



Applied Engineering
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CHILE | PERÚ | COLOMBIA

Committed to quality
and client needs





SIGA

With 15 years of experience in domestic and Latin America market, SIGA has become one of the largest Consultancy Companies in Chile, proudly contributing with projects development in Chile.

This reality has been built upon principles shared by all our employees and professional staff: total commitment to quality, and with the needs and expectations of Clients. We now have a permanent professional staff of over 400 employees, mostly professionals and technicians, in addition to infrastructure, vehicles and state of the art equipment along Chile, Colombia and Peru.

BUSINESS UNITS

WORKS MANAGEMENT AND
TECHNICAL
INSPECTION



MINING
ENGINEERING
& GEOTECHNICS



Mission Statement

Participate actively in the strengthening of public and private sector, supporting the development of comprehensive projects from the design stage to the certification of the operation, through skilled professional engineering services and consultancy.

PROJECT
ENGINEERING



SUSTAINAINABILITY AND
ENVIRONMENTAL
MANAGEMENT



Vision

Working Guidelines: Excellence in service delivery - Development of new services and/ or products for domestic market - Strengthening of our management teams and professional staff - Generate an area of growth and development for our employees and partners - Internationalization of services in all our business units - Develop "strategic partnerships" with our Clients.

SERVICES EXPORT

Since year 2000, we began to export engineering services to Latin America through subcontracts for large multinational companies (Canadian and American). In 2009, we opened our sales offices in Bogota, Colombia.

The year 2011, SIGA Engineers Peru, opened SIGA business offices in the city of Lima, Peru.



SECTOR DEVELOPMENT

**ENERGY / TRANSPORT / MINING / WATER
RESOURCES / CONSTRUCTION AND URBAN
PLANNING / PORT WORKS / INDUSTRY & OIL
/ WASTE / HOSPITAL / SUSTAINABILITY**



We value your time

Certification:

ISO 9001 -2008 Quality Certification. UKAS International Validation.
OHSAS Certification



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CHILE PERÚ COLOMBIA

WORLD CLASS ENGINEERING



WORKS MANAGEMENT AND
TECHNICAL
INSPECTION

We have extensive experience and a permanent presence in Chile, Colombia and Peru. We inspect works in all areas of development. Our contract management service and inspections reduces costs and projects implementation time, without altering the specifications set by our Clients. This will materialize works of the highest quality.





SPHERE OF COMPETENCE

Comprehensive Project Management
Technical Inspections to Industrial Works
Technical Inspections to Construction Works
Contractor Selection
Consultancy Basis Preparation for Bidding Processes
Contract Revision and Development
Geosynthetics Inspection

Works Technical Inspection (WTI): **SECTORIZED EXPERIENCE**

TRANSPORT / STATIONS

WTI to shafts construction, stations and inter-stations galleries, section K, section H-I, sections E, F, M and N, Grecia - La Cisterna, line 4 METRO S.A. / WTI to construction and assembly system of western extension railway system of Line 5, METRO S.A. / WTI for the construction of shafts and galleries, tunnels and stations, Quinta Normal - Las Rejas Line - Maipú. METRO S.A. / WTI for construction of railways, subways and catenaries. Merval / WTI to Railways Re-enablement and Maintenance, San Rosendo to Mariquina. EFE / WTI Railways Re-enablement and remediation. Arica - La Paz Railroad Co. EFE

INDUSTRIAL / OIL

Administration, Technical Inspection and construction of solids plant, Melipilla Road for Laboratorio Chile / Contract Inspections on investment projects and routine operation for business lines E&P and RI&C, ENAP Magallanes / Works administration and Technical Inspection to Quiborax's new plant project El Aguila.

MINING

WTI to Slag Plant Project. Codelco Chile — Teniente Division / Assurance and Quality Control of Geosynthetics Installation, Dolores Mining Co. S.A. MEXICO / Project Engineering Service, SQM Plants / WTI to Geomembrane, Pelambre Mining Co.

