

Worldwide Experience

International Construction Consulting, LLC (Independent Consultant to the Oil & Gas Industry)



Feasibility
Studies

Conceptual to
Detailed Cost
Estimates

Quality
Surveillance
Programs

Project
Execution
Plans

Specialized
Studies &
Investment
Analysis

Independent
Project
Reviews

Project &
Construction
Management

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Greg Lamberson

The following narrative provides more detail regarding recent project support functions, major studies, or audits I have performed or been involved which are not included on my CV.

Support Services / Studies Performed: 1992 - present

Confidential Project

Client: Frontier Energy Services, LLC

Location: US - Permian Basin

Scope: Develop a Valuation and Perform Due Diligence for a Gas Pipeline System (gathering & compression); Cost Estimates for Additional Capacity + Processing

Year: 2021-2022

Established a valuation for 18 miles of existing 12" and 8" gas gathering pipelines and 4 gas compression facilities using several valuation methods, including: replacement costs depreciated to result in a current book value; and estimating gas throughput to arrive at approximate net income from the assets; using a multiplier to arrive at an approximate valuation.

Developed cost estimates to add an additional twenty (20) miles of gas gathering pipelines, twenty (20) additional gas compression facilities, and two (2) liquid handling facilities.

Developed cost estimates for adding a future 100 MMCF/day or 200MMCF/day gas processing facility.

Confidential Gas System Acquisition

Client: Frontier Energy Services, LLC

Location: US - Permian Basin

Scope: Develop Replacement Value and Perform Due Diligence for a Gas Pipeline System (gathering & compression and processing)

Year: 2021

Developed a preliminary appraisal for a 335-mile gas gathering, compression and processing system for a potential purchase. Established due diligence criteria for evaluating the existing system.

Assisted in drafting the term sheet for the potential acquisition.

Confidential Projects

Client: Perdonado Development

Location: US – Lower 48, Permian, Delaware, Powder River, Bakken, and Niobrara Basins

Scope: Evaluate Private Equity Entities for Transmission Pipeline Investments

Year: 2020

Performed due diligence on Private Equity (PE) entities investing in oil & gas projects in the US, specifically the lower 48 states. Identified PE's with strong track records of investing in midstream oil & gas infrastructure with an emphasis on mid to long range pipelines.

Developed cost estimate and project economic evaluation models, to assess monthly cashflows with & without terminal value, G&A, depreciation, IRR, NPV, ROIC, estimated exit value with return calculations and waterfall, balance sheets, multiple of invested money, payout, etc.

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Confidential Projects

Client: Frontier Energy Services, LLC
Location: US – Permian, Delaware, Powder River, and Niobrara Basins
Scope: Evaluate Various Crude/Gas Prospects
Year: 2019-2022

Develop cost estimates for new construction and replacement values; assess downstream connections, existing infrastructure for a variety of crude and gas gathering systems.

Reviewed type curves, rig cadence plans, production and volume forecasts, and proposed permitting plans for potential producers.

Assisted in drafting term sheets for various gathering arrangements and structures, including dedication & transportation, as well as minimum volume commitment agreements.

Investigated Federal and State permitting and regulation requirements and assess potential impacts.

Confidential Project

Client: K&M Advisors
Location: Aruba
Scope: Provide a Class V Cost Estimate for Various Gas Pipeline Options
Year: 2018

Provided Class V cost estimates and Basis of Estimate for seven (7) Options / Alternatives for both onshore and offshore pipeline sections, including shore approaches and HDD's. Cost estimate included: engineering; materials; project & construction management; onshore / offshore construction costs; and a calculated contingency amount based on a proprietary Contingency Calculation Model.

Confidential Project

Client: K&M Advisors
Location: Aruba
Scope: Provide an Unclassified Cost Estimate for an Offshore Pipeline
Year: 2018

Provided a conceptual cost estimate report for an offshore gas pipeline, including preliminary sizing of the pipeline based on projected energy needs. Cost estimate included: engineering; materials; project & construction management; offshore construction costs; and a calculated contingency amount based on a proprietary Contingency Calculation Model. Additionally, an estimated project expenditure profile was provided.

