Terms of Reference: Empire Bridge Replacement – Design Services

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About this document

This document specifies the terms of reference (TOR) for the undertaking of the design services relating to the Empire Bridge Replacement Project on behalf of the Cook Islands Government.

Interested consultants are requested to submit a proposal to undertake the scope of works outlined within this TOR and the RFT document including Appendices

A Summary of the key design services required are as noted below;

Design Services

- Review of existing information and reports including consultation with key project stakeholders.
- Concept design and cost estimate for replacement of the existing Empire Bridge in Avarua, Rarotonga.
- Submission & approval of minimum design standards to be adopted.
- Detailed bridge design including provision of design statement and calculations.
- For construction drawings and construction specifications.
- Tender documentation including; RFT documents, Contract documents (to NZS3910:2013), Schedule of Quantities (SoQ) and an Engineers estimate for the contract works.

Goals and Outcomes

The Goal of the Empire Bridge Replacement Project is to provide for a safe and reliable land transport network which will encourage and support socio economic development as well as strengthen the resilience of Rarotonga to the impacts of natural disasters and climate change.

The outcomes are:

- A structurally safe, reliable, durable bridge compliant with appropriate standards.
- Provision of a resilient transport network.
- Facilitate social and economic development of Rarotonga and the Cook Islands.
- Secure critical infrastructure and transport routes during and post an event of disaster.
- Use and development of local resources and skills during the project.

Background

The volcanic island of Rarotonga is over 14,750 feet (4,500 meters) above the ocean floor. It is 32 km in circumference and has an area of 67.19 km^2. The island is surrounded by a lagoon, which often extends more than a hundred metres to the reef, then slopes steeply to deep water. The reef however generally fronts the shore to the north of the island. Rarotonga is encircled by a main road, Ara Tapu, which traces the coast. Three-quarters of Rarotonga is encircled by the ancient inner road, Ara Metua.

Location of the existing Empire Bridge

The Empire Bridge is located on the northern side of the island, and is part of Ara Tapu. The Empire Bridge crosses the Takuvaine Stream prior to it entering the Avarua harbour.

With assistance from Local Government New Zealand (LGNZ) and the Ministry of Foreign Affairs, Civil Engineers from the Wellington City Council (WCC) were requested to assist Infrastructure Cook Island (ICI) to perform bridge inspections on Rarotonga, Cook Islands.

The main island, Rarotonga has approximately 76 identified bridges within the transport network. Growth of industry and population has increased the vehicle loads on the current infrastructure. There is a lack of existing information and records on the original design of a majority of bridges (including the Empire Bridge). This is a major concern for ICI with regards to being able to determine the structural capacity of the current bridge assests.

The Empire Bridge was visually inspected with reference to the New Zealand Transport Agency (NZTA) bridge inspection and maintenance procedure which were adapted to the local environment. Refer to the Bridge Inspection Report Cook Islands Wellington City Council dated November 2016. This report recommended replacement, based primarily on the age of the arch section of the bridge and the unknown nature of its design. In addition to the criticality of the bridge to link the main business district and the rest of eastern Rarotonga.

Photos of the existing Empire Bridge

The Cook Island Government has made a commitment to rectify bridges with structural and stability issues around Rarotonga. The Cook Islands Government has allocated budget during the 2017/18 FY for the planning, design and construction of the replacement Empire Bridge. It is prudent that critical bridges be replaced on a timely basis, ensuring a safe and durable road network structure consistent with the National Sustainable Goals, 2016 – 2020.

This TOR will provide a basis for a proposal by suitably qualified consultants to undertake design services for the Empire Bridge Replacement project. This will enable the procurement of a physical works contractor for the construction of the Empire Bridge during the 2017/2018 financial year in line with funding made available by the Cook Islands Government.

