



THE CONSTRUCTION TECHNOLOGY CONSULTANTS

**STANDARD SCOPE
OF OUR SERVICES**



LOWTHER-ROLTON STANDARD SCOPE OF OUR SERVICES

INTRODUCTION

Lowther-Rolton is a Company of civil and structural engineers formed in 1987 to provide specialist engineering consultancy services in construction technology uniquely specialising in the specific field of load movement, lifting and transportation.

The objective of our truly independent Company is to offer technical advice and assistance in construction technology of the highest quality providing a Professional engineering approach to load movement thereby raising the profile of transportation and lifting.

Lowther-Rolton's focus on engineering aspects differentiates our consultancy service from similar services offered by machine suppliers and contractors, where their contractual responsibility usually ceases at their equipment. A consequence of this arrangement is that the associated engineering aspects, such as site preparation and support for construction equipment, lifting attachment design, local and global stresses in our Client's equipment during load movement operations etc, remain for others to resolve.

The unprecedented services Lowther-Rolton deliver can be adopted at any stage of a project from FEED through engineering to construction. However an early appointment would benefit the Project and assist our Client to achieve their philosophy of completion safely to budget and schedule.

Our team of engineers design practical efficient solutions and construction techniques based on the Company's considerable 'hands-on' experience of the systems and contractors available. We produce designs independently, maintaining flexibility by incorporating suitable contingency measures, which may be enacted should circumstances change, mitigating negative influence on project safety and/or commercial/operational objectives.

The exceptional engineering services we provide are not limited to 'Green-field' sites, they are equally beneficial to 'Brown-field' sites in addition to Turn-Around/Shutdown/Revamp projects.

The work undertaken by the Company is not limited to office desk study based activities but continues through to the construction phase by integrating into our Client's project team.

Lowther-Rolton provides engineering services tailored to suit our Client's requirements including, but not limited to the following:

- 1) FEED Stage Concept and Feasibility Planning Studies
- 2) Pre-tender Stage Concept Studies to Determine Available and Preferred Options
- 3) Preparation of Technical Section of Tender Documents
- 4) Contractor Tender Review and Selection
- 5) Engineering Development, Design and Detail Documentation
- 6) Constructability Studies
- 7) Client Representation and Liaison
- 8) Technical Audit (Technical Check and Safety Audit) Including Operational Attendance
- 9) Construction Management, Supervision and Oversight at Operational Locations



1) FEED Stage Concept and Feasibility Planning Studies

- Engineer concept construction techniques for the project, considering project load movement requirements
- Advise on 'construction led' project development, considering the relationship between methods, economics and safety of the planned construction techniques, deriving the appropriate construction technique and equipment for a project
- Develop strategies for the delivery of our Client's heavy/large equipment to site, involving ocean shipment and ports of loading/discharge, inland marine access and heavy haul routes
- Assist with ground investigation and civil preparation requirements for the support of load movements on heavy haul routes and in construction areas
- Prepare comparative planning studies including concept drawings to assist evaluation of conventional construction techniques and alternative methods such as modularisation, pre-assembly/sub-assembly and pre-dressing of pressure vessels
- Assist development of scope and budget for the project construction

2) Pre-tender Stage Concept Studies to Determine Available and Preferred Options

- Consider availability and characteristics of construction equipment options and suppliers/contractors together with their suitability for the planned construction technique
- Compile concept drawings, schemes, designs and proposals for our Client's consideration, the basis of which does not promote a bias towards any particular contractor, source, supplier or equipment but assists to define and communicate the scope and proposed construction methodology

3) Preparation of Technical Section of Tender Documents

- Assist our Client prepare for the issue of the load movement inquiry, ensuring thorough definition of scope details, required standards and contracting strategy
- Prepare inquiry concept scheme drawings and method statements to provide the methodology on which to issue the inquiry for load movement contracts
- Prepare supporting technical information specific to load movement for the proposed construction method for inclusion in the technical section of inquiry documents
- Liaise with Client's Project Management Team to develop the commercial content of inquiry and contract documents
- Attend discussions, meetings, interviews and investigations to advise on contractors with suitable experience, ability and equipment to receive inquiry documents
- At our Client's request issue inquiry documentation on behalf of our Client to the tendering contractors
- Support our Client's Project Management Team throughout the contractors' tendering period and responding to questions raised

