

CURRICULUM VITAE

Name: Ángel García - Fontanet Molina.

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Place and birth date: Lleida, February 21st 1970.

Civil status: Married. One son

EDUCATION:

Programa de Desarrollo Directivo (PDD) in IESE Business School - Universidad de Navarra (November 2009). MBA course focused towards Strategic Management of companies.

Civil Engineer PhD (*Doctor Ingeniero de Caminos, Canales y Puertos*) (July 1998). Geotechnical and Groundwater Engineering Program. Universidad Politécnica de Cataluña (UPC).

Civil Engineer MSc (*Ingeniero de Caminos, Canales y Puertos*) (June 1994).. Escuela Técnica Superior de Ingenieros de Caminos, Canales y Puertos de Barcelona (ETSICCPB). Universidad Politécnica de Cataluña (UPC).

MEMBERSHIP

I'm Chartered Engineer and Member of the Institution of Civil Engineers (CEng MICE), Professional Engineer (PEng) in the Alberta Province (Canada) and member of the Colegio de Ingenieros de Caminos, Canales y Puertos (Spanish Institution of Civil Engineers).

I'm also member of the following technical societies: International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) and the International Geothermal Association (IGA).

PRO GEO Geotechnical Consultants is also member of the British Geotechnical Association (BGA) and the British Tunnelling Society (BTS).

OTHER COURSES / TECHNICAL MEETINGS:

Advanced topics in Geotechnical Engineering related with energy and environmental engineering (2013): organized by CEDEX (a Spanish Civil Engineering research institute)..

Geotechnical Works in Harbours (2010): organized by SEMSIG – AETESS (Spanish Society of Soil Mechanics and the Spanish Geotechnical Contractors Association). Analytical and design procedures as well as practical cases are presented by subject specialists.

Geological and Geotechnical Survey of Tunnels Course (2010): organized by the Colegio de Ingenieros de Caminos Canales y Puertos (Spanish Institution of Civil Engineers).

Road Pavement Design Course (2010): organized by CEDEX and INTEVIA (two Civil Engineering Spanish research institutes). It was focused on analytic design techniques for highways and airports pavements.

Pressuremeter Tests in Geotechnical Project (2009): organized by Universidad Polit cnica de Catalu a.

Tunnel Boring Machines (TBM) Technology (2009): organized by Universidad Polit cnica de Catalu a. Relevant specialist took place and it was focused on EPB and Hydro Shield machines.

Excavation-Induced Building Movements: Damage Criteria and Risk Management (2008): organized by Universidad Polit cnica de Catalu a.

EPB Tunnels: Simulation and TBM Control (2008): organized by Universidad Polit cnica de Catalu a. Focused in numerical simulation of EPB construction process and description of control device systems during construction.

Rock Foundations Course (2005): organized by the Geotechnical Laboratory of CEDEX.

Ground Improvement by the use of Jet Grouting and Injections Techniques (2004): organized by SEMSIG – AETESS.

Business Management in Civil Engineering Companies Course (2002-2003): organized by the Fundaci  Polit cnica de Catalunya. Knowledge in building companies management.

Experience in groundwater resources planning and management.

Departament of Geotechnical Engineering and Geo-Sciences, Universidad Polit cnica de Catalu a (March 1995 – December 1997): Researcher in some R+D projects related with the Deep Geological Disposal Concept for high activity nuclear waste: *Mock Up Test* (Madrid) and *Grimsel Testing Site* (Switzerland). These projects were funded by ENRESA and NAGRA (Spanish and Swiss companies in charge of nuclear waste management).

Urban drainage management course (1998): organized by the Hydraulics and Environmental Department. Technical University of Catalonia.

Spanish Congress in Numerical Methods in Engineering (1996): organized by SEMNI (Spanish Society of Numerical Methods in Engineering). A technical paper was presented.

Use of explosives in Civil Engineering Course (1993): organized by the Department of Geotechnical Engineering and Geo-Sciences.

PROFESSIONAL EXPERIENCE:

PRO GEO Geotechnical Consultants SL (since June 2011): Owner and Technical Director. The company specialized in solving complex problems related with Geotechnics, underground construction, rock mechanics and environmental geomechanics.

I have collaborated in many projects related with underground engineering, Rock Mechanics designs, harbour and onshore Geomechanics, geotechnical monitoring, advanced foundations design, back analysis techniques, waste repositories, offshore geomechanics, seismic risk analysis, soil-structure interaction in dynamic analysis, soil improvement techniques, etc.

I develop consultancy activities in Europe, South America, North America, Middle East and Asia.

PRO GEO has taken part in projects such as Toronto – York Spadina Subway Extension (Toronto, Canada), ITER nuclear facility (Cadache, France), Bola os Tunnel (Galicia, Spain),

Sao Jose do Norte harbour (Rio Grande do Sul, Brazil), Puerto Quetzal harbour (Guatemala), Lines 3 and 5 Riyadh metro (Saudi Arabia), New Tunnels under Plaça de les Glòries (Barcelona, Spain), etc.

PRO GEO is a member of the British Geotechnical Association (BGA) and the British Tunneling Society (BTS).