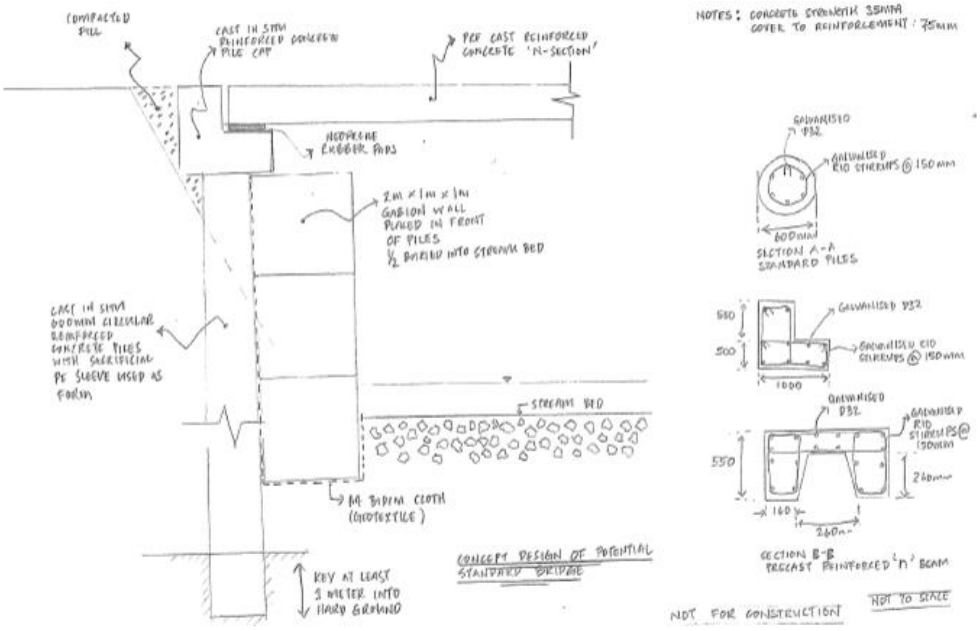
Scope of Services

The Cook Islands Government through Infrastructure Cook Islands is seeking suitably qualified consultants to provide design services for the Empire Bridge Replacement project.

The extent of the works is to include the existing Empire Bridge, the waterway and associated retaining or support structures immediately upstream and downstream of the bridge.

It is intended that while developing a design solution for the Empire Bridge that the design outputs would also be made suitable as a standardised design for bridges in Rarotonga. To this end it is expected that this standard design would include:

- Standardised Foundation design/requirements
- Abutments and pier design (where multiple spans are required).
- Pre-cast/Modular design encompassing the deck and beam into a single modular unit able to be constructed in varying spans as required.
- Provision for pedestrian and cyclists.
- Standardised bridge barriers/rails.
- Provision for the installation of services (water, sewer, storm water, communications and electricity).



Conceptualised drawing for bridge replacement from Bridge Inspection Report Cook Islands Wellington City Council dated November 2016

The required scope of services is as detailed below and is to be read in conjunction with the other sections of the RFT and supporting documents.

- Review the supplied project information and previous reports including concept design information and inputs from key project stakeholders. This is to include the potential to utilise existing infrastructure such as the existing bridge foundations and abutments.
- Propose minimum design standards to be adopted for the Empire Bridge Replacement project. Liaise with ICI and the Project Management Committee (PMC) to confirm minimum requirements.
- Finalise Empire Bridge Replacement concept design based on provided information and additional inputs from key stakeholders. This is to include development of a construction methodology to maintain operation of one traffic lane throughout the physical works and is to be cognisant of the construction capabilities in Rarotonga. Final approval of the concept design is to be gained from the Project Management Committee. It is noted that the finalisation of the Empire Bridge

Replacement concept design is to be undertaken with regard to the available physical works funds and is a key project constraint.

- Undertake a cost estimate for the Empire Bridge Replacement physical works contract based on the concept design and confirmed minimum design standards. ICI will facilitate access to local suppliers, contractors and shipping companies to assist with information required for costing.
- Provision of National Environmental Service (NES) Environment Submission including preparation of an Environmental Impact Assessment (EIA) in line with requirements of the NES. Note works are provisional and requirments will be as per the terms of reference to be provided by NES during the project. Consultants are to provide a cost to undertake a typical Environment Submission and EIA.
- Complete detailed design of the Empire Bridge Replacement including geotechnical and foundation design, structural design, civil design, provision for services including future proofing, Road safety including pedestrian and cyclist use and appropriate road safety barriers.
- Provision of construction drawings suitable for incorporation into a physical works tender document, construction & material specifications and quality requirements, design report outlining the key aspects of the design with all required calculations and information to support the design and a building consent application. It is noted that the Empire Bridge Replacement design is to be undertaken with regard to the available physical works funds and is a key project constraint.
- Provision of tender documentation including; Contract documents utilising NZS3910:2013 form of contract, Request for tender documents including evaluation methodology in accordance with the COOK ISLANDS GOVERNMENT Purchase and Sale of Goods and Services Policy (Procurement Policy), Schedule of Quantities (SoQ). Note it is intended that as part of the construction contract the contractor will be required to provide a suitable durable steel form for the Pre-cast/Modular deck and beam design which upon completion of the works would become the property of the Cook Islands Government for future use.
- Updated cost estimate for the Empire Bridge Replacement physical works contract based on the detailed design of the contract works.