HYDRAULIC AND SANITARY WORKS

WTI in the construction and operation of Hydraulic Systems "Laja Diguillín." DOH / WTI to Construction and Operation of Hydraulics Systems "Faja Faisan" Pitrufquén. DOH / Improvement of Zanjón de la Aguada. Section La Farfana - ditch bridge and improvement of Zanjón de la Aguada, section Lo Errazuriz Ave. - La Farfana. / WTI to Construction of Collector 3 East Side, Design and Construction Inspection. / WTI Construction of rainwater collector J. J. Perez, sectors 1-A and 2, Santiago. MOP

ENERGY

Electric and Electromechanical System, Extension L1 Los Dominicos, Extension L5 to Maipú and Improvements in General - METRO S.A. / WTI Service, Construction New Section 220 kV S / E Chena - TRANSELEC / WTI to Construction Project 1 x 220 kV line Pan de Azúcar - Andacollo and expansion of 220 kV S / E Pan de Azúcar - TRANSELEC / PST-7022 / C, Section of Line in SS / EE. Diego de Almagro - Chañaral TRANSELEC / STA 3107 "SS / EE 220 kV Chena" Line Section. B. BOSH / Replacement Drivers line 2x220 kV. Cerro Navia - Chena and Alto Jahuel - Chena. COBRA / WTI to Mejillones and Tocopilla power station. EDELNOR

HOSPITAL

WTI to C.D.T. Project, Talca Regional Hospital. Maule Health Service. Region VII / WTI to Alto Hospicio Hospital. Iquique - Health Service. I Region / WTI to standardization works Hernán Henríquez Hospital, Araucanía Sur Health Service. Region IX.

CONSTRUCTION, BANKS AND RETAIL

WTI to audit works — Casino Control: Calama - Antofagasta - Copiapo - Valdivia - Osorno - Punta Arenas. Superintendence of Casinos / AIF Enabling Gabriela Mistral Cultural Center / WTI to Scotiabank. / WTI to remodeling project Bancoestado headquarters. / WTI to construction works project Banco Estado headquarters. / WTI and administration of Valparaíso historical building renovation - Public Prosecutor's offices of the Regional Office, Region V and Valparaíso Local Prosecutor's Office. / WTI Construction of the Guarantee Court Office and Oral Trial Court Office, Curico. / Road Impact Works, Tobalaba Mall Plaza.

PORT WORKS

Consultancy to tax audit for improvement of port productive infrastructure, Calbuca, X Region. DOP / Consultancy to the tax audit for construction of the artisanal fishing port of Coquimbo contract. DOP / Consultancy to tax audit of the improvement of port infrastructure works in Puerto Eden, Region XII. DOP / Construction of fix ramp in Punta Colonel, Los Lagos Region

ROADS

WTI to Construction Works of Transfer Stations, Municipality of Santiago / WTI to Urban Road Works Bicentennial Portal Macro-road-works Stage I / Management support service, tracking and monitoring of paving and rainwater works, South and Nor-East sector. / Management support service in implementing control of breakage and preposition of roads and sidewalks with no permission of SERVIU, North and South Sector. / WTI to Juanita Terminal Transantiago.



Our Engineering Department has a permanent staff of professionals and high level external consultants, trained to deliver comprehensive advice on civil projects and other disciplines from concept to Detail Engineering stage. Our Quality Management System, associated with experience in developing projects in different areas of engineering, allow us to offer a quality product and Client-oriented service.

