



MARKET RESEARCH ON ENGINEERING SERVICES FOR IMPROVEMENTS TO THE GATUN DAM

- 1) **DESCRIPTION:** The Panama Canal Authority (ACP) has identified the need to conduct improvements to the Gatun Dam, located in the province of Colon. The improvement works include the following construction work activities:
- a) **Environmental Impact Study.** Prepare the Environmental Impact Study in its area of influence, including borrowing sites, in accordance with the Republic of Panama regulations and ACP standards.
 - b) **Dewatering System.** Includes all the work for the design and construction of a drainage and drawdown system to control the groundwater level and surface water during earthworks, including geotechnical monitoring of operations and associated temporary structures.
 - c) **Clearing UXO Areas.** The work includes site characterization and destruction of all UXOs found on the site in an area exceeding 8 hectares.
 - d) **Clearing and Grubbing.** Includes clearing and grubbing of the surface material, and preparation of the area as needed to conduct the work. Includes the hauling of the material resulting from the clearing and grubbing to the designated disposal site. The cleaning includes the removal of the top 0.75 m of the soil layer. The work covers an area exceeding 20 hectares.
 - e) **Unclassified Excavation.** It consists of all the work necessary to excavate the unclassified material and bring the area to the final required levels. It must include the hauling of excess or unsatisfactory material to the designated disposal site, dikes construction, and the corresponding drainage works. Excavation volume exceeding 350,000 m³.
 - f) **Filter and Drain System.** Supply and install a filter/drain system of granular material, including geosynthetics. Filter/drain volume exceeding 80,000 m³.
 - g) **Rockfill.** Supply and install a rockfill. The work includes the hauling from the borrowing site to the jobsite. Rockfill volume exceeding 1,000,000 m³.
 - h) **Fill Material Type 3.** Supply, install, and compact fill material to the required design levels. It includes hauling from the borrow site to the jobsite. Fill volume exceeding 10,000 m³.
 - i) **Erosion Control.** Includes the supply and installation of a temporary erosion control blanket in designated areas with hydroseeding. The work includes carrying out hydroseeding maintenance for the duration of the Contract. Area to be covered exceeding 75,000 m².



- j) **Silt fences.** Supply and installation of silt fences (type 1 and 2). Lineal meters of silt fence exceeding 3,000 m.
- k) **Geosynthetics.** Supply and install geosynthetics (biaxial geogrid, uniaxial geogrid, woven and unwoven geotextile, and geosynthetic cementitious composite mat). Square meters of geosynthetics exceeding 1,000,000 m².
- l) **Drilling of grout holes.** Prepare and drill grouting holes for grout injections. Drilling work exceeding 100 linear meters.
- m) **Grouting types 1, 2 y 3.** Grouting works of cementitious, foam-forming chemical grout, gel-forming chemical grout, and cementitious-bentonite slurries. Injection volume exceeding 2,000 kg.
- n) **Grouted riprap.** Supply and install grouted riprap, including the rock in the specified areas of the designated disposal site. Square meters of rip rap exceeding 100 m².
- o) **Geotechnical Instrumentation.** Supply and install an automated geotechnical instrumentation system (piezometers and inclinometers) and settlement plates. Instrumentation comprised more than 100 settlement plates and 30 multilevel piezometers and inclinometers.





Consequently, the ACP wants to know the interest of consultancy firms in providing engineering services for quality control, documentation, monitoring, and inspection during construction. The scope of the engineering services is detailed in the following paragraph.

2) SCOPE OF ENGINEERING SERVICES:

- a) Develop the Quality Assurance Plan to monitor the effectiveness of the Contractor's Quality Control Plan.
- b) Review of technical submittals by the Construction Contractor at the request of the Contracting Officer.
- c) Provide specialized technical advisory services to ACP Design Team during the execution of the construction contract.
- d) Provide inspection services for the following construction activities: Dewatering System, Unclassified Excavation, Filter and Drain System, Rockfill, Fill Material Type 3, Grouting, Geotechnical Instrumentation, Stockpiling and Processing Materials, Geosynthetics.
- e) Provide construction material and soil testing laboratory services as part of the Quality Assurance Plan by assigning the required equipment and qualified laboratory and field technicians at the work site to coordinate daily testing and monitoring activities.
- f) Prepare and submit daily and monthly inspection reports as part of the inspection work for the construction contract.
- g) Prepare and submit a final inspection report.
- h) Participate in progress meetings and workshops at predetermined milestones agreed by ACP and the Construction Contractor.
- i) Participate in progress meetings and workshops at predetermined milestones agreed by ACP and the Construction Advisory Board to review the geotechnical performance of the Gatun Dam and construction works.
- j) Provide engineering services through task orders, at the request of the Contracting Officer, related to design changes by ACP.