Minimum design standards relating to the Empire Bridge Replacement are to be developed as part of the consultants design scope and reviewed by ICI, for approval by the PMC. Adopted standards including departures from any applicable standards or international best practice are to be advised by the consultant.

Specific Design and durability standards relating to the Empire Bridge Replacement are expected to include but are not limited to:

- Compliance with requirements of Cook Islands Building Code 1990 and associated legislation. Please note that the Cook Islands Building Code is currently under review and allowance is to be made to incorporate the outcomes of this review where practicable. Information in relation to these outcomes will be provided by ICI.
- Design is to be generally in accordance with the NZTA Bridge manual (SP/M/022) latest edition. Including but not limited to the below;
- Minimum design life of 100 years, the structure shall be sufficiently durable to ensure that, without reconstruction or major renovation, it will continue to fulfil its intended function throughout the design life.
- The design loadings are to account for cyclone events in terms of wind, flooding and sea surge.
- Waterway crossing shall be designed to pass an appropriate average recurrence interval (ARI) flood and shall account for scour.
- It is noted that the Empire bridge is on a primary lifeline route and is of high importance in terms of post disaster recovery.

Relevant reports/documentation

ICI are aware of the following documents which provide relevant background or information to the project.

- Site photos.
- Available rainfall and Takuvaine Stream hydrology information.
- Bridge Inspection Report Cook Islands Wellington City Council dated November 2016.
- Additional Empire Bridge inspection information collated during the Bridge Inspection Report Cook Islands Wellington City Council works.
- Coastal Adaptation Needs for Extreme Events and Climate Change, Avarua, Rarotonga, Cook Islands: Project Stage 1: Scoping and Collation of Existing Data. 2013.
- Coastal Adaptation Needs for Extreme Events and Climate Change, Avarua, Rarotonga, Cook Islands. Project Stage 2: Topographic and Bathymetric Survey Data Collection. 2013.
- Coastal Adaptation Needs for Extreme Events and Climate Change, Avarua, Rarotonga, Cook Islands: Project Stage 3: Coastal Engineering Vulnerability Assessment. 2013.

Issues and risks

There are a number of risks associated with the Empire Bridge Replacement project. Those issues, risks or constraints that are considered to have a significant impact on the design services, should they eventuate, have been identified in below. Please note that this is not an exhaustive list and is provided for as part of the TOR.

It is further noted that due to the relative remoteness of the Cook Islands and Rarotonga and limited facilities, including plant, equipment and materials, that construction methodologies and the associated costing will be impacted.

Issues

- Limited access to the island due to transportation links and remoteness.
- Ability of design to be constructed on the island given available plant, equipment and labour
- Identifying and procuring suitable contractors.
- Available physical works funding. It is noted that funding for the construction of Empire Bridge is limited to the available Government appropriations.
- Time frames to complete design and to undertake construction works. Physical works are required to be undertaken prior to June 2018.
- Available plant and machinery, limited on island resources (such as sand and aggregates.).
- Staging of the works to enable traffic flow during works.

Risks

- Lack of Geotechnical investigation for the site.
- Lack of data to assist design.
- Limited testing and quality assurance practices on the island.
- Construction cost exceeding available budget.
- Monitoring of the construction in line with design requirements. Provision of resources/personnel.
- Availability and quality of local and international contractors to undertake the construction works.
- Inclement weather impacting construction, impact of cyclone season on project and programme.
- Traffic Management.
- NES approval of works.

Outputs

The following are the required outputs. Final dues dates will be in consultation with the preferred consultants.