4) Review of Tenders and Contractor Selection



- Promote transparency, excellence and maintenance of a competitive environment throughout the tendering process
- At our Client's request receive and review tender proposals from contractors for load movement contracts
- Evaluate the contractors' technical proposals in the tender returns and comment on the proposals offered therein and compliance with the concept proposed
- Review the commercial content of tenders in conjunction with our Client's Project Management Team and attend tender clarification meetings as required. At our Client's request make recommendation for suitable nominee for the contract award
- Prepare written report and analysis to our Client on the tender results

5) Engineering Development, Design and Detail Documentation

In accordance with our Client's requirements, Lowther-Rolton provide first party engineering and design services or alternatively act as specialist independent third party support to discipline and contractor groups.

In all cases we incorporate flexibility and contingency arrangements throughout our planning and designs to ensure the proposals can accommodate potential future changes, mitigating negative influences should circumstances change.

First party engineering and design services:

- Prepare arrangement and detail drawings for specific load movement operations, lift and rigging studies, transport arrangements (land and sea) etc, supported by appropriate engineering calculations and detailed equipment specifications
- Develop method statements, operational procedures, risk assessments etc to form and define load movement proposals, particularly relevant where equipment is supplied on a hire basis without technical support
- Provide structural engineering relating to a process equipment item or module/structure integrating the dynamic requirements for the various forms of load movement into the design, maintaining flexibility for various modes of load movement which may be considered between points of manufacture and installation
- Determine the ground investigation requirements for specific load movement operations and review the subsequent results and recommendations
- Design support conditions for load movement equipment such as ground preparation or structural support requirements for cranes, lift systems and transporters, including strengthening methods and constructions
- Design associated engineering aspects such as sea-fastenings, transport restraints, staging/laydown supports, lifting attachments , lifting devices etc
- Create innovative concept designs and prepare engineering drawings for specialised structures and equipment to be detailed by others, potentially for later design compliance by Lowther-Rolton

- Prepare arrangement and detail drawings to define dimensional control methods and surveying requirements for process equipment items, modules, pre-assemblies and structures to optimise installation within civil, structural and mechanical tolerances
- Prepare detailed assessments for weight and Centre of Gravity location
- Prepare specification, method statements and interpretations of results for weighing operations to obtain accurate weighing data

Third party support to discipline and contractor groups:

- Provide design assistance for the structural aspects of a process equipment item, structure or module ensuring appropriate standards and procedures are adopted into the design for the dynamic requirements for the various forms of load movement
- Assist engineering discipline groups to develop strategy for a process equipment item, structure or module definition including efficient design details and fabrication methods at interfaces, to minimize residual hook-up scope to be completed at the construction site
- Provide design assistance with the associated engineering aspects to load movement such as sea-fastenings, transport restraints, staging/laydown supports, lifting attachments , lifting devices etc
- Provide design assistance during the engineering of support conditions for load movement equipment to calculate, or estimate, imposed loads considering load spreading construction or specific foundations, together with appropriate ground strengthening methods such as compaction, or piling etc
- Assist engineering discipline groups resolve the ground investigation requirements for specific load movement operations together with reviewing results and recommendations
- Provide advice relating to surveying and dimensional control methods for process equipment items, structures, modules and pre-assemblies to obtain optimal installation within civil, structural and mechanical tolerances
- Provide advice relating to design weight control and physical weight measurement, including Centre of Gravity estimation and measurement, for process equipment items, modules, pre-assemblies and structures

6) Constructability Studies

- Have a pro-active representation in constructability reviews to assist project progress and implement expert advice on construction techniques, equipment and safety
- Continued input during development of detailed design to promote safe and efficient construction
- Review of construction sequence and schedule considering best use of resources such as construction equipment, land and marine transportation equipment, docks/jetties, laydown and pre-assembly areas



- Advice relating to surveying techniques to assist accurate positioning of process equipment items, structures, modules and pre-assemblies minimizing re-work and assisting efficiency of process equipment items, structures, modules and pre-assemblies hook-up