PROJECT ENGINEERING





SPHERE OF COMPETENCE

Mining Civil Works - Hydraulics Works - Drinking Waters Systems - Wastewater Piping Systems - Construction Projects - Bridges - Road Works - Landfill - Hydrogeologic Surveys - LIW Treatment Management - Structures - Air-Conditioning Systems - Special Projects - Geosynthetics Design

PROJECT ENGINEERING SECTORIZED EXPERIENCE

MINING

Water Resources Technical Study CODELCO NORTE / Owner's Engineering for the Studies of Detailed Engineering and Procurement management of the water conduction System, Pampapuno Fountain and Factibility Engineering Industrial water conduction system of ADASA. MMH / Conceptual engineering updating Pampa Perdiz Explotation CODELCO Norte/ Rainwater Control Design, Alumysa Project. CH2 MHILL / Detail Engineering Design for integrated industrial and hazardous waste Management Center. Codelco Division Teniente - Hill Chile, KDM. / Development of Basic and Detail Engineering. Codelco Teniente Div. / Basic Engineering Potrerillos drinking water system. CODELCO / Design of a general environmental management system for Benefit Plants. ENAMI / Acid Water Treatment System Design, Furioso Mining Project. CDE Mining Co. / Conceptual study for water balance flows. Quebrada Blanca Mining Co.

INDUSTRIAL AND OIL

Basic Engineering for Massive Mining Waste Dump Project and Complementary Works, Ecometales Plant. ECOMETALES / Detail Engineering: Wastewater Handling System. COINCA / Sewer design solution for Printing Plant. IMPRESO PACKAGING / Rainwater solution, discharge works for Distribution Center, Concepcion. Agrícola Ariztía / Standardization Engineering Service, Camp Facilities. ENAP / Transfer Engineering Three Bridges. ENAP

TRANSPORT

Consultancy Services and Project Development for the grant, maintenance and minor works at METRO premises. METRO S.A. / Study of Choapa River Flooding in Transportes Rojas' Land, Choapa / Detail Engineering Study for the Re-enablement and / or reinforcement of 10 bridges, Alameda - Valparaíso section and Talca section - Chillán. EFE / Repair Budget for 11 bridges Project. Government Railroad (EFE)

HYDRAULICS

Proposal for Collector in La Hondonada Sector. SERVIU / Revision to San Pedro Marine Outfall Report. ESSBIO - AGUAS NUEVO SUR / Rainwater Water Drainage and Disposal Master Plan, Ovalle, IV Region. DOH-MOP / Diagnosis of Indigenous Towns for Drinking Water Special Program. DOH-MOP / Río Simpson Fluvial Conservation Design Works, Region XI, Aysen. DOH-MOP / Engineering Design of Maisan Strip Project Irrigation System Complementary Works, Pitrufquen, Region IX. DOH-MOP / Engineering Design, Improvement of Los Patos de Arauco Canal -California Road Sector, VIII Region. DOH-MOP / Revision consultancy for Convento Viejo Dam Project, Phase II. DOH-MOP / Update Laja Canal Design Works - Region VIII. DOH-MOP / Construction Feasibility Study Purapel Irrigation System - Region VII. DOH-MOP / Construction Feasibility Study, San Juan Dam - Quirihue. DOH-MOP / Implementation of a Geographic Information System For Management of Talca City Rainwater Master Plan. DOH-MOP / Design of LL Collector - 8 Los Generales Ave. - Punta Arenas. DOH-MOP / Diagnosis of Rainwater Network Region VII. DOH-MOP / Feasibility Study, Installation of Wastewater Treatment System and Sewer System Improvement in Puerto Williams. DOH-MOP / Feasibility Study and Final Design of Estero El Gabino, La Barnechea, Metropolitan Region. DOH-MOP / Rainwater Collector Design, Coyhaique. DOH-MOP / Construction Standardization Works D'Angostini Park Sector. DOH-MOP / Diagnostics to management of Quebrada Tarapaca banks. DOH-MOP

SANITARY

Renovation project of drinking water and wastewater networks, Deputy Zonal Office, San Felipe - Los Andes. ESVAL / Renovation project of drinking water and wastewater networks, Deputy Zonal Office, Quillota. ESVAL / Replacement and Restitution Engineering Design for Drinking Water and Wastewater Liquid Industrial Waste (LIW), Cañete. ESVAL / Preparation of SACAFF 6 Drinking Water Treatment Plant, Region VII. ESVAL

