGOA, (jun06 a mar07) (*)
- **019_ Paraguai's Chaco Central raw water supply pipeline**: Diagnosis of existing design alternatives for pipeline with 250km, 150 l/s (nominal flow), capturing in the Paraguay River in Puerto Casado and demanding the towns of LomaPlata, Philadelphia and NewLand. Enterprise Assessment sustainability: m³ price estimation for several alternatives. Technical-economic advice, etc. for ACOMPEPA – Mennonites Colonies Association, Paraguay (mar-ago2008)
- **020_ Duque de Caxias County, RJ**- Drinking Water & Urban Sewage systems analysis to help the municipality to apprise possible management alternatives (PPP – Public Private Partnership, public enterprise cooperative, Concession, Sub-concession) and draft /terms of reference contracts for bidding and draft laws that would allow to continue in new institutional arrangements for management. Encompassing demographic studies, 2.500km of streets (2030), find the water source to be used, main lines and distribution network pipes evaluation (2, 25m³/s), sewage collection and treatment (1,8m³/s), urban population estimated at 1,030,000 hab (2030), with investments budget assessment using unit cost curves, investment budgets, costs (operation and maintenance), evaluation of Existing investments (including remaining life-times), deployment planning, m³ cost evaluation for several return rates on invested capital, draft laws that would allow to continue in new institutional arrangements for management and consider the inclusion of urban drainage and collection and final disposition of Garbage. To the city hall and to the mayor of Duque de Caxias, RJ (2012-2015)
- **021_ PCH AVE** (Adventureiro stream river, Além Paraíba county, MG) - small Hydroelectric Center for 2,2MW installed power, with 2 turbo-generators Francis type. Turbo-Flow 2,88m³/s, Geometric fall 65m, 1.000 years recurrence period flow at site: 86m³/s)
- **022 -PCH MVE** (Monte Verde stream river Santa Bárbara do Monte Verde county, MG) - small Hydroelectric Center for 5,4MW installed power, with 2 turbo-generators Francis (2 x 2,04m³/s), Geometric fall 153m, 1.000 years recurrence period flow at site: 175m³/s) ³

PUBLISHED WORKS

- # "Sedimentation in Rectangular Settling Basins as a Function of the Outlet Structure." 1981, Brazilian ABES-AIDIS congress
- # "Flowable Tanks, a Low Cost Technology", 1981; ABES-AIDIS congress Fortaleza, CE
- # "Introduction to Industrial Waste Treatment, "paper-book for teaching at FEEMA (1981);
- # "Water Pollution Control in Coal Mines at SC, paper for teaching at IBAM (1983);
- # "Analysis by the pumping energy consumption of the position entrance pipe in water reservoirs", 1985 ABES-AIDIS congress, AL;
- # "Optimization of the thickness of wall pipes, as a function of the positions of the air intake valves" 1985 ABES-AIDIS congress;
- # "new managing and institutional approach to water & sewage companies in brazil" – III SILUBESA, Braga, Portugal-jul88.
- # "Public Companies or State Companies?" article in the journals of ABES & AIDIS (1987), Engineering Club (1991),
- # "Contribution for the Studies and understanding of the Guanabara Bay and its Basins waters" ABES-AIDIS congress, 1991
- # "standards prices evaluations for construction, for operation and for maintenance of potable water" by units, by pipes, by pipes networks, by pump stations, and water treatment plants"- XXX Congress of AIDIS in Punta del east, uruguay, nov2006 (www.aidis.org.br El V. 1, 3, 2008 Electronic Magazine of AIDIS con el theme **Water table**)
- # **MANUAL DE HIDRÁULICA (AZEVEDO Netto & Miguel FERNÁNDEZ)** since 1955, more than 100.000 books sold, invited in 1988 by Prof. Azevedo Netto to be the co-autor at the 8th edition, printed in 1998. Fernandez made alone the 9th edition in 2015 with 630 pages (a new book, selling more than 2.500 books per year).