3) ESTIMATED ENGINEERING SERVICES DURATION: Engineering services will have a duration of 12 months with annual extensions at ACP convenience based on performance of firm during contract execution. The maximum duration of the services will be 4 years.

4) KEY PERSONNEL AND FUNCTIONS:

Personnel	Responsibilities
Manager	<ul style="list-style-type: none"> ▪ Shall be responsible for all services provided by the Contractor and for all subordinate Contractor's personnel. ▪ Review and verify the effectiveness of the Construction Contractor's quality control program and ensure that it is fully implemented in the field during construction.



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	<ul style="list-style-type: none">▪ Develop a QA plan to ensure the quality of supplies, equipment, or components that may come from abroad.▪ Identify all resources and processes required for successful construction completion.▪ Provide specialized advisory in the resolution of technical issues, drawing upon necessary resources and experts in applicable disciplines.▪ Provide specialized project management services and advisory in the resolution of contractual issues, drawing upon necessary resources of its own, within the ACP or other consulting resources or boards of experts.▪ Provide guidance and support to the risk management team on the overall development and updating of the risk management plan, and in the development of specific risk mitigation alternatives.▪ Prepare presentations on the details of the construction progress to the ACP's Board of Directors, Administration, instrumentation, and others, as required.
Resident Engineer	<ul style="list-style-type: none">▪ Maintain regular communication with ACP's Contracting Officer.▪ Review the construction contractor's submittals as requested by the Contracting Officer.▪ Aid, as needed on the review of requests for information (RFI), requests for clarification (RFC), and design change, request DCR, and coordinate response including Senior Construction Team.▪ Verify works are being constructed per the contract drawings and specifications.▪ Ensure inspection deliverables are met and the project receives the necessary level of inspection support.▪ Verify drawings and specifications remain applicable to field conditions and provide recommendations to the Contracting Officer.▪ Anticipate field or construction conditions that will require re-design and change orders.▪ Coordinate input from ACP Technical Team on necessary change orders.▪ Troubleshoot in conjunction with ACP Technical Team any design or construction problems as they arise.▪ Through regular inspection and review, anticipate potential design or construction issues, and provide recommendations to the Contracting Officer.



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	<ul style="list-style-type: none">▪ Supervise and manage on-site construction inspection team staff.▪ Direct and coordinate inspection of all construction activities in coordination with the ACP Inspector.▪ Oversee inspection of all construction activities with regular periodic field inspection visits.▪ Provide ACP Technical Team with supporting information as needed from the field.▪ Coordinate periodic visits by ACP Technical Team.▪ Prepare and review construction report sections and review record drawings.▪ Review daily inspection reports prepared by on-site team staff.▪ Review Construction Contractor Instrumentation Report.▪ Coordinate additional inspections, data requests, or information gathering as required.▪ Prepare bi-monthly inspection reports summarizing overall construction activity.▪ Attend bi-weekly construction meetings, as requested by ACP.
Senior Construction Engineer	<ul style="list-style-type: none">▪ Review the QA plan and provide comments to the resident engineer.▪ Lead overall QA effort.▪ Coordinate QA testing of construction works.▪ Ensure all QC/QA information is received, compiled, and summarized.▪ Set up the initial design QC/QA database as well as the reporting and filing structure for the project.▪ Perform preliminary review of applicable contractor submittals as directed by the resident engineer.▪ Review and provide input on RFIs, RFCs, and DCRs.▪ Provide resident engineer with initial comments and supporting information on review items.▪ Lead inspection oversight and provide recommendations to foundation excavation operations.▪ Monitor surface and groundwater control and dewatering system performance.▪ Verify excavation limits and disposition of excavated materials.▪ Confirm suitability of excavated surfaces to receive rockfill.▪ Lead inspection oversight of material selection and