HOSPITAL

Hospital Engineering Design for thermal, gas and fuel installations and Thermal Energy Saving Systems. CARS Project. Metropolitan Health Service. / Detail Engineering and Environmental Assessment of Intermunicipal Landfill. Metropolitan Health Service / Engineering Professional Services and Special Projects revision for Gustavo Fricke Hospital Design. Maule Health Service

CONSTRUCTION, BANKS AND RETAIL

Detail Engineering Project for Rainwater, Sewerage and Drinking Water La Reserva II. Harseim Co. / Rainwater and Urban Design Solution, Pan de Azúcar. HARSEIM / Urbanization - Alto Atacama Hotel. Alto Atacama Hotel / Urbanization - La Reserv Phase II. HARSEIM / Urbanization Detail Engineering West Indean Lot, Valle Poniente. La Reserva Construction Co. / Elevation, Diagnosis and Project Proposal for installation of Sewerage and Drinking Water in Headquarters. Banco Estado / Development of Undersoil Cadastre and Basic Engineering for Public Restrooms, Municipality of Santiago. Austral Construction Co. / Preparation of the Conservation Plan, Del Valle Ave. - Route 57 CH. Connection HARSEIM

SUSTAINABILITY AND ENVIRONMENTAL MANAGEMENT

For us, the environmental area is a key issue. The vision of partners and managers, determined SIGA's growth through years, as to be considered one of the most prestigious environmental consultants nationwide. The opinion of our managers in this specific area is a reference in the public and private sector.





SPHERE OF COMPETENCE

Environmental Monitoring and Studies / Environmental Assessments and Studies / **Pre-feasibility Studies** / Projects and Sectorial Permits / **Legal Studies** / Closure Plans / **Environmental Impact Studies and Statements** / Waste Management / **Risk Studies** / Environmental Damage Assessments / **Environmental Analysis Reports** / LIW Treatment Management / **Environmental Audit** / Design And Development Of Specific Projects

Waste Management: Landfill Conceptual, basic and Detail Engineering projects. Safety landfill conceptual, basic and Detail Engineering for for hazardous and / or non-hazardous industrial waste (CMRIS). / Water treatment systems for domestic and industrial water (LIW). / Projects for internal waste management - Development of plans and

ENVIRONMENTAL MAGEMENT SECTORIZED EXPERIENCE

MINING

Environmental Impact Study to Hypogene Project, Teck Mining Co. Carmen Andacollo / EIS Tres Valles Mining Project, VALE / Environmental Impact Statement for Oxide Dump Closure Operations Project, **Teck Quebrada Blanca Mining Co.** / Engineering Service to Solid Supplies Storage Profile, CODELCO Norte Foundry / Environmental Impact Statement for the Optimization of Borates Processing Plant, QUIBORAX S.A. / Hazardous Waste Management Plan, **Teck Quebrada Blanca Mining Co.** / Update Hazardous Waste Management Plan, El Abra / Modeling of Atmospheric Dispersion of PM10 Emissions, Escondida, **Escondida Mining Ltd.** / Development of Mine Closure Plans, **TECK Quebrada Blanca and Carmen de Andacollo Mining Co.** / Closure Development Plan of Processing Plant, ENAMI. / Elevation of surface land, mining properties and easements in the Region of Tarapacá, **TECK** / Consultancy for the Implementation of OHSAS 18,001 Certification, Anglo American Chile

