



Marco Antonio Noa Villanueva, C.I.P.
Water Resources Engineer

Education

ME, Water Resources Engineering, Universidad Nacional Agraria La Molina, Perú, 2014

Diploma, Environmental Management and Environmental Impact Assessment, Universidad Nacional Federico Villarreal, 2008

Civil Engineering, Universidad Nacional de Ingeniería, 2002

Registrations/Certifications

Professional Engineer CIP (#95720)

Experience Summary

Mr. Noa is a Civil Engineer with over 14 years' experience in consulting and construction of civil works. His experience includes infrastructure projects for the mining industry, design and construction of heap leach structures, process ponds (ILS, PLS, and major events), waste management systems, tailings storage facilities (TSF), landfills, rock waste/bofedal dumps, water management, access roads, haul roads, and mine closure plans. His expertise includes water resource projects, climatology, hydrology, and hydraulics. Additionally, Mr. Noa is proficient in the use of engineering software programs including AutoCAD Land, Civil Design, Civil 3D, Eagle Point, MS Project, Arc-GIS, FlowMaster, H-Channel, HEC-RAS, HEC-HMS, GoldSim, Hidroesta, Minitap, HYFRAN, HYDRACCESS Trend, and GEO-SLOPE.

His Construction Quality Assurance (CQA) experience includes soil, concrete, and geosynthetic material Control Supervision for mining operation facilities such as dams, heap leach pads (HLP), process shafts, TSF, dumps, access ways, channels, ponds, etc. Mr. Noa's CQA experience includes earthworks, construction of foundations, compaction works (mainly platforms), control of topographical works, construction and placement of formworks and steel reinforcements, and concrete casting according to design drawings, technical specifications, international standards, and construction procedures.

Mr. Noa is experienced in the development of technical and financial proposals, and in administrative-technical management with the client. He has a solid verbal and written communication competence, as well as organizational, leadership, and teamwork building skills.

Project Experience

Water Resources

CALIBRATION AND MONITORING STUDY OF GAUGING STRUCTURES, LAGUNAS NORTE MINE | LA LIBERTAD, PERÚ

Project Manager responsible for calibration and monitoring services of seven flow gauging structures. The study included fieldwork for flow measurement at each gauging station, the development of height-flow (H-Q) curves for each of the stations, and the estimation of flows based on H-Q curves. A final report was prepared summarizing fieldwork and office work activities performed. (Tierra Group, 2017)

DESIGN OF CLOSURE COVER FOR SLOPES ADJACENT TO PONDS, UNIDAD PIERINA, MINERA BARRICK MISQUICHILCA S.A. | ANCASH, PERÚ

Engineer responsible for the design of the hydraulic structures. The project included hydrological, hydraulic, and civil designs, volume and cost estimates, and final report. (Tierra Group, 2016)

DETAILED ENGINEERING DESIGN OF SEDIMENTATION PONDS | ANCASH, PERÚ

Project Engineer responsible for the detailed civil design of the geometry of ponds, mechanical and electrical hydraulic structures for sludge removal, and automated water and sludge pumps. Civil design

included underdrain and overdrain systems, piping plans, and surface water management. Prepared detailed volume and cost estimates, and the final report. (Tierra Group, 2015)

LAGUNAS NORTE, MINERA BARRICK MISQUICHILCA | TRUJILLO, PERÚ

Project Manager in charge of surface water drainage in and around the operations of the Lagunas Norte Mine, including the HLP, waste dumps, ponds, campsites, access ways, and offices, among other facilities. Prepared plans for hydraulic and drainage works to be constructed during the dry season at the Lagunas Norte Mine. Tasks performed included the design of discharge works, gauges, and the required flow measurement instrumentation. Implementation of a pit drainage system according to the mining plan in the short-, middle-, and long-term. Supervised construction of the heap leach facilities and hydraulic works. (Minera Barrick Misquichilca S.A., 2013 to 2015)

MINERA CHINALCO PERÚ S.A. TOROMOCHO PROJECT | JUNÍN, PERÚ

Assistant Project Engineer responsible for the dewatering system design of the Buenaventura and Copaycocha Lagoons. Water supply facilities (for truck washing and dust control) were included as part of the scope of work. (Schlumberger Water Services S.A., 2013)