Confidential Project

Client: The Michel-Shaked Group / Robbins Geller Rudman & Dowd LLP
Location: USA
Scope: Expert Testimony and Witness for Plaintiff / Findings Report for Litigation
Year: 2017/2018

Provided services as an independent expert in the areas of project and construction management, including project controls, cost engineering, progress tracking, schedule control, and project reporting for litigation regarding the corporate reporting of a major domestic EPC services contractor.

Developed a Findings Report to provide an overall understanding of what processes and procedures a prudent EPC services company would take in order to properly manage its major capital projects,

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including schedule, cost control, cost engineering, and reporting activities for management to be fully apprised at all times of the status and profitability of its' projects.

Tender Preparation for International Energy Projects

Contracted to: Various EPC and Service Companies
Location: Nigeria, Egypt
Scope: Principle Consultant
Project Cost: NA
Year: 2017

As Principle Consultant, facilitating with various international and domestic EPC, construction, and engineering service companies to develop a variety of tender proposals for National Oil Company's (NOC) in Nigeria and Egypt, including gas meter facilities, production facilities, gas compressions, and gas processing facilities. Tender scopes include engineering, procurement, construction/installation, commissioning & start up, and operations and maintenance.

Major Capital Project / EPC Execution Process Evaluation

Client: Boston Strategies International
Location: Saudi Arabia
Scope: Enhancement and Upgrade of Gate Deliverables from Project Initiation to Operations
Year: 2016/2017

As an improvement initiative for the Project Execution System of a major petrochemical company based in Saudi Arabia, the following work was performed for the Execution department in the areas of: Mega Projects; 3rd Party Projects; Assurance; and Procurement including, but not limited to the:

1. Assessment of existing systems, specifications, and procedures.
2. Study of present Processes & recommended Process Maps
3. Review of existing Stage Gating System and enhancement of Gating System which covers the activities of Gate Phases from the initial idea to pre-feasibility to execution and project close-out, including the acceptance of an asset or facility for Operations.
4. Review and upgrade "Gate" documents - phase procedures, deliverables list of each phase, deliverables work procedures of each phase, standard forms, standard templates, process flow in organization and Integrated RACI matrix to provide a structured approach for executing projects yielding maximum savings and benefits while ensuring EHS issues, Product Quality & Cost are fully addressed.

LNG Re-Gasification Terminal

Client: Confidential
Location: Ukraine
Scope: Develop Concepts for Gas Supply to Ukraine via LNG Imports
Year: 2015

Developed a study covering the varied concepts of importing and re-gasifying LNG. Considered both Onshore processing facilities as well as Floating Storage and Re-Gasification Units (FSRU).

Cost estimates were developed for the project execution (CAPEX) as well as operations (OPEX), including project management team costs; a cash flow forecast along with an expenditure profile was established. A finance package was developed for submittal to investors. Preliminary financing for

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the \$800M project was secured. Worked with local government officials, US diplomatic staff in Ukraine, as well as US State Department, both in Ukraine and US to gain project support.

The project's objective is to increase Ukraine gas supply for domestic use and relieve the dependence on gas imported from Russia, Poland, Slovakia, and Hungary. Project is currently on hold pending resolution of the Bosphorus Strait crossing agreement.

Appraisal for Natural Gas Pipeline Replacement Costs

Client: Comisión de Regulación de Energía y Gas (CREG)

Location: Colombia

Scope: Develop Cost Models and Detailed Cost Estimates to Assist in Determining Full Replacement Costs for Pipeline Asset Retirement

Year: 2015

Define a variables based on international practices and norms in order to determine valuation and the current remaining useful life of Colombian pipelines for refined petroleum products and LPG, as well as pumping stations and other facilities of the Colombian infrastructure. The normative analysis took into account the following aspects:

- a. ASME B31.4 Pipeline Transportation Systems for Liquid Hydrocarbons.
- b. ASME B31g Manual for Determining the Remaining Strength of Corroded Pipeline
- c. RSTRENG. Remaining Strength of Corroded Pipe.
- d. API 1160 Managing System Integrity for Hazardous Liquid Pipelines.
- e. DOT 49 CFR PART 195: Transportation of Hazardous Liquids by Pipeline.
- f. LEY 388 DE 1997 Ordenamiento territorial.
- g. LEY 1523 DE 2012 Gestión del Riesgo, Responsabilidad, Principios, Definiciones y Sistema Nacional de Gestión del Riesgo de Desastres.
- h. NTC 5901
- i. National decree 4299 of 2005
- j. Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes. RCM SAE JA 1011-2009.