HYDRAULICS

Rainwater Management Plan for Hypogene Project, **TECK Carmen de Andacollo Mining Co.** / Environmental Impact Study to ANCOA Water Dam Project, **Hydraulic Works Department MOP** / Environmental Impact Study to Ovalle City Rain Water Management Plan, **Hydraulic Works Office, MOP.** / Environmental Assessment to Egaña Canal Project in VIII Region, **Hydraulic Works Department, MOP.** / EIA to Improvement of Rainwater Evacuation Route, Gibbs Canal- Mistral, **Hydraulic Works Office, MOP.** / EIA to Canal El Morro Project, Stage 3 Construction of right river bank, Region VIII, **Hydraulic Works Department MOP.** / Hydrogeological Study of the Influence of the Dump Leach in Quebrada Choja and aquifer recovery, **TECK Quebrada Blanca Mining Co.** / EIA on La Ligua Valley, EIA to Alicahue Irrigation Dam and Environmental Impact Study of Los Angeles Irrigation Dam, La Ligua Valley, Valparaíso Region, **Hydraulic Works Office, MOP**

INDUSTRIAL

Environmental Impact Diagnosis, Pipeline Spill, ENAP Punta Arenas. **Graham Müller Insurance Adjusters** / Diagnosis and audit of wastewater plant management, Prefabricados Pudahuel. **Multicret.** / MSP (Management Support Program) Diagnosis of clean production and soft technology implementation in Sotaqui Plant. **Pisco Control** / Implementation of Environmental Management Services under the clean production program. (**Pisco Control**) / Environmental Impact Assessment to plant modification and expansion of Limestone Plant and Consultancy for regularization of sectorial permits. **SISEL Ltd.** / Regularization of facilities and activities associated with the generation of liquid industrial wastewater (LIW). **Viña Casa del Toqui** / Consultancy and expropriations in San Bernardo plant (**WASIL S.A.**)

OIL

Environmental Studies Development for Rebenque Well N° 1 for the Tertiary Drilling Project. **ENAP** / Environmental Impact Statement on Gregorio Complex Boiler Replacement. **ENAP** / Environmental Impact Statement Chañarcillo Well. **ENAP** / Environmental Impact Statement on outfall San Gregorio Plant. **ENAP** / Emissions Statement according to SD 138 ENAP mainland and island facilities. **ENAP** / Development of Hazardous Waste Management Plan. **ENAP** / Archaeology Rescue El Bato sector, Quintero. **COPEC S.A.**

TRANSPORT

EIA to Sulfuric Acid Transport between Regions II, III, IV, V and Metropolitan Region. **Transport Hurcam** / EIA to Sulfuric Acid Transport in III Region between Hernan Videla Lira Foundry and Manto Verde Mining Co. **Santa Marta Transport Co.** / EIA to Sulfuric Acid Transport between different I and II Region routes, **Santa Marta Transport Co.** / EIA on Acid transport between Punta Patache Port and Teck facilities, **TECK Quebrada Blanca Mining Co.**

SANITARY

Environmental assessment and update of the San Pedro Sewer and wastewater treatment plant, Municipality of San Pedro. / Strengthening of Sanitary and Environmental Adequate Waste Management Capacity in Health Care Facilities, Chile Ministry of Health / Non-Hazardous Organic Solid Waste and Industrial Solid Waste Landfill Engineering Project, Doña Inés de Collahuasi Mining Co.

CONSTRUCTION, BANKS AND RETAIL

Strategic Environmental Management for Construction Projects and Aggregates Plant, Pan de Azúcar Consultancy, **HARSEIM** / Analysis and resolution of conflicts between different social groups living in Las Canteras Sector. **HARSEIM** / Land use change Limache Allotment. **Nogaleda Construction Co.** / EIA to modification of Manuel Ford González Residential Complex Project. **RODAS Construction Co.** / EIA to modification of El Porvenir Residential Complex Project. **RODAS Construction Co.**



SIGA is highly qualified to provide consultancy, advisory and specialized services of mining engineering, geomechanics, rock mechanics and geotechnical engineering. This will give adequate technical support to companies seeking practical solutions to engineering problems, production and development.