RACAYCOCHA PROJECT, MINERA PEÑALES DEL PERÚ S.A. | ANCASH, PERÚ

Assistant Project Engineer in charge of the hydrological characterization report. The study consisted of the analysis and processing of data collected at the Racaycocha weather station, Llacchi and Pasacancha rain gauges, and four gauging stations located in the project area, in order to develop the hydrological characterization of the basin. (Schlumberger Water Services S.A., 2012)

WATER CONSOLIDATION STUDY, TINTAYA - ANTAPACCAY AND OTHER PROJECTS, XSTRATA TINTAYA S.A. | CUSCO, PERÚ

Assistant Project Engineer responsible for the analysis of climate variables such as precipitation, evaporation, temperature, relative humidity, and wind magnitude and direction for the development of a water consolidation study. (Schlumberger Water Services S.A., 2012)

LA GRANJA PROJECT, RIO TINTO MINERA PERÚ LIMITADA S.A.C. | CAJAMARCA, PERÚ

Assistant Project Engineer in charge of the hydraulic modeling of the Paltic River. HEC-RAS software was used to identify potential flooding zones in the campsite area for various flood inflows. (Schlumberger Water Services S.A., 2012)

BREAPAMPA RESERVOIR DAM | AYACUCHO, PERÚ

Project Engineer responsible for the development of a conceptual engineering study for the Breapampa Reservoir Dam and a geotechnical site investigation of the reservoir (water supply to be used for the project site). Geotechnical investigations, hydrological and stability analyses, cost estimates, civil design, and conceptual drawings were developed. (Klohn Crippen Berger S.A., 2010)

AMENDMENT OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA), ANTAMINA PROJECT – AUXILIARY POWER TRANSMISSION LINE | ANCASH, PERÚ

Assistant Project Engineer responsible for the identification of major water bodies, areas of direct and indirect influence, development of surface water quality monitoring, and collection of samples for the laboratory. (Klohn Crippen Berger S.A., 2010)

HUALANGA TSF | LA LIBERTAD, PERÚ

Engineer responsible for the development of a conceptual engineering study for the new Hualanga TSF. A trade-off study was developed to analyze diverse alternatives for the storage of conventional, paste, and filtered tailings. Geotechnical investigations, hydrological and stability analyses, cost estimates, civil design, and conceptual drawings were developed for the selected alternative (paste tailings). (Klohn Crippen Berger S.A., 2010)

SOUTH PROTECTION DAM – BAYOVAR | PIURA, PERÚ

Detailed engineering design of the Bayovar Project South Protection Dam, which aimed at the protection of the mine area from possible flooding during transient events such as El Niño. The South Protection Dam has a length of 2.83 km and a maximum height of 9.5 m. Project included geotechnical investigations, hydrological and stability analyses, technical specifications, cost estimates, civil design, and construction drawings. (Klohn Crippen Berger S.A., 2009)

SIPAN UNIT PROJECT | CAJAMARCA, PERÚ

Civil design engineer responsible for the detailed engineering of Sedimentation Ponds (P1 and P2). Project included the design of access platforms, underdrain system, stability analyses, earthwork and material volume estimates, development of detailed civil drawings, technical specifications, and preparation of the construction technical file. (Buenaventura Ingenieros S.A., 2008)

Heap Leach Pads

EXPANSION OF HLP, PHASE 5, CRESTON MASCOTA MINE, AGNICO EAGLE, MÉXICO | SONORA, MÉXICO

Engineer responsible for the design and preparation of detailed drawings for the expansion of the Phase 5 HLP. Project included perimeter access design, underdrain system, solution collection system, design of channels, and earthwork and material volume estimates. (Tierra Group, 2018)

HLP PROJECT | MONTELIBANO, COLOMBIA

Civil Design Engineer for the detailed engineering and construction supervision of the waste rock dumps and the HLP. Project included earthwork and material volume estimates, preparation of detailed drawings, design of the perimeter berm, diversion ditches, underdrain system, wastewater collection systems, geosynthetic liner (geomembrane), technical specifications, preparation of design report, and construction supervision. (Ausenco Vector, 2007)

VELADERO PROJECT | SAN JUAN, ARGENTINA

Civil Design Engineer for the detailed engineering of the Phase 2B and 2C HLP expansion. The project included earthwork and material volume estimates, preparation of detailed drawings, design of perimeter road, diversion channel, underdrain system, solution collection systems, geosynthetic liner (geomembrane, geocomposite), technical specifications, and preparation of the design report. (Ausenco Vector, 2008)