Additional scope included developing a methodology for asset valuation considering two methods: the first one taking into account the new infrastructure installation value (Replacement Value). The second one taking into account the present value and considering the usage of the current infrastructure (Actual Cash Value).

Appraisal for Natural Gas Pipeline Replacement Costs

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Location: Colombia

Scope: Develop Cost Models and Detailed Cost Estimates to Assist in Determining Full Replacement Costs for Pipeline Asset Retirement

Year: 2014

Sound financial accounting standards require companies to estimate the fair market value of their asset retirement liabilities. During each life cycle stage, pipeline operating companies update and adjust the inventory, business plans, asset development plans, and other appropriate plans to ensure compliance with robust assets retirement strategies. Maintaining an accurate asset and environmental aspect inventory and managing risks are integral to every stage of the asset life cycle expectations.

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To satisfy this requirement CREG determined there were 25 pipeline systems which had reached the end of their design life and sought to determine the replacement value for the asset retirements. The scope was to develop detailed and complete cost estimates for gas pipelines of sizes ranging from 1" to 12", totaling 660 kms and over \$275M in total installed costs. The 25 separate detailed cost estimates were developed that included:

- Tendering costs for new construction
- Engineering
- Procurement, including pipe & coating, valves, pig traps, etc.
- Existing pipeline abandonment
- Project and Construction Management
- Pipeline construction costs
- Client oversight costs
- Project financing

Expert Appraisal on Natural Gas Pipelines and Compressor Stations

Client: Comisión de Regulación de Energía y Gas (CREG)

Location: Colombia

Scope: Develop Cost Models and Scenarios to Assist in Developing Tariff Structures in the Colombia Gas Industry

Year: 2014

The Colombian government has taken great strides recently to attract more foreign investment in oil and gas exploration and to boost domestic production. CREG has released a series of incentives for promoting development of natural gas in the Cusiana-Cupiagua fields. CREG's main focus is to regulate the domestic utilities of electricity and fuel gas from a technical, independent and transparent way, promoting the sustained development of these sectors, regulating monopolies, encouraging competition wherever possible and timely responding to the users and companies needs according to the criteria established by the Colombian Law.

A study was awarded to re-quantify risks leading to a variety of cost impacts for various gas pipeline construction projects that will allow CREG to incorporate real time cost data in their gas market structuring and to accurately develop tariffs.

To support this effort, detailed pipeline construction cost estimates were prepared for 58 pipeline cases ranging in size from 2" to 36" and in length increments of 100 meters, 10kms, 20kms, 50kms, 100kms, and 200kms in length and terrain ranging from flat to mountainous, clay, sand, rock, light through heavy vegetation and a variety of special crossings of roads and waterways, including aerial, traditional, and horizontal directional drilling, and seismic crossings.

Investment Assessment for Heavy Oil Field Development Program

Client: Confidential

Location: Canada

Scope: Assess Data for Investment Suitability for a Long Term Full Field Development of a Heavy Oil Field in Canada.

Year: 2014

The scope was to assess available reports, investigate through industry contacts and provide a recommendation on the suitability for making a significant investment in a heavy oil field development in Alberta, Canada.

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The information assessed included potential oil reserves; method of extraction; methodology for drilling program; infrastructure costs; pipeline and facility costs; environmental and regulatory costs; owner company costs; risks and assumptions.

Cost Estimate Development and Analysis for Tanks and Tank Farms & Terminals

Client: Boston Strategies, LLC

Location: Venezuela

Scope: Develop Basic Design and Cost Models for a Variety of Large Tanks, Tank Farms, and Marine Loading Facilities to Assist a Confidential Client.