Miscellaneous activities

- ABNT (Brazilian Standards Association): #Steel Pipes for Potable Water Standards commission, member representing COMAS-SABESP-1972; # Waste Water Systems Design Standards, representing the "Clubb de Engenharia-1983/84.
- Club de Engenharia (Rio de Janeiro), elected the Environmental Engineering Division chief, 1980/81 and 1983/84.
- ABES - Brazilian Association of Sanitary and Environmental Engineering; elected and re-elected to the board of Directors to 1981/84, 1986/88, 1988/90, 1992/94, 1996/98, 2008/2010 periods and as Fiscal Council to 2010/2012 and 2012-2014; - ABES Rio section, elected vice president 1984/87.
- **ABES: Creator and Head of Technical Committee for Tariffs (2010-2012 & 2014-2016)**
- ABES Journal (Bio magazine) each 3 months publication for the 5.000 associates: author (writer) of the column "professional folklore" with funny or strange or marking or unforgettable or famous professional happenings (2016 - today)
- WPCF "Water Pollution Control Federation" (USA association): member since 1971 to 1995; From 1983 to 1985, the brazilian representative on the Wastewater Collection System Committee.
- DHI Danish Hydraulic Institute: Brazil exclusive agent (unique) from 1991 to 2003
- ABCE Consultants Engineering Brazilian Association; Water Resources marquet Director (2004 - 2007)

Teaching activities, & Talks

- PUC-Rio (Pontifical Catholic University of Rio de Janeiro), Civil Engineering Course, Professor, responsible for the "hydraulic 1" course I (1982, 1983 and 1994, 1995)
- UFRJ-(Federal University of Rio de Janeiro), "Water Supply" course "invited teacher" Professor at master's level, about one year duration,, promoted to engineers belonging to the federal financing sanitation agency board to all Brazil (1995)
- FEEMA – Rio de Janeiro State Environmental Engineering Foundation – Professor twice courses: # "practical notions of plumbing sanitary installations in buildings", professor and writer of a small book to teach, jan/fev77. # "treatment of industrial liquid disposals", professor with writing of handout on "introduction to sewage treatment"-Rio de Janeiro, mar/ago77.
- AMABARRA - Barra da Tijuca District Residents and Friends Association - coordinator and presenter of the course "introduction to urban problems and sanitation techniques: water, sewage, drainage, garbage, sickness vectors, for people interested in knowing the subject - abr83, Rio de Janeiro city.
- IBRAM - Brazilian Mining Institute - Professor at a "Mining and Environment" course, with emphasis on "control of pollution of water in coal Mines" - Belo Horizonte, MG-set83.
- "Guanabara bay West shore despollution (sanitation)", at Club de Engenharia, RJ-nov82.
- "Guanabara bay pollution", at Club de Engenharia, RJ set83.
- "the philosophy and approach of the state Government of Rio de Janeiro in the area of sanitation and environment", debater with the Infrastructure State Secretary, Mr.Luis Alfredo Salomão, at Clube de Engenharia, out83.
- "Guanabara Bay"- debater in the commemorative session of World Environment day, in the Rio city Council -april/1986.
- A depollution program for for Guanabara bay: lecture given at Clube de Engenharia, out86.
- The Taquaril tunnel: a solution for operational security and the reduction of operational costs for the -Water supply of the entire metropolitan area of the big Rio de Janeiro and big Niterói metropolis: draft design for a tunnel with 6m diameter, 47km extension and capacity of 60m³/s, with about 75 MW power generation (SEAERJ 2015 and Clube de Engenharia 2016)

Conferences and Seminars participations

- "THE CITY AS A SYSTEM"- cycle of conferences promoted at all Brazil territory by USIS (United States Information Service) 27abr to 27mai70.
- "THE HUMAN CITY" 14 to 18set70 seminar on engineering, promoted by USIS, in all Brazil territory, among more than 200 participants, I was one of the eight Brazilians Chosen to go to USA during 60 days for a "Problems of Big Cities" seminars