The company collaborates in various R & D projects in the field of geomechanics and THM modeling. We can mention the TUNEL project, dedicated to the study of underground works under the effect of seismic events of high magnitude, or the ALBEPAV project, dedicated to the thermo-mechanical study of pavements that reduce the effect heat island in urban environment. These projects are financed by the CDTI, an entity under the Ministry of Economy and Competitiveness of Spain.

A more detailed explanation of the company on our website: www.progeo-cga.com.

Technical University of Catalonia (January 2013-April 2016): Senior researcher in CIMAVA project, aimed to develop new concepts in deep foundations with the aid of advanced geomechanical design methods.

This project is carried out together with first level Spanish building companies and it is funded by the Spanish government (CDTI).

Consultor de Ingeniería Civil (CICSA) (March 2008 – June 2011): Project Manager and Head of the Geotechnical Engineering Department. Wide experience in complex geotechnical problems and Project Management of transport infrastructure underground projects.

Administrador de Infraestructuras Ferroviarias (ADIF) (February 2007 – March 2008): Senior Project Manager (Director de Obra) during the construction of the High Speed Line Madrid - Barcelona - France, mainly in the Barcelona Area (Total budget: about 250 M€). Wide experience in the management of technically, economic or administrative problems. I was responsible of more than twenty people team.

Many of these projects involved the use of complex geotechnical techniques (tunnel construction in densely populated areas, building monitoring or ground improvement techniques)

INECO TIFSA (December 2005 – January 2007): same activities as in previous position.

Consultor de Ingeniería Civil (CICSA) (January 2004-November 2005): Senior Project Manager Assistant in the Sant Joan Despí - Can Tunis sector of High Speed Line Madrid - Barcelona - France. Total Budget: 120 M€. Technical definition and construction control of singular construction procedures (tunnels with *cut and cover* technique, Ground with low bearing capacity improvement, singular bridge deck construction procedures, deep foundations of great structures). I was responsible of a ten people team.

EIX LLOBREGAT UTE (*FCC Construcción – COPCISA – Guinovart & OSHA*) (October 2001 – January 2004): Senior Civil Engineer. Contractor's office Technical Director of C-16 Highway (*Total Budget: about 80 M€*), leading a team of six people. Technical and economic planning of construction process and technical definition of the new motorway (layout and geometrical aspects, geotechnical problems, structures, drainage, pavement...).

UTE SANTA MARIA DEL CAMÍ (*FCC Construcción – Vías y Construcciones*) (November 1999 – October 2001): Civil Engineer responsible of the contractor's Quality Department in Santa María del Camí – Igualada sector of Madrid - Barcelona Highway (*Total Budget: about 42 M€*), leading a team of four people.

AZVI S.A. (December 1998 - November 1999): Civil Engineer responsible of the contractor's Technical Office of Cervera by-pass (a new sector of Madrid - Barcelona Highway, Spain) construction team. *Total budget: about 25 M€*, built by the contractor **UTE CERVERA (ALTEC-PLODER-AZVI)**.

Clavegueram de Barcelona S.A. (January – December 1998): Civil Engineer in charge of hydrogeological and hydrological studies and Sewer System Projects. Participation in Groundwater Director Plan of the City of Barcelona.

Departament of Geotechnical Engineering and Geo-Sciences, Universidad Politècnica de Catalunya (March 1995 – December 1997): Researcher in some R+D projects related with the Deep Geological Disposal Concept for high activity nuclear waste: *Mock Up Test* (Madrid) and *Grimsel Testing Site* (Switzerland). These projects were funded by ENRESA and NAGRA (Spanish and Swiss companies in charge of nuclear waste management).

This work was an application of my PhD thesis based on Thermo – Hydro – Mechanical (THM) numerical modelling in geological media. This thesis was funded by a Spanish Government Scholarship (FPI type).

Fomento de Construcciones y Contratas (July 1994 - March 1995): Technical assistant in the contractor's office in the construction of Barcelona City Second Ring Road (Badalona – Montgat sector).

Student in Practice in the Civil Engineering Department of **ENDESA** (Spanish main electricity firm, July - September 1993) and the Slovak building company **STAVBAR FIRMA** (July - August de 1992) thanks to a IAESTE grant (International Association of Exchange of Students for Technical Experience).

SOME RELEVANT PROJECTS:

Vacarisses MSW landfill geotechnical design (August 2016-now): project aimed to carry out long term predictions in the geotechnical behaviour of an important municipal solid waste landfill placed in Barcelona Metropolitan Area.

ALBEPAV research project (June 2016 – now): project aimed to the study of thermal-hydro-mechanical behaviour of pavements with glass inclusions.

Suria tunnel design (April 2016 – now): design of a mining gallery in Suria (Catalunya, Spain) with more than 700 m overburden. A displacements and tunnel lining analysis has been carried out in a high stress level rock environment.

Riyadh L5 underground geotechnical design (July 2015-now): project aimed to the construction of a new subway extension in Riyadh (Saudi Arabia). Design of stations, shafts and tunnels in rock mass.

New Tunnels under Plaça de les Glories (April 2015-now): construction of *cut and cover* and sectorized excavation tunnels in a complex urban environment.