Year: 2013

The scope was to develop a basic design framework for a variety of tank farm scenarios which included determining storage requirements for heavy crude, diluent, syncrude (for blending), fire water, diesel fuel storage, gas storage (spheres), LNG storage, infrastructure, product mixing, power generation, jetty's, and loading facilities for VLCC's. Based on the results, models were developed for conceptual cost development and analysis to provide the client with a menu of pricing options based on the various scenarios. Nine (9) separate conceptual tank farm and terminal cost estimates runs were developed for complete tank farms that included:

- Tank installations
- Civil, mechanical, piping, electrical, instrumentation & controls
- Engineering
- Procurement
- Project and Construction Management
- Jetty for VLCC's and tanker loading facilities

Tank sizes and quantities varied, up to 16 each 750K BBL, floating roof for crude storage and 1 each 150K m³ self-contained LNG storage. Total installed tanks varied between scenarios from 20 each to 41 each and ranging in sizes from 5K BBL to 750K BBLs.

Appraisal for Natural Gas Pipeline Replacement Costs

Client: Comisión de Regulación de Energía y Gas (CREG)

Location: Colombia

Scope: Develop Cost Models and Detailed Cost Estimates to Assist in Determining Full Replacement Costs for Pipeline Asset Retirement

Year: 2013

Sound financial accounting standards require companies to estimate the fair market value of their asset retirement liabilities. During each life cycle stage, pipeline operating companies update and adjust the inventory, business plans, asset development plans, and other appropriate plans to ensure compliance with robust assets retirement strategies. Maintaining an accurate asset and environmental aspect inventory and managing risks are integral to every stage of the asset life cycle expectations.

To satisfy this requirement CREG determined there were 29 pipeline systems which had reached the end of their design life and sought to determine the replacement value for the asset retirements. The scope was to develop detailed and complete cost estimates for gas pipelines of sizes ranging from 2" to 24", totaling over 1,000 kms and \$1B in total installed costs. The 29 separate detailed cost estimates were developed that included:

- Tendering costs for new construction

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- Engineering
- Procurement, including pipe & coating, valves, pig traps, etc.
- Existing pipeline abandonment
- Project and Construction Management
- Pipeline construction costs
- Client oversight costs
- Project financing

Cost Estimate Development and Analysis for Pipelines and Pump Stations

Client: Boston Strategies, LLC

Location: Venezuela

Scope: Develop Heavy Crude Oil Pipeline Throughput Estimates and Cost Models for a Variety of Pipeline Sizes and Associated Pump Stations to Assist a Confidential Client.

Year: 2013

The scope was to develop crude oil throughputs for pipelines of sizes 12", 24", 36", and 48" in lengths of 50kms, 100kms, 300kms, 500kms, and 1,000kms, including associated pump stations. Based on the results, models were developed for conceptual cost development and analysis to provide the client with a menu of pricing options based on various scenarios. Over 75 separate conceptual cost estimates runs were developed that included:

- Pipeline construction costs
- Pump station construction costs
- Engineering
- Procurement, including pumps, pipe & coating, valves, pig traps, etc.
- Project and Construction Management
- Client costs
- Project financing

Confidential Audit for Capital Cost Analysis

Client: K&M Engineering and Consulting, LLC / Alex Stewart International

Location: Mozambique

Scope: Develop Historical Escalation Model to Assist in an Audit of a Major Mining and Metallurgical Operation

Year: 2012-2013

The scope was to develop historical cost escalation factors for a variety of major capital project components, including labor, materials, and equipment from the years 2005 through 2011.

Expert Appraisal on Natural Gas Pipelines and Compressor Stations

Client: Comisión de Regulación de Energía y Gas (CREG)

Location: Colombia

Scope: Develop Cost Models and Scenarios to Assist in Developing Tariff Structures in the Colombia Gas Industry

Year: 2012

The Colombian government has taken great strides recently to attract more foreign investment in oil and gas exploration and to boost domestic production. CREG has released a series of incentives for promoting development of natural gas in the Cusiana-Cupiagua fields. CREG's main focus is to regulate the domestic utilities of electricity and fuel gas from a technical, independent and transparent

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way, promoting the sustained development of these sectors, regulating monopolies, encouraging competition wherever possible and timely responding to the users and companies needs according to the criteria established by the Colombian Law.