- around USA coast-to-coast
- congresses of the Brazilian Association of Sanitary and Environmental engineering (ABES):
- | | | |
|-------|------------------------|--|
| Saw | In Sao Paulo, SP, | Jan71 |
| Vii | In Salvador, BA, | nov73 |
| Viii | In Rio de Janeiro, RJ, | Dez75 |
| Ix | In Belo Horizonte, MG, | Jul77 |
| X | In Manaus, AM, | jan79, Presenting technical work |
| Xi | In Fortaleza, CE, | set81, Presenting technical work |
| Xii | In camboriu, SC, | nov83, Presenting technical work |
| Xiii | In Maceió, AL, | ago85, presenting work and chairing Session. |
| Xiv | In Sao Paulo, SP, | set87, Secretarial Session |
| Xv | In bethlehem, PA, | out89, presenting work and secretarial session |
| Xvi | In Goiânia, GO, | set91, Presenting technical work |
| 17th | In Salvador, BA | Set95 |
| 18th | In Foz do Iguaçu (PR) | Set97 |
| 19th | In Rio de Janeiro, Rj | Mai99 |
| Xx | In João Pessoa, PB | set01 |
| 21st | In Joinville, SC | set03 Exhibitor "methodology of Studies and projects |
| Xxii | In Belo Horizonte | set07 |
| Xxiii | In Recife | set09 |
| Xxv | In Porto Alegre | Set13 President Table of debates tariff issues |
| Xxvi | In Rio de Janeiro | set2015 |
| Xxvii | In Sao Paulo | out2017, President Bureau debates institutional models |
- congress of AIDIS - Asociación Interamericana de Ingeniería Sanitaria inter-american:
- | | | |
|-------|----------------------------|--------|
| Xiii | In asuncion, Paraguay | ago72. |
| XXIII | in Havana, Cuba | nov92 |
| XXIV, | Buenos Aires, Argentina | Out94 |
| XXXI, | in Punta del east, Uruguay | Nov06 |
- XVI Congress of the International Association of Hydraulic Research (IAHR)-SP-jul/ago75.
- III Brazilian Congress of Public solid waste (Garbage) - SP-ago78.
- I Brazilian Oil congress - IBP-RJ-nov78.
- AWWA - American Water Works Association: "Annual Conference and Exposition": # jun1986 -Denver, Colorado, USA # jun97 Atlanta, Georgia, USA # jun2001, Washington, d.c., USA
- III - the Portuguese-brazilian Symposium on Sanitary and environmental engineering - Braga-Portugal-jul88, presenting paper.
- DHI-Danish Hydraulic Institute, Agents Seminar and Users of software for hydraulics, Orsholm, (great Kopenhagen), Denmark, in sep93, apr95, may97 and jun1999.
- 1st Conference of Deutsche Bank on water and sanitation in brazil. Hotel Meliá, Sao Paulo-SP, 06mai99
- 1st National Forum for urban drainage and sanitary exhaustion, RioCentro, 11 a 14 May 99, participating in the final writing group of the summary of this "Forum".
- international seminar "basic Sanitation in Brazil: challenges and Opportunities - Fundação Getúlio Vargas (05 and 06JUL99), participating as moderator at two of the tables and as spectator in the Others.
- assemæe-national Association of Municipal Sanitation services-36ª "national assembly"- 18 a 23jul2006, Joinville, SC, as a congressman and as a moderator in the presentation of technical works. -www.assemæe.org.br
- ABAR/ARSESP – (brazilian Association of Regulatory Agencies / regulatory Agency for Sanitation and Energy of the State of São Paulo) – WorkShop "**Tariffs and allowances** – The challenges imposed by the Sanitation Act, apr2009, Sao Paulo, SP

Class entities and associations

- ABES - Brazilian Association of Sanitary and Environmental Engineering - since 1970 to now.
- ABCE- Brazilian Association of Engineering Consultants (from 1985 to now).
- Instituto de Engenharia at São Paulo – since 1971 to now. - (actual Representative at Rio)
- Clube de Engenharia at Rio - since 1970 to now.
- WPCF (Water Pollution Control Federation) now WEF - since 1971 to 2010
- AWWA-American Water Works Association - since 1975 to 2010.
- IAHR-international Association for Hidraulic Research-de 1975 a 1990.
- ABID - Brazilian Association for Irrigation and Drainage -since 1986 to 2015

Languages

English: Mater language # Spanish: Fluent # English and French: regular.

Personal data

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Countries Visited:

- Professionally (and sometimes also as a tourist):

1- United States of America, 2- Spain, 3- Peru, 4- Chile, 5- Ecuador, 6- Bolivia, 7- Uruguay, 8- Argentina, 9- Denmark, 10- Portugal, 11- Angola (with Cabinda) 12 Libya, 13- Paraguay 14- Dominican Republic, 15-Honduras _

- As a tourist:

1_ Mexico, 2- France, 3Italy, 4- Greece, 5- Austria, 6- Czechoslovakia, 7- Cuba 8Germany 9-Monaco, 10-luxembourg, 11- switzerland, 12-holland, 13-england, 14-CaboVerde, 15-Senegal, 16-morocco, 17-Venezuela, 18-sweden, 19-canada, 20-Dubai, 21- Oman, 22-india, 23-alaska, 24 _ hungary, 25-panama,

Leisure: Sail Boats / Reading / Travel