TIERRA GROUP INTERNATIONAL, LTD.

James A. Willis, P.E.

Project Professional III

Education

BS, Civil Engineering, December 2004, University of Utah, Salt Lake City, Utah

Registrations/Certifications

Professional Engineer Utah (#5340238-2202, 2011), Nevada (#23544, 2015)

Experience Summary

Mr. Willis is a Professional Engineer with over 13 years of experience in civil design and water resource engineering. As a Project Engineer he has managed projects ranging from feasibility level designs to final engineering and construction. His project experience in the mining industry includes heap leach pads, tailings dams, dam rehabilitation, facility closure plans, and the design of water management facilities, such as water storage dams, spillways, and diversion channels for mines located internationally and throughout the U.S. His design experience on these projects includes site grading design, stormwater management, hydrologic modeling, seepage mitigation, erosion/sediment control, and roadway design. Areas of expertise include:

- Water and mass balance modeling;
- Dam breach and flood inundation analysis;
- Civil design and modeling of heap leach, waste rock, water management, and tailings facilities (AutoCAD Land Desktop and Civil 3D);
- Stormwater management and sediment control design (SEDCAD, RUSLE);
- Diversion channel and spillway modeling and design;
- Surface water modeling (HydroCAD, Rational Method, TR-55, HEC-RAS, HEC-HMS); and
- Mine closure design.

He also has designed/reviewed plans, made design recommendations, prepared reports, for residential developments, highways, and commercial development projects.

Project Experience

Civil Design / Hydrology / Hydraulics

San José TSF Breach Analysis | Mina El Limón, Nicaragua

Completed a breach analysis of the existing tailings storage facility (TSF) design to determine the tailings runout from the facility as well as the downstream limits of inundation. Results were summarized in a design memo and incorporated into the mine's Emergency Action Plan (EAP). (Tierra Group, 2017)

Civil Engineering Support, Barrick McLaughlin Mine | California

Prepared multiple civil design projects including seepage mitigation from existing waste rock facilities to support maintenance of closed facilities. Provided resident engineering services and oversaw construction of prepared civil design. (Tierra Group, 2017 to Present)

Los Gatos TSF Breach Analysis, Premier Gold Mines Ltd. | Mexico

Completed a breach analysis of the prosed tailings storage facility design. Analysis included calculation of the tailings runout from the facility as well as the limits of inundation. Results were summarized in a design memo and incorporated into the mine's EAP. (Tierra Group, 2017)

HOLLISTER MINE PEER REVIEW, KLONDEX GOLD & SILVER MINING COMPANY | NEVADA

Conducted a peer review of waste rock storage facility (WRSF) design for the mine. Prepared report identifying design issues and detailing proposed modification to allow the project to meet regulatory guidelines. (Tierra Group, 2016 to Present)

FIRE CREEK MINE WRSF, KLONDEX GOLD & SILVER MINING COMPANY | CRESCENT VALLEY, NEVADA

Project Manager and Lead Engineer for the design and construction of a second (WRSF) to support mining operations. Project's design aspects included open channel design, surface water modeling, and civil grading design. Assisted in permitting and reporting as part of an update to the projects water pollution control permit. (Tierra Group, 2016 to Present)

TONKIN DAM DESIGN MODIFICATIONS, BARRICK CORTEZ INC. | JD RANCH, NEVADA

As Project Engineer, managed the preparation of design work and construction of modifications to the existing Tonkin Dam. Design work consisted of a geotechnical analysis, civil grading design, site hydrologic analysis, and a hydraulic analysis of the dam's existing spillway. Modifications to the dam included a buttress design and spillway regrading with the addition of riprap protection. (Tierra Group, 2015 to 2016)

LA ESPERANZA STAGE 6 RAISE AND CONCEPTUAL CLOSURE DESIGN, DESMINIC | LA LIBERTAD, NICARAGUA

As Project Engineer, reviewed and managed the preparation of the TSF Stage 6 raise's construction documents. Directed the preparation of surface water management plans including grouted riprap outfall structures, and diversion channels. Also, evaluated conceptual closure design including closure spillway and closure cover grading designs. (Tierra Group, 2015)