A study was awarded to develop and quantify risks leading to a variety of cost impacts for various gas pipeline construction projects that will allow CREG to incorporate real time cost data in their gas market structuring and to accurately develop tariffs.

To support this effort, detailed pipeline construction cost estimates were prepared for 56 pipeline cases ranging in size from 6" to 36" and up to 100kms in length and terrain ranging from flat to mountainous, clay, sand, rock, light through heavy vegetation and a variety of special crossings of roads and waterways, including aerial, traditional, and horizontal directional drilling.

Keystone Phase 3 & 4 RFP

Client: Snelson Companies, Inc.

Location: USA / Canada

Scope: Proposal Manager for the Tendering the Construction of 38 Pump Stations

Year: 2011

The Keystone Project's Phase 3 and 4 Request for Proposal (RFP) consisted of Constructing 1,660 miles of pipeline and 38 pump stations in Canada and the U.S.

The purpose of the project was to expand the initial Keystone system capacity of 700,000 bbl/d, increasing to 1.3 Million bbl/d.

The project developed construction readiness plans to start construction in 2012, including:

- Ordered \$1.5 billion of pipe, pumps and equipment
- Phase 3 Gulf Coast construction to start in January 2012 with in-service in February 2013
- Phase 4 Steele City U.S. construction to start in May 2012 with in-service in June 2013.

The RFP submittal included developing a robust cost model, MTO's, man-hour evaluations, crew developments, organizational planning, subcontractor evaluation & selection (commercial & technical), execution plans, developing alternative proposals, putting together integrated schedules, cash flow development, risk assessment & mitigations, and internal corporate review process.

Oil & Gas Project Financing

Client: Universal Strategic Alliance

Location: Malaysia

Scope: Seminar on Oil & Gas Project Financing

Year: 2011

The purpose of the Seminar was to provide an overview of the oil & gas energy sector; the outlook for the future of the sectors; investment-related issues specific to the sectors; as well as how oil & gas development companies approach costs, estimates, funding, control, and execution of major capital projects.

As a typical energy company's yearly investment and divestiture portfolio is made up of numerous business segments and project level investment decisions; these require financial and economic analysis. In order to fund the best investment opportunities and assess individual elements in a portfolio appropriately, a consistent approach to evaluating investment decisions is required. Careful

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attention to the principles of investment and economic analysis should result in better decision-making.

Confidential Project

Client: Germer Gertz, LLP
Location: USA
Scope: Provide Expert Testimony and a Findings Report for Litigation
Year: 2010-2011

Provided services as an independent expert in the areas of project and construction management for litigation regarding a domestic pipeline project. Developed a Findings Report to provide an overall understanding of what steps an Owner Company would typically be expected to take in order to manage its major capital projects taking into consideration the contracting strategies selected.

A management analysis was provided based on contracting strategies selected for the pipeline engineering and construction work with a focus on what should have happened after the contract type was made, both from a Construction and Project Management standpoint. The litigation was successfully defended against.

Obiafu/Obrikom – Oben (OB3) Gas Pipeline Project

Client: Jaihind Project Services Ltd
Location: Nigeria
Scope: Construction Advisor for the Swamp & Major River Crossings for a 48-inch Pipeline Installation Tender
Year: 2009

Review of project documents and development of detailed cost estimates and execution plans for 33 kms of swamp/marsh lands and the Niger River crossing.

Project consists of a 48-inch pipeline system comprising:

- Tie-in station at OB/OB Central Processing Facilities (CPF)
- Ob/Ob Custody Transfer Metering Station.
- Intermediate Pigging Station.
- Oben Gas Treatment Plant.
- CP System Groundbed.
- 127km x 25m width ROW route of the gas pipeline from OB/OB CPF to Oben Node with Intermediate Pigging Station to located at a suitable point to be determined by the engineering design.
- Sub-surface Geological features of all river crossings and the river bed.