TANTAHUATAY PROJECT | CAJAMARCA, PERÚ

Civil Design Engineer for the detailed engineering of the HLP, process ponds, waste rock dump, inadequate and organic material dumps, access roads, and haul roads. Project included geotechnical investigations, hydrological designs, stability analyses, technical specifications, cost estimates, civil design, and construction drawings. (Ausenco Vector, 2008)

ALICIA PROJECT | MOQUEGUA, PERÚ

Civil Design Engineer for the detailed engineering of the HLP and process ponds. Project included geotechnical investigations, hydrological designs, stability analyses, technical specifications, cost estimates, civil design, and construction drawings. (Ausenco Vector, 2006)

ALUMBRE PROJECT | LA LIBERTAD, PERÚ

Engineer responsible for the feasibility basic engineering for the leaching facilities, including HLP, PLS, and ILS ponds, stormwater pond, and waste dump. Project included access roads, diversion channels, solution collection pipeline system, geosynthetic liner system, earthwork and material volume estimates, and preparation of feasibility drawings and report. (Ausenco Vector, 2006)

LA ARENA PROJECT | LA LIBERTAD, PERÚ

Engineer responsible for the pre-feasibility basic engineering for the leaching facilities, including HLP, PLS, and ILS ponds, stormwater pond, and waste dump. Project included access roads, diversion channels, solution collection pipeline system, geosynthetic liner system, earthwork and material volume estimates, and preparation of pre-feasibility drawings and report. (Ausenco Vector, 2006)

AREA 118 COPPER PROJECT | BRAZIL

Assistant Engineer for the detailed engineering of a leach pad. Project included design of the access road, diversion channel, underdrain system, solution collection systems, geosynthetic liner system, earthwork and material volume estimates, and preparation of detailed drawings. (Ausenco Vector, 2006)

PIERINA PROJECT | HUARÁZ, PERÚ

Assistant Engineer for the detailed engineering of the Phase 5 HLP expansion. Project included the access road, diversion channel, underdrain system, solution collection system, geosynthetic liner system (geomembrane, geosynthetic clay liner, geocomposite), earthwork and material volume estimates, detailed drawings, technical specifications, and design report. (Ausenco Vector, 2006)

CORIHUARMI PROJECT | LIMA, PERÚ

Assistant Engineer for feasibility basic engineering of the leaching facilities, including Phase 1 and the Final Phase leach pad, PLS pond, stormwater pond, waste dump, and haul road. Project included access roads, diversion channels, solution collection pipeline systems, geosynthetic liner system, earthwork and material volume estimates, and preparation of feasibility level drawings. (Ausenco Vector, 2005)

Tailings Dams

UPDATE OF OPERATIONS, MAINTENANCE AND SURVEILLANCE (OMS) MANUAL FOR THE YAURICOCHA TAILINGS DAM | LIMA, PERÚ

Project Manager responsible for the update of the OMS Manual for the Yauricocha tailings dam and the water management facilities. Work included procedures and processes related to the operation and description of the main components of the facility. A final report was prepared including the inspection and monitoring criteria, as well as a description of the contingency plans for emergency conditions. (Tierra Group, 2017)

SENSITIVITY ANALYSIS TO DETERMINE FINAL CAPACITY OF THE YAURICOCHA TAILINGS DAM | LIMA, PERÚ

Project Manager responsible for the conceptual assessment to determine the lifetime of the deposit, considering its expansion beyond Stage 7. The activities included fieldwork with a geological recognition program of the study area, analysis of volumes, conceptual design of the tailings dam final capacity, stability analyses of the different raise stages (Stages 8 to 12), and conceptual design for the closure of mine portals and bofedals within the area of influence of the tailings dam reservoir. Prepared material volume and cost estimates, detailed drawings, and report. (Tierra Group, 2017)

TSF DESIGN, YAURICOCHA MINE (STAGES 5, 6, AND 7) | LIMA, PERÚ

Project Civil Engineer responsible for the detailed engineering of the Yauricocha tailings dam raise. Project included hydrological designs, water balance, hydraulic structure designs, geotechnical stability, and surface water diversion. Prepared material volume and cost estimates, detailed drawings, and report. (Tierra Group, 2016)

TSF DESIGN, ERNESTO E PAU A PIQUE | MATO GROSSO, BRAZIL

Project Civil Engineer responsible for the review and update of the detailed engineering for the tailings dam raise. Project included the review and update of geotechnical stability, hydrological designs, water balance, tailings deposition plan, and the design of surface water diversion facilities. Prepared material volume and cost estimates, detailed drawings, and report. (Tierra Group, 2016)