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	<p>stockpiling of excavated materials.</p> <ul style="list-style-type: none">▪ Observe and document material processing, conditioning, and stockpiling.▪ Assist in the development of QA processes for material tracking.▪ Review QA data to ensure compliant material is being stockpiled.▪ Inspect preparation and protection of final surfaces before receiving rockfill.▪ Inspect the installation of geosynthetics before and during the construction of the rockfill.▪ Lead inspection oversight of rockfill construction.▪ Verify surface preparation before receiving the rockfill fill.▪ Ensure material properties such as moisture and gradations are within acceptable limits.▪ Confirm proper compaction, equipment, and lift thicknesses.▪ Review material testing procedures and test results.▪ Verify filters and drains comply with specifications and are free from contamination.▪ Observe overall material behavior for its performance function.▪ Inspect drilling, installation, and inspection of instrumentation.▪ Observe the performance of installed instruments and provide recommendations.▪ Review instrumentation results and summarize findings for resident engineer and design engineers.▪ Prepare daily inspection reports.▪ Prepare applicable sections of the construction report and other construction documentation.▪ Regularly review as-built “red-lines” prepared by Construction Contractor.▪ Participate in monitoring dam performance during and after rockfill construction.▪ Lead inspection oversight of manufactured granular materials (filters and drains).▪ Verify that all manufactured materials are produced consistently within specification requirements.▪ Perform regular inspections of raw rock sources and crushing and screening plant operations.▪ Regularly review construction contractor’s QC data and
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	<p>material plant record to verify material compliance.</p> <ul style="list-style-type: none"> ▪ Review QC/QA data and document construction progress. ▪ Provide input to resident engineer on QA activities and testing for preparation of bi-monthly inspection reports.
Grouting Specialist	<ul style="list-style-type: none"> ▪ Perform preliminary review of applicable construction contractor submittals related to grouting works. ▪ Review RFIs, RFCs, and DCRs related to grouting works. ▪ Provide resident engineer with initial comments and supporting information on review items. ▪ Lead inspection oversight of grouting program. ▪ Coordinate field activities of staff inspectors on each grouting front. ▪ Layout and coordinate execution of test sections. ▪ Evaluate proposed grouting procedures and grout mixes. ▪ Interpret water pressure test results, grout takes, and line pressures. ▪ Monitor foundation soil performance as the program advances. ▪ Recommend location, spacing, and depths of additional holes as needed. ▪ Suggest special treatments as needed. ▪ Work closely with the Contracting Officer as program modifications are administered. ▪ Ensure program modifications are implemented properly and expediently. ▪ Document all aspects of the grouting program. ▪ Provide supervision and direction to all grouting support staff. ▪ Prepare daily inspection reports. ▪ Provide input for bi-monthly inspection reports to be prepared by the dam resident engineer. ▪ Prepare applicable sections of the construction report and other construction documentation. ▪ Regularly review as-built “red lines” prepared by the construction contractor.
Construction Inspector/Staff Engineer	<ul style="list-style-type: none"> ▪ Support senior engineers in conducting daily duties. ▪ Perform inspection oversight of construction activities as needed. ▪ Ensure that all critical work is verified and recorded. ▪ Regularly review construction activity with senior and resident engineers. ▪ Compile and summarize all geotechnical QC/QA data daily



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	<p>for review.</p> <ul style="list-style-type: none">▪ Provide daily inspection of foundation excavation, dewatering activities, instrumentation, filter/drain blanket, and rockfill placement.▪ Provide daily inspection of material selection, stockpiling, and rockfill construction.▪ Maintain an organized filing system for all information.▪ Participate in the drilling and installation of geotechnical instrumentation.▪ Assist ACP in reading instrumentation.▪ Reduce, review and present instrumentation data for ACP review.▪ Assist resident engineer and other design team members with special assignments as required.▪ During grouting, provide shift support to grouting operation.▪ Supervise up to three grout headers and grouting subcontractor activity.▪ Regularly report back to the grouting specialist.▪ Assist grouting specialist in reviewing and tracking all aspects of the grouting program.▪ Provide daily monitoring of instrumentation and inspection of performance during construction.▪ Document grout activities daily.▪ Prepare daily inspection reports.▪ Prepare data summaries and graphics for applicable sections of the construction report and other construction documentation.▪ Regularly review as-built “red lines” prepared by the construction contractor as directed by senior engineers.▪ Compile and summarize all QC/QA data associated with manufactured material production.▪ Prepare material data review packages for senior engineers and resident engineer.▪ Prepare applicable sections of the construction report and other construction documentation.
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- 5) **QUALITY ASSURANCE PLAN:** The Contractor's quality assurance plan shall address monitoring the effectiveness of the construction contractor's quality control system, and include but not be limited to:
- a) Verification of the construction strategy.