The Mining & Geotechnics area consists of an experienced team of professionals and their activities are carried out by "Surveys & Special Projects" and the "Rock Mechanics Laboratory" division. This work has a high standard of quality and safety according to internal policies to prevent risks and protect the environment.

MINING ENGINEERING & GEOTECHNICS





SPHERE OF COMPETENCE

Mining Engineering / Geomechanics and Geotechnics / Geology / Underground Mine Design / Open Pit Mine Design / Geosynthetics Design / Geosynthetics Certification / Geology Audit / Mine Assessment / Mine Assets Appraisal / Risk Prevention In Mining / Tailing Deposits Engineering / Technical Inspection to Mine Works

Rock Mechanics Laboratory

Complementary Services of Destructive / Non Destructive Testing

MINING ENGINEERING & GEOTECHNICS SECTORIZED EXPERIENCE

CODELCO – NORTE

Characterization and Geotechnical Design Service; Chuquicamata, Mina Sur, Radomiro Tomic

CODELCO – TENIENTE DIVISION

Conceptual Engineering, Standardization and Extension of Sample Preparation & Exploration Laboratory Capacity
Geotechnical Survey and Basic Engineering for Slope Protection, El Cobre Road
Report of expert opinion on the slope stability, El Cobre Road

CODELCO - SALVADOR DIVISION

Models Update Service with geological mapping and diamond and air exploration drilling
Comprehensive Consultancy in Geomechanics, Underground Mine, Pits, Dumps and Leach Piles,
Geomechanic instrumentation program for underground mine, mine slopes and dumps.
Slope stability survey at end pit, Old Camp Pit.
Pit slope stability survey at Final PIT, Damiana Pit, Phases 20-30.
Slope stability survey at Damiana Pit, Phase 8 and 9.
Training program in geology, geotechnics and basic geomechanics.
Geotechnical Assessment of Continuous Mining pilot testing.

XSTRATA CO. - LOMAS BAYAS.

Stability survey and geotechnical slope design at Final PIT, Phases 7 & 8.
Rock characterization program, slope project, Phases 7 & 8.
Stability survey and geotechnical slope design at Final PIT, Phases 9 & 10

YAMANA GOLD INC

Geotechnical Slope Design at Final PIT, Portezuelo Blanco, Belgrano and Target 11 Pit. Minas Argentinas S.A. (MASA)
Gualcamayo Gold Project, San Juan. Minas Argentinas S.A. (MASA)
Comprehensive Geomechanical Survey, Open-pit project La Pepa, Slope Mine Design. Minera Meridian Ltda.
Comprehensive geomechanical Survey the profile level, Jeronimo Underground Mine Project. Meridian Mining Co.

EL ABRA MINING CO. – FREPORT MAC-MORAN

Stability analysis and geotechnical slope design, Ballast Dump 02.
Comprehensive stability analysis, ROM Dump - El Abra ROM Dump Leach Project.
Stability analysis and geotechnical slope design, North and South Waste Rock Dump.
Geotechnical report, situation of stability ROM Dump - El Abra ROM Dump Leach Project.
Geomechanics Consultancy services for pits and dumps, El Abra Mine.
Slope stability analysis to Final PIT, 15 m bank design.

DOÑA INES DE COLLAHUASI MINING COMPANY

Stability analysis and geotechnical design of slopes of waste-rock dump, Rosario Pit.
Training Course, Geomechanics Applied to Mine Slopes.

QUEBRADA BLANCA MINING COMPANY - TECK

Stability analysis and geotechnical slopes design, Waste-rock Dump No. 8.
Stability analysis, Main Waste-rock Dump, Cienaga 2 Creek Area.
Training Seminar; Rock Mechanics Applied to Mine Slopes.
Geomechanical testing program, Blasting Optimization Project.

NATIONAL MINING COMPANY – ENAMI

Geomechanic Comprehensive Plan - Laura Mine - Laurita
Geological audit and mine assets appraisal – Tropezón Mining Co.





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