FEASIBILITY LEVEL DESIGN, INVICTA DRY TAILINGS STORAGE FACILITY | LIMA, PERÚ

Engineer responsible for the development of the feasibility engineering study for the Invicta dry TSF. Project included geotechnical investigations, hydrological designs, stability analyses, access roads, diversion channels, earthwork and material volume estimates, cost estimates, and preparation of feasibility drawings and report. (Klohn Crippen Berger S.A., 2012)

ALTERNATIVES STUDY, CHAQUICOCHA TSF | CAJAMARCA, PERÚ

Project Engineer in charge of the alternatives study for the location of the new Chaquicocha TSF. The study included the analysis of alternatives for seven areas. The evaluation and selection of alternatives were performed considering technical, environmental, and economic criteria using the Leopold Matrix. A risk analysis was performed for the three best options with the risk assessment methodology proposed by McLeod. Civil works and hydrological designs, stability analyses, earthwork and material volume estimates, cost estimates, conceptual level drawings, and the final report were developed. (Klohn Crippen Berger S.A., 2011)

GEOTECHNICAL PROJECT – BAYOVAR EXPANSION | PIURA, PERÚ

Basic civil engineering design for multiple structures in the Bayovar Mine area. The designs considered the layout of nine tailings tanks, a waste rock dump, two waste rock piles, and a coarse tailings pile. Project included access roads, diversion channels, earthwork and material volume estimates, and preparation of feasibility drawings and report. (Klohn Crippen Berger S.A., 2011)

YURICOCHA TAILINGS DAM RAISE | LIMA, PERÚ

Engineer responsible for the development of the detailed engineering study for the Yauricocha tailings dam raise. The raise was executed in four progressive stages of 5 m each, and Terramesh elements were used in the construction of the dam embankment. Project included geotechnical investigations, hydrological designs, stability analyses, technical specifications, cost estimates, civil design, and construction drawings. (Klohn Crippen Berger S.A., 2009)

MAINTENANCE WORKSHOP PROJECT AT TSF AREA | AREQUIPA, PERÚ

Civil Design Engineer in charge of the detailed engineering of the mechanical maintenance workshop at the tailings area. Project included design of the platform for the maintenance workshop and warehouse, driveway to the platform, earthwork volume estimates, and preparation of detailed civil drawings and project descriptive report. (Buenaventura Ingenieros S.A., 2008)

Waste Dumps

ESTRELLA 2 AND 3 WASTE DUMPS | LA LIBERTAD, PERÚ

Engineer responsible for the development of the detailed engineering for the Estrella 2 and 3 waste dumps. Project included geotechnical investigations, hydrological designs, stability analyses, technical specifications, cost estimates, civil design, and construction drawings. The design of both waste dumps included the construction of two vertical walls formed with Terramesh elements. The height of the two walls varied; reaching approximately 26 m. (Klohn Crippen Berger S.A., 2010)

CHUMPE WASTE DUMP | LIMA, PERÚ

Engineer responsible for the development of the detailed engineering study of the Chumpe Waste Dump. Project included geotechnical investigations, hydrological designs, stability analyses, technical specifications, cost estimates, civil design, and construction drawings. The design included the construction of a 23-m high vertical wall formed with Terramesh elements. (Klohn Crippen Berger S.A., 2009)

SAN JOSÉ PROJECT | SANTA CRUZ, ARGENTINA

Assistant Engineer for a feasibility level study of the tailings impoundment and waste rock dump. Project included access roads, diversion channels, geosynthetic liner system, earthwork and material volume estimates, and drawings. (Ausenco Vector, 2005)

Mining Facilities

MAINTENANCE WORKSHOP PROJECT AT CRUSHING AREA | AREQUIPA, PERÚ

Civil Design Engineer responsible for the detailed engineering of the Mechanical/Electrical Maintenance Workshop at the crushing zone. Project included the design of the platform for the maintenance workshop and offices, driveway to the platform, earthwork volume estimates, preparation of detailed drawings, and project descriptive report. (Buenaventura Ingenieros S.A., 2008)

CENTRAL WAREHOUSE FIRE SYSTEM PROJECT | CAJAMARCA, PERÚ

Civil Design Engineer responsible for the detailed engineering of the Central Warehouse Fire System. Project included a platform design for the tank and pump house area, diversion ditches and coronation channels, driveway to the platform, earthwork volume estimates, preparation of detailed civil drawings, and project specifications. (Buenaventura Ingenieros S.A., 2008)