7) Client Representation and Liaison

- Integrate into our Client's Project Management Team and liaise with the process equipment/structure/module designers and load movement contractors during engineering development
- Liaise with our Client's technical discipline groups related with the associated engineering works and ensure information and detail is defined for inclusion in the construction execution plans and contractor work scopes, mitigating against re-work and change orders
- Liaise with statutory parties outside our Client's Project Management Team to advise and review the contractor's detailed proposals
- Assist our Client's Project Management Team develop the planning, sequencing and scheduling of the construction works
- Assist our Client determine suitable structure/module/pre-assembly layout during assembly and storage together with the development of dimensional control strategy for modularisation projects
- Represent our Client at various locations prior to, and during, load movement operations and construction activities to inspect construction equipment proposed for conformity to the requirements of the statutory and Client regulations, preventing inadequate equipment from mobilising or being utilised during operations
- Represent our Client at operational locations to review contractors' proposals for conformity to statutory and Client requirements, together with good engineering practices

8) Technical Audit (Technical Check and Safety Audit)

- Obtain from the transport and lifting contractor fully engineered and detailed proposals for the load movement operations, including supporting information and associated calculations. This includes, but is not limited to, the arrangement and detail drawings for lifting, rigging, transportation (land and sea), jacking and skidding etc
- Technical Audit (Technical Check and Safety Audit) of the contractors' proposals for compliance with the statutory rules, regulations, codes, standards and manufacturer's information applicable together with good engineering practices
- Conduct comprehensive independent review, check and Technical Audit of all load movement schemes, method statements, details and calculations required and issued by the contractors for completeness and accuracy
- Conduct comprehensive independent review, check and Technical Audit of all equipment proposals for suitability of use for each particular application



- Technical Audit (Technical Check and Safety Audit) of all associated engineering aspects to confirm suitability of technical content, ie items such as support foundations, sea-fastenings, lifting attachments, structure under dynamic loading, etc using documentation prepared by our Client and contractors from various sources including existing plant documentation, structural and mechanical design documents, geotechnical and metallurgical reports, load test results, etc
- Check that all perceivable interfaces between the various technical support groups and disciplines have been explored, identified, assessed and resolved positively, as necessary, to mitigate any miscommunication, omissions, etc
- The Technical Audit includes checks (design and operational) made independently from the source material to ensure errors and omissions present in the original design are identified and resolved during the Technical Audit
- Attend operational locations during the load movement and construction phase to affirm that the contractors perform their duties in compliance with the accepted procedures, regulations and standards
- Compile a report upon the performance of the contractors with constructive comments for consideration and implementation in future projects, as requested

9) Construction Management, Supervision and Oversight at Operational Locations

- Attend the construction phase by integrating into our Client's Project Management Team as an active member for managing and co-ordinating load movement operations in accordance with the project schedule requirements
- Assist our Client maintain high and consistent standards of safety and integrity of the load movement operations across all contracts, locations and movement modes irrespective of the profile accorded to the activities by others
- Represent our Client during toolbox talks and pre-lift/transport meetings, providing continuity and 'first hand' support based on our previous knowledge and understanding of the operational planning
- Carry out pre-operational inspections and ensuring quality and safety of preparation, equipment and arrangements are as planned
- Safeguard project assurance by oversight that contractors' proposals are undertaken in accordance with the accepted procedures of the Technical Audit (Technical Check and Safety Audit) the load movements
- Provide continued technical support at all times during construction relating to the construction techniques, engineering and load movement activities

SUMMARY

Our early appointment maintains flexibility in all aspects while engineering continues to develop the project's structures to suit our Client's requirements. This avoids 'locking-in' a contractor or particular equipment and potentially limiting the project's structural design and/or dimensions, etc. Commercial benefits are thereby available to the project by contractors tendering against a uniform project concept, sequence and schedule which maintain flexibility by considering more than one type of equipment and is therefore open to competitive selection.



The engineering development proceeds on the basis that constructability is built-in at an early stage removing any uncertainty of what may or may not be achievable. At such an early stage the structures can be analysed for dynamic loading incorporating the design of attachments and temporary works for load movement and securing, which may otherwise be necessary to be undertaken later. This leads to efficiency in design, fabrication and construction activities as design revisions, potentially costly re-fabrication and abortive work, dependent on the advanced condition of the process equipment items, structures, modules and pre-assemblies etc, should not be necessary.

Our Client may select one or more of the items from the above scope of services dependent upon their specific requirements, with the comfort that our services are specifically designed to suit their project, to look after their interests and provide the best possible service to the project.

Lowther-Rolton has the ability to address all the engineering aspects and interfaces. We have a positive attitude and commitment to assist our Client to achieve their project completion objectives safely, on time and to budget.