MIDAS TSF ANALYSIS, KLONDEX GOLD & SILVER MINING COMPANY | MIDAS, NEVADA

As Project Engineer, prepared analyses to assist Klondex in the operation and future planning at their Midas mine. Analyses included the preparation of a facility water balance, analysis of existing storage capacity, and a siting study for a new tailings facility. (Tierra Group, 2014)

WRSF, KLONDEX GOLD & SILVER MINING COMPANY | CRESCENT VALLEY, NEVADA

As Project Engineer, reviewed and managed the preparation and design of permitting documents for a proposed WRSF at the Fire Creek Mine. Design included the preparation of the surface water management plan and civil grading design. (Tierra Group, 2014)

ESMERALDA MINE TSF CLOSURE PLAN, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Project Engineer, reviewed and managed the preparation of construction documents for the TSF 1 Closure Plan. Directed the preparation of the surface water management plan including spillway, diversion channel, and closure cover grading designs. (Tierra Group, 2013)

PITARRILLA PROJECT DEFINITIVE FEASIBILITY STUDY| DURANGO, MÉXICO

As Project Engineer, managed the civil design and plan preparation for the TSF. Reviewed the civil plan set and design for completeness. Prepared sections of the MIA and TSF Design Report corresponding to the civil design and analysis. (Tierra Group, 2012)

SANTA ROSA WEST CLOSURE PLAN | MINA EL LIMÓN, NICARAGUA

As Project Engineer, helped to direct the design and plan set development of the closure plan for the Santa Rosa West tailings facility. The design included preparing a closure grading plan to re-route upland drainage across the facility, and stormwater channel design using HEC-HMS model to determine flows. (Tierra Group, 2012)

ESMERALDA MINE, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Project Engineer, reviewed and directed the preparation of construction documents for the new tailings facility. (Tierra Group, 2012)

ESMERALDA MINE TSF 2, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Engineer II, designed dams, diversions, and roadways required for a new TSF at the Esmeralda Mine. The design included site grading, liner layout, earthwork estimates, site hydrologic analysis, and preparation of civil drawings. Helped prepare engineering design report as part of the permitting submittals to the NDEP and NDWR in the state of Nevada. (Tetra Tech, 2011 to 2012)

SOLEDAD STAGE 2 DESIGN | EL MOCHITO, HONDURAS

As Engineer II, developed designs for the stage two raise at the existing tailings facility, including grading design, liner layout, earthwork estimates, and preparation of civil drawings. (Tetra Tech, 2011)

SAN JOSÉ TSF DESIGN | MINA EL LIMÓN, NICARAGUA

As Engineer II, developed designs for the grading and layout of the tailings facility, including grading design, liner layout, earthwork estimates, water balance calculations, and preparation of civil drawings. (Tetra Tech, 2011)

RODEO CREEK SOUTH WALL DIVERSION, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

As Engineer II, conducted HydroCAD analysis of existing conditions and proposed diversion conditions, assisted in design and sizing of diversion culvert and prepared civil plans for review. (Tetra Tech, 2010)

PONDS 7 & 8 DIVERSION DESIGN, RIO ALGOM | GRANTS, NEW MEXICO

Developed conceptual designs for diversion of surface water around a closed uranium process water facility, including riprap design, HEC-RAS modeling, earthwork estimates, alternatives analysis, and preparation of civil plans for review. (Tetra Tech, 2010)

SOLEDAD SPILLWAY PRELIMINARY DESIGN | EL MOCHITO, HONDURAS

As Engineer II, developed conceptual designs for spillway at the existing tailings facility, including channel design, proposed channel alignment, earthwork estimates, alternatives analysis, and preparation of civil exhibits for review. (Tetra Tech, 2010)