Overland Pass Pipeline Project

Client: Willbros Engineers
Location: USA
Scope: Constructability Study
Year: 2007

Overland Pass Pipeline is a 760-mile natural gas liquids (NGL) pipeline from Opal, Wyo., in the southwestern part of the state, to the mid- continent natural gas liquids market center in Conway, Kan., one of the nation's primary NGL distribution and storage hubs. The pipeline will be designed to transport 110,000 barrels per day of natural gas liquids. The system includes 5 facilities (pump

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stations, meter stations). Additional pump facilities would increase the capacity to 150,000 barrels per day.

Oneok NGL Pipeline, LP Project

Client: Willbros Engineers
Location: USA
Scope: Feasibility Study
Year: 2006

The proposed Oneok NGL Pipeline, LP consists of a 12.75-inch, X-60, 0.219" and 0.330" WT, 135 mile long natural gas liquids (NGL) pipeline operating at 1,480 psig transporting NGL with a throughput of 91,000 BPD. The project begins at the Bushton, Kansas facility (MP 0), and traverses Kansas in an east-southeast direction toward Mitchell, Kansas. From there, the pipeline parallels an existing Oneok pipeline south to the city of Medford, Oklahoma.

West Africa Gas Pipeline Project (WAGP)

Client: Willbros Engineers
Location: Nigeria, Ghana, Benin, Togo
Scope: Technical Support – Commissioning Documentation Development
Year: 2005

The WAGP will traverse 620 miles (1,033 kilometers) both on and offshore from Nigeria's Niger Delta region to its final planned terminus in Ghana. The first portion of the pipeline, which will deliver gas to the greater Lagos area (Alagbado), is already in existence. The Escravos-Lagos pipeline (ELP) was commissioned in 1989, supplying natural gas to Nigeria's Egbin power plant and other industrial consumers in Lagos and Ogun States. ELP has a capacity to handle nearly 900 million cubic feet per day (Mmcf/d) of natural gas, but currently the majority of this capacity is not utilized. A 34-mile (57-kilometer) onshore portion of the WAGP will run from Alagbado to Seme beach in Lagos State. The WAGP will continue offshore, with proposed landfall spurs at Cotonou (Benin), Lome (Togo), Tema (Ghana), Takoradi (Ghana) and Effasu (Ghana). The initial capacity of the WAGP will be 200 Mmcf/d, with the capability to expand to 600 Mmcf/d as demand grows.

The \$500-million WAGP will initially transport 120 Mmcf/d of gas to Ghana, Benin and Togo beginning in June 2005. Gas deliveries are expected to increase to 150 Mmcf/d in 2007, to 210 MMcf/d in 7 years and be at 400 Mmcf/d when the pipeline is functioning at its capacity (approximately 15 years after construction). It is estimated that \$600 million will be spent on the development of new and renovated power facilities in the four states to utilize the gas.

Overland Pass Pipeline Project

Client: Willbros Engineers
Location: USA
Scope: Feasibility Study
Year: 2005

Overland Pass Pipeline is a 760-mile natural gas liquids (NGL) pipeline from Opal, Wyo., in the southwestern part of the state, to the mid-continent natural gas liquids market center in Conway, Kan., one of the nation's primary NGL distribution and storage hubs. The pipeline will be designed to transport 110,000 barrels per day of natural gas liquids. The system includes 5 facilities (pump stations, meter stations). Additional pump facilities would increase the capacity to 150,000 barrels per day.

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Millennium Project

Client: Willbros Engineers
Location: USA
Scope: Technical Support – Feasibility Study; Cost Estimate
Year: 2005

The 181.7 miles of The Millennium Pipeline (utilizing more than 90 percent existing easements) will extend from Corning in Steuben County across the southern tier and lower Hudson Valley of New York State to Ramapo in Rockland County.

Interconnections with gas utilities, storage fields, and major interstate pipelines at several points along the Millennium system will significantly enhance the efficiency of the Northeast's natural gas system.

Primary supply will be provided through an interconnection with the Empire State Pipeline at Corning.