Riyadh L3 underground geotechnical design (October 2014-now): project aimed to the construction of a new subway extension in Riyadh (Saudi Arabia). Design of stations, shafts and tunnels in rock mass.

TUNEL research project (July 2013 – March 2014): this project is aimed to analyse the behaviour of screen walls, in underground construction, under strong seismic events. Funded by the Spanish government (CDTI).

São Jose do Norte harbour (Rio Grande do Sul, Brazil) geotechnical design (April 2013-January 2015): geotechnical and structural design of an 800 m long container dock in a soft soil environment.

Bolaños tunnel (Spain) geotechnical design (October 2012 – now): geomechanical design of a 7000 m long and 220 m depth tunnel in the High Speed Rail Line Madrid – Galicia. Bored with a rock TBM single shield device. Tunnel diameter: 9.90 m.

ITER site (Cadache, France) geotechnical design (December 2012 – February 2014): geotechnical consultancy to COMSA EMTE in some geotechnical problems that have arose during the new ITER nuclear facility construction.

Toronto – York Spadina Subway Extension (Canada). Highway 407 Station geotechnical design (October 2011 – December 2013): assessment of shoring – permanent structure interaction. Design and modelling of a feasible construction sequence for a 20 m depth station.

Toronto – York Spadina Subway Extension (Canada). Schulich Building compensation grouting design (December 2011- October 2012): compensation grouting design assessment, geomechanical modelling and monitoring analysis during two EPB passage under Seymour Schulich Business School Building.

High Speed Rail Line Madrid – Barcelona. Torrassa Tunnel (2005-2008): Project management and technical direction of an urban (cut and cover and NATM) 2.7 km long tunnel in Barcelona city.

COMPUTER:

Engineering numerical codes: wide experience in *CODE_BRIGHT* (THM modelling and multiphase flow analysis in geological media), *PLAXIS*, *FLAC 3D*, *MIDAS GTS*, *RS3* (Geomechanical analysis), *RIDO*, *SAP* o *CALSEF* (Structural analysis).

Code Developer: development of numerical analysis codes in FORTRAN language (partially *CODE_BRIGHT* code).

Internet: e-mail and www user since 1994.

Others: Microsoft Office.

FOREIGN LANGUAGES:

Spanish and Catalan: natives.

English: fluently read, written and spoken. Frequent use of technical books and reports in this language.

German and French: basic level.

FOREIGN EXPERIENCE

Wide experience in international consultancy, mainly in Europe, South America and North America. As a result, I'm used to deal with foreign clients and I have also a good knowledge of foreign technical standards (Eurocodes, British or Canadian Standards, etc).

In addition, I lived in Canada for several months (1997) and I worked as researcher for the Civil Engineering Department at Mc Gill University in Montreal.

PATENTS

Método para la obtención de un pilote de cimentación y pilote de cimentación. Spanish patent number P201430980. Other inventors: Prof. Marcos Arroyo (Technical University of Catalonia – Barcelona Tech) and Eng. Juan Peset Iribarren (COMSA – EMTE).

SCIENTIFIC/TECHNICAL PUBLICATIONS:

Arroyo M., Di Mariano A., Gens A., Alonso E., García-Fontanet A., García-Germán J. (2007): Management of third-party risk in an urban deep excavation projects. Proceedings of the 14th European Conference on Soil Mechanics and Geotechnical Engineering, Madrid, Spain.

Gens A.; Guimaraes L. do N.; Garcia-Molina A.; Alonso E.E. (2002): Factors controlling rock-clay buffer interaction in a radioactive waste repository. *Engineering Geology* 64 / 2-3, 297-308.

Gens, A., Alonso E.E., Huertas F., Santiago J., Guimaraes L., Garcia-Molina A. *FEBEX large scale in situ test. Modelling and interpretation.* A: "HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT". AMERICAN NUCLEAR SOCIETY, 1998, p. 119-121.

Gens, A., Alonso E.E., Garcia-Molina A., Huertas F. (1997): *Modelling FEBEX large scale "in situ" test.*: "SCIENTIFIC BASIS FOR NUCLEAR WASTE MANAGEMENT XXI". MATERIALS RESEARCH SOCIETY, p. 329-342

García-Molina, A., Gens A., Olivella S. (1997): *A joint element for coupled hydro-thermo-mechanical analysis of porous media.* Ninth International Conference of Computer Methods and Advances in Geomechanics. "Computer Methods and Advances in Geomechanics". A.A. Balkema Publishers, p. 1097-1105

Gens, Garcia-Molina A., S. Olivella, E.E. Alonso, F. Huertas (1998): *Analysis of a full scale in-situ test simulating repository conditions.* International Journal for Analytical and Numerical Methods in Geomechanics, 22, pp. 515-548.

García Molina, A., Gens A., Olivella S. (1996): *Un modelo constitutivo para suelos no saturados sometidos a variaciones térmicas: formulación, implementación y aplicaciones.* III Congreso de Métodos Numéricos en Ingeniería. Doblaré M., Correas J.M., Alarcón E., Gavete L., Pastor M. Eds.