HUMBOLDT PIT, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Engineer II, developed hydrological model for surface water around a pit lake, PMP storm computations, and HEC-HMS modeling. (Tetra Tech, 2010)

NEWPARK DEVELOPMENT | PARK CITY, UTAH

Civil Engineer responsible for preparing the stormwater management model for the Newpark Development. Analyzed existing stormwater system design, and prepared watershed analysis for pre- and post-development conditions. Designed and prepared civil stormwater plans for the development meeting state and county requirements for discharge and pollution control. Provided on-site engineering quality control and inspection during construction of civil plans, coordinating design, and installation with contractors. (Jack Johnson Company, 2005 to 2009)

PROMONTORY | PARK CITY, UTAH

As Civil Engineer, helped prepare the watershed analysis and stormwater prevention plans for the development. Designed a stormwater collection system to meet county standards for stormwater detention and treatment using detention ponds and ditch design. (Jack Johnson Company, 2005 to 2007)

Heap Leach Pads

STERLING MINE HEAP LEACH FACILITY, STERLING GOLD MINING CORPORATION | BEATTY, NEVADA

As Project Engineer, managed the civil design, and stormwater management plan for a new 20-acre heap leach pad at the Sterling Mine. The new heap leach pad design included slope stability modeling, civil layout, ore capacity optimization, liner design, solution recovery system design, and completion of a stacking plan to guide ore placement during operations. (Tierra Group, 2014)

STERLING MINE SLOT HEAP LEACH FACILITY, STERLING GOLD MINING CORPORATION | BEATTY, NEVADA

As Project Engineer, managed the civil design, and stormwater management plan for the expansion of an existing heap leach facility at the Sterling Mine. The heap leach pad expansion included slope stability modeling, civil layout, ore capacity optimization, liner design, and solution recovery system design. (Tierra Group, 2013)

Site Design

GOLDFIELDS BONANZA UNDERGROUND WASTE ROCK STORAGE, LODE STAR GOLD | NEVADA

Prepared construction plans for underground storage of waste rock and the backfilling of existing shafts. Supported permitting process by developing figures and preparing design report. (Tierra Group, 2017 to Present)

PLANT ENGINEERING DESIGN CHANGE, STERLING GOLD MINING CORPORATION | BEATTY, NEVADA

As Project Engineer, directed the preparation of an engineering design change submittal for design modifications to the existing process plant piping and repurposing of existing process ponds at the Sterling Mine. (Tierra Group, 2014)

CORE STORAGE EXPANSION | COPPERTON, UTAH

As an Engineer II, designed the stormwater and site grading portions of the expansion of an existing core storage facility at the Bingham Canyon Mine. Prepared civil construction documents and cost estimate for the site grading and stormwater collection system. Modeled the upland site using HEC-HMS to aid in sizing the stormwater system. (Tierra Group, 2012)

ANTHEM AT MERRILL RANCH | FLORENCE, ARIZONA

Civil Engineer assisted in the preparation of roadway designs, utility plans, and site grading plans for the residential development. Design included the preparation of three sets of plans meeting city design standards including site grading, utilities, and roadway plans. (Jack Johnson Company, 2004 to 2009)

Professional Affiliations

American Society of Civil Engineers (ASCE), Member
Society for Mining, Metallurgy & Exploration (SME), Member

Employment History

CURRENT EMPLOYER	**TIERRA GROUP INTERNATIONAL, LTD.**
POSITION	Project Engineer
YEARS	2012 to Present
EMPLOYER	**TETRA TECH, INC.**
POSITION	Staff Engineer
YEARS	2010 to 2012
EMPLOYER	**JACK JOHNSON COMPANY**
POSITION	Civil Engineer, EIT
YEARS	2005 to 2009
EMPLOYER	**UNIVERSITY OF UTAH**
POSITION	Engineering Internship
YEARS	2004 to 2005

Language Proficiency

English: Native
Spanish: Fluent (spoken and written)