Millennium Pipeline will be capable of delivering up to 525,400 million cubic feet of natural gas per day to energy consumers.

Acueducto Bajanorte Hydrogeneration Project

Client: Willbros Engineers
Location: Mexico/USA
Scope: Technical Support; Feasibility Study; Cost Estimate; Execution Plan
Year: 2005

A \$1.9 billion bi-national water pipeline between the US and Mexico, consisting of the transportation of water through a 96" concrete pipeline system, turning into dual 54" pipelines that will include 5 pump stations, an electrical substation, power transmission lines, various spur and distribution lines and other ancillary facilities, and associated SCADA system and telecom facilities may be included.

Bibiyana Gas Field Development Project

Client: Willbros Engineers/UNOCAL
Location: Bangladesh
Scope: Technical Support; Constructability Study
Year: 2004

The Bibiyana Project is the development of the Bibiyana Gas (and Condensate) Field located in northeast Bangladesh, in Block 12. The field is about 2.5 kilometers wide and 14 kilometers long, and is located 150 kilometers northeast of Dhaka, 50 kilometers miles southwest of the gas producing Jalalabad Plant, and 50 kilometers northwest of the Moulavi Bazar future Gas Plant.

The Bibiyana Field will be developed in 2 phases corresponding to a 2-pad (drilling program) development with the possibility of a third pad north of the Kushiara river if extended reach wells from the existing pad cannot be technically or economically justified during detailed engineering.

The field facilities to be installed as part of the Bibiyana Gas Development Project will be developed in two phases, and include the following: Two well pads, North Pad Site and South Pad Site (with the possibility of adding a third depending on the viability of extended reach drilling activities); Four production trains rated at 150-MMSCFD each for a total throughput of 600-MMSCFD; Gas gathering pipeline (20" x 4.5 km) connecting the south pad to the north pad where the as plant will be located; Gas plant, consisting of: loading & transfer pumps; Flare, power generation; Fire and gas system;

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SCADA; inlet separation, gas dehydration and gas metering; condensate stabilization through staged depressurization, storage, condensate, pipeline pumps, and metering; produced water, degassing, storage and disposal; associated utilities, including flare and blow down system, power generation and distribution, fuel gas, diesel fuel, instrument air, utility air, fire water utility, water systems, open/closed process drain systems; Gas plant, including drilling/production area, process area, flare area, and permanent accommodations area, to be built on a work pad of approximately 12' of thickness made up of dredged, hauled and compacted material.

Corporate Constructability Program

Client: Confidential
Location: USA
Scope: Technical Support; Constructability
Year: 2004 - 2005

Developed a comprehensive Constructability Program for a major oil & gas engineering firm based in the US. Program consisted of frameworks, plans, checklists, sample agendas, charters, examples, flow charts, etc.

Variety of Confidential Feasibility Studies

Client: Confidential
Locations: USA
Scope: Technical Support; Feasibility Study
Year: 2004 - 2005

Developed a number of confidential Feasibility Studies for pipeline projects in the US. The Studies consisted of developing conceptual designs, execution plans, schedules, detailed costs estimates, and cash flows. Additionally, risk assessments were performed and a listing of project exposures & vulnerabilities was developed along with recommended mitigations.

West-East China Gas Pipeline Project

Client: ExxonMobil
Location: China
Scope: Technical Support; Feasibility Study
Year: 2001

The first phase involved an investment of 140 billion yuan and will be capable of transporting 12 billion cubic meters of gas annually. The 4,000 km pipeline, with a diameter of 1,016 mm ran eastwards from Lunnan gas field in Xinjiang. Its route will take it through Gansu, Ningxia, Shaanxi, Shanxi, Henan, Anhui, and Jiangsu terminating in Baihe Town in Shanghai.

Core Ventures 1 & 2

Client: ExxonMobil
Location: Saudi Arabia
Scope: Technical Support; Independent Project Review
Year: 2001

The integrated program involved exploration and processing of gas plus power stations, water desalination plants and petrochemical schemes. Total investments initially projected between \$ 25-30 billion in the first ten years covering gas field development plus other downstream projects.