No.	Output	Inputs/tasks	**Due date:** *Dates to be Confirmed with consultant*
1	Detailed work programme	Signing of contract by both parties.	5 working days following signing of contract.
2	Minimum design standards.	Liaise with Infrastructure Cook Islands (ICI) and project stakeholders to develop and get approval of minimum design standards.	Week 2
3	Finalised concept design.	Liaise with Infrastructure Cook Islands (ICI) and project stakeholders to finalise the Empire Bridge concept design. Finalised concept design is to be based on information provided with this TOR and inputs from key project stakeholders. It is noted that the finalised concept design is to be completed in line with the available physical works funding. The finalised concept design is to be provided to the Project Management Committee (PMC) for approval.	Week 4
4	Concept design cost estimate	Provision of concept design cost estimate for the physical works	Week 4
5	NES Environment Submission (provisional)	Provision of NES Environment Submission including EIA as required by NES	Week 8
6	70% Detailed Design and design report.	Provision of draft documents for approximately 70% detailed design including drawings, calculations, material requirements specifications and draft design report.	Week 8
7	Detailed Design and design report.	Complete detailed design including completion of construction drawings, calculations, material requirements specifications and design report. It is noted that the detailed design is to be undertaken with regards to the available physical works funding.	Week 10

8	Tender and contract documentation.	Provision of tender documentation including; Request for tender documents and Contract documents (NZS3910:2013), Schedule of Quantities (SoQ), Completed Engineers estimate for the contract works.	Week 12

Methodology and Programme

Consultants are requested to submit their methodology for the achievement of the goals, outcomes and outputs included within this TOR.

The consultant may elect to spend a portion of the project in the Cook Islands to undertake the required scope of works. Travel including all associated costs will be borne by the consultant and is to be included within the consultants provided costs to undertake the design services.

A draft work plan/programme is to be provided with the consultant's proposal outlining the key activities, required inputs, outputs and time frames for the completion of activities. The work plan is to be finalised following awarding of the works and is to be approved prior to commencement of any substantive works.

Expected Competencies

It is expected that the consultants will have the following key competencies:

- Comprehensive understanding of structural design and geotechnical design including compliance with design standards, legislation and suitable material specifications.
- Expertise in traffic safety in relation to bridge design.
- Expertise in relation to the bridge waterway design including; hydrology, flood flows, scour, storm surge etc.
- Expertise in the preparation of Environmental Impact Assessments.
- Competent in the provision of CAD drafting and detailing.
- Competency in quantity surveying in relation to scheduling and costing of construction projects particularly in the Pacific Islands.
- Proven ability and experience in similar projects.
- Project experience within the Pacific Islands, preferably in the Cook Islands.
- Understanding of expected future climate change and sea level rise impacts.

Team Composition

Consultants are requested to submit an organisational chart, project experience and CV's demonstrating their proposed team and organisation's experience in delivering similar projects

Consultants are to provide at least 2 references as part of their proposal.

Performance Standards

The resulting Empire Bridge Replacement – Design Services contract will be managed and assessed in collaboration with the Principal's representative, ICI. Quality standards adopted must comply with

international good practice and published standards. Delivery standards will be reviewed and endorsed by the key technical ministries involved in this project - (NES, ICI, CIIC). Ongoing conformance with quality and design standards will be accessed as the works progress.

The consultant is required to abide by the Cook Islands Government Public Sector Code of Conduct in particular to carry out their duties in a professional, transparent, participatory and culturally appropriate way.

The consultant is to undertake the works in accordance with the applicable Cook Islands law, regulations and procedures, particularly the:

- Cook Islands Government Financial Policy and Procedures Manual.
- The Cook Island Environment Act 2003 and all subsequent amendments.
- The Cook Island Building Code 1990 and associated legislation.

Governance and Management

The successful consultant will report to the Project Management Committee (PMC) through the Principal's representative, Infrastructure Cook Islands (ICI).

The Cook Islands Government will facilitate the project through the PMC which will contribute support and dissemination of information as well as providing project oversight.

PMC Participant	Description
Infrastructure Cook Islands (ICI)	Implementing Agency with primary project delivery responsibility. Direct reporting by the ICI Project Manager to the PMC. Member of the PMC.
Ministry of Finance and Economic Management	Development Coordination including funding streams and project related engagement with ICI.. Member of the PMC.
National Environment Services	Critical project stakeholder in relation to development and environmental protection. Member of the PMC.
Cook Island Investment Corporation (CIIC)	Coordination and legal input into land issues including responsibility for ownership and asset management in conjunction with ICI following completion of the project. Member of the PMC.

Appendix 1: Additional Information

The following documents are provided as part of the TOR.

- Site photos
- Available rainfall and Takuvaine Stream hydrology information
- Bridge Inspection Report Cook Islands Wellington City Council dated November 2016
- Additional Empire Bridge inspection information collated during the Bridge Inspection Report Cook Islands Wellington City Council works.
- Coastal Adaptation Needs for Extreme Events and Climate Change, Avarua, Rarotonga, Cook Islands: Project Stage 1: Scoping and Collation of Existing Data. 2013.
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