- b) Monitoring feedback reports from the construction contractor's visits to potential vendor and subcontractor shops to verify the ability to meet the construction contract requirements;
- c) Monitoring that the construction contractor conveys the proper specifications and quality requirements to its subcontractors and vendors;
- d) Monitoring that the construction contractor is complying with the construction contract requirements;
- e) Reviewing and approving the construction contract's vendors' and subcontractors' quality plans, inspection and test plans, and procedures before the commencement of the construction work;
- f) Interfacing with the construction contract's vendors' and subcontractors' quality control staff to promote quality, encouraging them to be pro-active rather than reactive and offer guidance;
- g) Carrying out quality inspection visits to vendor shops during work activities to verify actual conformance to specifications;
- h) Carrying out quality audits - audit activities shall generally be based on schedules and/or critical activities and quality levels. Typically, these shall include:
 - i) Conducting quality inspection audits at construction contract offices;
 - ii) Conducting system audits in the construction contract's engineering and site offices at critical stages of the execution of the contract;
 - iii) Conducting random mini audits on vendors' and on-site subcontractors' documentation; and
 - iv) Conducting ad-hoc, random audits on critical deliverables/ activities throughout the execution of the construction contract.

6) **LABORATORY TESTS:** As a part of the Quality Assurance Plan the following tests shall be performed on the materials considered for the construction contract.

Standard	Title	Estimated Qty
C 33/C 33M	Specification for Concrete Aggregates	10
C 150/C 150M	Specification for Portland Cement	5
C 39/C 39M-21	Test Method for Compressive Strength Cylindrical Concrete Specimens	5
C 143/C 143M	Test Method for Slump of Hydraulic-Cement Concrete	10
C 88/C88M-18	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	10
C 97/C 97M-18	Absorption and Bulk Specific Gravity of Dimension Stone	10
C 117-17	Materials Finer than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing.	320
C 127-15	Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate	10
C 131/C131M-20	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	10
C 136/C136M-19	Sieve Analysis of Fine and Coarse Aggregates	320
D 6913/6913M-17	Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis	5



D 698-12(e2)	Laboratory Compaction Characteristics of Soil Using Standard Effort [12,400 ft-lbf/ft ³ (600 kN-m/m ³)]	150
D 1140-17	Amount of Material in Soils Finer Than the No. 200 (75- μ m) Sieve	5
D1556/D1556M-15(e1)	Density and Unit Weight of Soil in Place by the Sand-cone Method	150
D 1557-12(e1)	Laboratory Compaction of Soil Using Modified Effort [56,000 ft-lbf/ft ³ (2,700 kN-m/m ³)]	150
D 2216-19	Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	150
D 2487-17(e1)	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)	5
D 4253-16(e1)	Maximum Index Density and Unit Weight of Soil Using a Vibratory Table	580
D 4254-16	Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density	580
D 4318-17(e1)	Liquid Limit, Plastic Limit, and Plasticity Index of Soils	10
C 295/C 295M-19	Guide for Petrographic Examination of Aggregates for Concrete	10
D 5030/ D 5030M-13a	Standard Test Methods for Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit	580
C 939/C 939M-16a	Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)	10
C 942-15	Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory	5
C 953-17	Test Method for Time of Setting of Grouts for Preplaced-Aggregate Concrete in Laboratory	30
D 4016-14	Test Method for Viscosity and Gel Time of Chemical Grouts by Rotational Viscometer (Laboratory Method)	5
D 7487-18	Practice for Polyurethane Raw Materials: Polyurethane Foam Cup Test	5

- 7) **SUPPORT BY ACP:** The ACP will provide a space or area near the Jobsite to establish offices for the Contractor's personnel who will be working as field engineers and inspectors.