The gas initiative has three core ventures. ExxonMobil leads Venture One, known as South Ghawar, tipped as the most prized requiring investments of \$ 10 to \$ 15 billion. ExxonMobil also led Venture

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Two in the Red Sea area, which requires outlay of \$ 5 to \$ 7 billion, but widely regarded as exceptionally complex in nature.

Alaska Gas Producers Pipeline Project

Client: ExxonMobil
Location: Alaska
Scope: Technical Support; Owner Team Construction Advisor
Year: 2001 - 2002

The feasibility study looked at 2 options (Alaska option or the Mackenzie Valley option) to build a natural gas pipeline and related facilities, which would have a design capacity to transport approximately 4 Bcfd of gas from the Alaska North Slope to markets in Alaska, Canada and the Lower 48 States. The pipeline and related facilities will be designed such that the future capacity could be increased by approximately 1 Bcfd with additional investments.

While specific details of the project design are likely to change as additional engineering studies are conducted and market information is gained through the initial open season, the project is expected to consist of a large diameter, large volume pipeline delivering Alaska gas to North American markets. The major components forming the Alaska Gas Pipeline Project are: gas transmission pipelines from upstream facilities to the Gas Treatment Plant (Gas Transmission Pipelines); a Gas Treatment Plant (GTP); a pipeline in Alaska (Mainline); a pipeline from Alaska to Alberta (Alaska to Alberta Pipeline); potential Natural Gas Liquids (NGLs) extraction facilities, and; a potential pipeline from Alberta to Chicago (Alberta to Lower 48 Pipeline).

The GTP would be located on the Alaska North Slope and would be designed to remove carbon dioxide (CO₂), hydrogen sulfide (H₂S) and other impurities from the natural gas stream to meet the Mainline specifications. These pipeline specifications would also require that the gas be compressed and chilled. The Mainline would be an approximately 730 mile long, large diameter pipeline that extends from the GTP on the Alaska North Slope to the Alaska/Canada border. The Alaska to Alberta Pipeline, which would be a continuation of the Mainline, would be an approximately 1,400 mile long pipeline that extends from the Alaska/Canada border into Alberta.

Gas Recovery Feasibility Study

Client: Raytheon
Location: Venezuela
Scope: Project Manager
Year: 1996 - 1997

Project included gas flow measurements, gas analysis, reservoir analysis, future gas production projections, design of a gas recovery and transmission/distribution system, and a gas marketing strategy. The project deliverables included a project financing package and an EPC-type FEED Bid Package. The study covered roughly 6,000 wells producing a total of approximately 300 mmscfd in three separate fields, including one offshore field, with associated facilities.

Yamal Field Development Project

Client: Willbros International/Gazprom
Location: Russia
Scope: Construction Manager
Year: 1992

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Feasibility study of the Yamal Field Development Project - Baydarts kaya Bay Crossing. Project consisted of 62 kilometers of five parallel 52" x .831" WT offshore pipelines; beach interface approach; 6 kilometers of eight parallel 48" x .831" WT insulated pipelines on VSM's; and launchers and receivers.

Yemen LNG Feasibility Study

Client: Willbros International/Enron International
Location: Yemen
Scope: Construction Manager
Year: 1992

Study consisted of analyzing two separate routes, 400 kilometers each of 36"x .656" WT pipe with compressor stations totaling 142,000 HP; gas receipt and tie-in to a CPF at the Mar'ib field; custody transfer; main line valves and launcher/receivers; construction execution plan; testing and commissioning plan with procedures for introduction of process gas.

Production Facilities Expansion – West Kuwait Project

Client: Willbros International/Kuwait Petroleum Company
Location: Kuwait
Scope: Project Manager
Year: 1992

Project was for the evaluation and study of the Production Facilities Expansion - West Kuwait Project. The project details consist of detailed engineering, design, and construction of 250 kilometers of 8" to 24" crude oil, gas, condensate and fuel gas pipelines; slug catcher; Central Mixing Manifold (CMM); cathodic protection system; pig traps; and related electrical, civil and ancillary works.