YANACocha NORTE WORKSHOP FIRE SYSTEM PROJECT | CAJAMARCA, PERÚ

Civil Design Engineer in charge of the detailed engineering of the Yanacocha Norte Workshop Fire System. Project included a platform design for the tank and pump house area, diversion and crown ditches, driveway to the platform, earthwork volume estimates, preparation of detailed civil drawings, and project specifications. (Buenaventura Ingenieros S.A., 2008)

HUARAUCACA PLANT PROJECT | CERRO DE PASCO, PERÚ

Assistant Engineer for the detailed engineering of the Huarauca Crushing Plant Expansion. Project included earthwork and material volume estimates, development of detailed civil drawings, platforms for the crushing plant, access ramps, and roads. Work also included the design of a Terramesh wall for the crushing plant, preparation of detailed civil drawings, and project specifications. (Buenaventura Ingenieros S.A., 2008)

HYDRANT AREA TERRAMESH WALL DETAIL | AREQUIPA, PERÚ

Engineer in charge of the Hydrant Area Terramesh Wall Detailed Design. Project included earthwork and material volume estimates and preparation of detailed drawings. (Ausenco Vector, 2006)

COMPENSATION TOWER AREA TERRAMESH WALL DESIGN | AREQUIPA, PERÚ

Engineer in charge of the Compensation Tower Area Terramesh Wall Detailed Design. Project included earthwork and material volume estimates and preparation of detailed drawings. (Ausenco Vector, 2006)

Environmental Impact Studies

ANTAMINA MINING PROJECT, EIA MODIFICATION | ANCASH, PERÚ

Supervised the development of the Air and Noise Quality Monitoring and for the collection of laboratory samples at the Condorcocha and Dos Cruces monitoring stations. EIA modification due to increased reserves and optimization of the mining plan. (Klohn Crippen Berger S.A., 2010)

MAGISTRAL PROJECT, EIA | HUARAZ, PERÚ

Engineer responsible for the review and development of the EIA observations for the Magistral Project. An early response was provided to the observations presented by the Ministry of Energy and Mines and the INRENA. (Klohn Crippen Berger S.A., 2008)

Reclamation and Closure

SIPAN MINE CLOSURE PLAN | LA LIBERTAD, PERÚ

Engineer responsible for the development of the Closure Plan for the Sipan Mine, according to the requirements established in the Peruvian legislation. Closure work was executed on existing facilities; the main ones being the HLP, waste dumps, pits, access roads, and campsites, among others. (Klohn Crippen Berger S.A., 2010)

Construction Quality Assurance

CQA AND DESIGN SUPPORT SERVICES DURING TSF CONSTRUCTION | LA LIBERTAD, NICARAGUA

CQA Inspection Manager, responsible for the coordination with the client, preparation of monthly reports, integration of documentation, update of design support, etc. (Tierra Group, 2016)

CQA AND DESIGN SUPPORT SERVICES DURING TSF STAGE 4 CONSTRUCTION, YAURICOCHA MINE | LIMA, PERÚ

CQA Inspection Manager, responsible for the coordination with the client, preparation of monthly reports, integration of documentation, update of design support, etc. (Tierra Group, 2016)

Publications / Presentations

Noa M, 2006. *Proyecto de Mejoramiento y Rehabilitación de la Carretera Cocachacra-Matucana*, Universidad Nacional de Ingeniería, Perú. Degree Course, 2006.

Noa M, 2006. *Estudio de Tráfico de la Carretera Cocachacra-Matucana*, Universidad Nacional de Ingeniería, Perú, Thesis Report, 2006.

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL S.A.C.
POSITION	Water Resources Engineer
YEARS	2015 to Present
EMPLOYER	MINERA BARRICK MISQUICHILCA S.A., LAGUNAS NORTE
POSITION	Hydrologist Engineer
YEARS	2013 to 2015

EMPLOYER	SCHLUMBERGER WATER SERVICES S.A.
POSITION	Project Hydrologist
YEARS	2012 to 2013
EMPLOYER	KLOHN CRIPPEN BERGER S.A.
POSITION	Project Engineer
YEARS	2008 to 2012
EMPLOYER	BUENAVENTURA INGENIEROS S.A.
POSITION	Project Engineer
YEARS	2008
EMPLOYER	AUSENCO VECTOR
POSITION	Project Engineer
YEARS	2004 to 2008

Language Proficiency

Spanish: Native
English: Intermediate Level