8) **PRICE LIST:** ACP kindly requests an estimated amount of these services for budgeting purposes. It can be provided as a lump sum amount, or in a price list format as indicated below.

	Job Category/Description	EST. QTY (MONTHS)	MONTHLY RATE	Amount (Annual Rate)
1.	Clerical Support/Technical Secretary (on-site and off-site)	12	\$ _____	\$ _____
2.	Resident Engineer (on-site)	12	\$ _____	\$ _____
3.	Senior Construction Engineer (on-site)	12	\$ _____	\$ _____
4.	Senior Construction Engineer (on-site)	12	\$ _____	\$ _____
5.	Construction Inspector (on-site)	12	\$ _____	\$ _____
6.	Construction Inspector (on-site)	12	\$ _____	\$ _____
7.	Construction Inspector (on-site)	12	\$ _____	\$ _____
8.	Grouting Specialist (on-site)	6	\$ _____	\$ _____
9.	Laboratory technician (on-site)	12	\$ _____	\$ _____
10.	Laboratory technician (on-site)	12	\$ _____	\$ _____
11.	Laboratory technician (on-site)	12	\$ _____	\$ _____
12.	Laboratory Tests			\$ _____
SUBTOTAL AMOUNT OFF-SITE ON-SITE PERSONNEL (Items 1. thru 12.)				\$ _____
13.	Overhead and Profit (optional to place separately or distributed on items 1-11)		_____ %	\$ _____
TOTAL AMOUNT (Items 1. thru 13.)				\$ _____



9) **EXPERIENCE:** In addition to the estimated amount, ACP would like to know the company's experience in providing engineering services such as those described in this document for heavy civil engineering construction projects. The experience can be presented in a list or table, including at least the following:

PROJECT No. _____					
Project's Name	Start and end dates	Project Description (including material volume)	Client name / Project's owner	Contract Value (USD)	Points of contact for the client/ project's owner (name, phone number and email)

10) **GENERAL TERMS:**

- a) **Deadline:** Due to time constraints, those interested must ensure that all the information requested through this application is delivered before August 15, 2022. The information must be sent via email to the point of contact indicated in paragraph d (*Point of Contact*).
- b) **Reserved Information:** Please note that this process is strictly confidential, and the information provided by this means, as well as any other exchange of information, must be treated in the same way. For this reason, the participants must handle all the information provided in a strictly confidential manner; implement adequate security measures to prevent this information from being disclosed; do not deliver or make public the information under reserve; keep and consider all confidential information as the property of the ACP; and keep this information in a safe place. All information pertinent to the Gatun Earth Dam and other complementary structures of the ACP is classified as reserved information. The availability of reserved information is subject to the signing of a confidentiality agreement.
- c) Additionally, no portion of the information contained in this document or other documents produced because of the exchanges between both parties should be considered as an acceptance or evaluation by the ACP of documents required for future contracts, nor should they create award expectations. Any future process that the ACP issues related to this, or other studies will be formally announced at the appropriate time.
- d) **Project overhead and profit:** Overhead and profit will be deemed to be inclusive of the following whether incurred in the staff's country of residence or in the Republic of Panama:



- Visiting personnel.
 - Administration - payroll, pension, medical, training, bonus, recruitment, performance/salary reviews, disciplinary/promotion.
 - Head office management support.
 - Support services - estimating, tendering, buying (supply chain), auditing, health and safety, environmental, legal (including claims) quality, temporary works, marketing, research and development.
 - Company offices and associated buildings - leases, mortgages, utility bills, insurances, maintenance, security, cleaning and the like.
 - Company taxes and levies.
 - Finance/banking costs and charges:
 - IT hardware, software, and support.
 - Legal costs and charges.
 - Insurances and excesses.
 - Permits, consents, licenses, visas and the like.
 - Hospitality, marketing, advertising, photography and the like.
 - Communications - internet, conferencing, phones (land, satellite, mobile, web, fax), stationery.
 - Equipment, assets and depreciation including vehicles.
 - Holding company overheads and contributions.
 - Profit.
- e) **Point of Contact:** Any clarification regarding the market study should directly contact Mr. Daniel Muschett, email: DaMuschett@pancanal.com

END OF DOCUMENT