ENERGY FIJI LIMITED TENDER

TENDER NO: MR248/2020

DESIGN AND CONSTRUCT 2 X 33kV/11kV TRANSFORMER PAD AND CARRY OUT ASSOCIATED CIVIL WORKS FOR WAILEKUTU SUBSTATION

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The Energy Fiji limited invites reputable contractors to tender for the Design and Construction of transformer pad and civil works to be carried out for the installation of two (2) new power transformers at Wailekutu 33kV/11kV zone substation. The tender shall be on the basis of a lump sum contract based on firm prices.

EFL is seeking those contractors who shall be able to ensure all civil lightening protection and earth grid works to be completed before **30th May, 2021**. Construction and installation of the bund walls, Firewall, Oil Separator Pit, Fence and gate and other miscellaneous work as specified by the employer's representative shall take place following installation and commissioning of the two new transformers. Bidder to ensure all mandatory documents are submitted as part of the bids.

It is Mandatory for bidders to submit two (2) hard copies of bids in sealed envelopes to the following location:

The Secretary – Tender Committee,
Energy Fiji Limited,
2 Marlow Street,
Suva

The Tenders Should be marked with the Following Details:

"**TENDER NO: MR248/2020 – DESIGN AND CONSTRUCT TWO (2) X 33kV/11kV TRANSFORMER PAD AND CARRY OUT ASSOCIATED CIVIL WORKS FOR WAILEKUTU SUBSTATION"**

COMPANY NAME AND ADDRESS

Further Information about this tender can be obtained from:

Mr. Jitendra Reddy,
Acting/Unit Leader Strategic Procurement, Inventories and Properties
Supply Chain Office,
2 Marlow Street, Private Mail Bag,
Suva
or email: JReddy@efl.com.fj

A Mandatory Site visit will be held at Wailekutu Substation on 28th October, 2020 commencing at 10.30am

The deadline for submission of Tenders shall be 1600hrs on Wednesday 18th November, 2020, Fiji Standard Time.

Tenders received after the closing date and time as stipulated above will not be considered.

It is the responsibility of the bidder to pay the courier charges and all other costs associated with the delivery of the hard copy of the tender bid. **The bid should be fully typed and not hand written, any hand written bid will be disqualified.**

SECTION 1

1. SCOPE OF WORKS

This section covers the civil scope of work required to be carried for preparation of the transformer bay prior to and following the installation of two new 10/12MVA 33kV/11kV Transformers at the Energy Fiji Limited's Wailekutu Substation. The proposed area for the pad works is:

- Currently lies as a green field ground between the primary and secondary fence line as shown in the attached concept drawings.

The civil work scopes of this tender shall be to construct 2 x 50 tonne transformer pad on the in this allocated space. Design details of the two (2) new transformers are as listed in the table below:

One (1) TRANSFORMER ELECTRICAL SPECIFICATIONS	
RATING	10/12 MVA
TOTAL TRANSFORMER MASS	38,000 kg
OIL VOLUME	9,900 liter each

1.2 GENERAL DESCRIPTION

1.2.1 WAILEKUTU SUBSTATION TRANSFORMER PAD WORKS

The transformer pad works shall consist of the following main items:

a) Construction of 2 X transformer pads suited for 50 Tonne of Load each.
b) Construction of transformer bund bases and wall 800mm high x 200mm thick wall
c) Construction of fire walls – 5,200mm high and 200mm thick as per drawings
d) Installation of oil/water drainage system and oil separator pits as per NFA, USA standards. Provide over flow alarm and lay wire to control building till protection panel. Provide all required relay, switch and control wires required for this including conduits.
e) Installation of high voltage cable conduits for 11kV and 33kV cables, each circuit shall be 150mm X 18 conduits from Pad to the cable trench. Install 4 x 100mm conduits for controls cables and 4 x 50mm conduits for earthing. Contractor to provide all the straight conduits and conduit bends required.
f) Construct concrete control cable trench from the transformer pad to the switch room building for control cables Provide cable ladders across the entire cable trench route. Trench to be to AN/NZS standard and with concrete trench cover capable to support 35T loading. Concept drawing for cable trench lay out to be prepared by the contractor during site visit. Allow for all cables entries in the switch room building with conduits and concert entries appropriately after works.
g) Dig and lay HV cable from transformer pad to the 33kV out door switch gear and from transformer pad to the 11kV Switch board. Reinstate trench after laying cable with fine sand bedding, hardcovers, etc.. The portion of cable entering the switch yard after the secondary fence to be in conduit with bends protruding from the ground approaching the 33kV circuit breaker termination point. This will enable for cable fault works without the need for trenching works inside the switch yard. Bidder to place cable markers as required by EFL Engineer. All sizes of conduits and conduit bends needed for the project has to be supplied by the bidder.
h) Run all control cables from the control building till the new transformer.
i) Contractor to supply all the glens which may be needed in this project for the 33kV/11kV or control cables inside the transformer cubical. Note that all the glens supplied by the bidder should be metal glen.

j) Carry out 12 x 11kV Termination and 6 x 33kV towards the Transformer end, carry out 6 x 33kV termination towards outdoor Breaker end and 12 x 11kV termination towards the 11kV switchgear end. (All termination kits will be free issue from EFL). Contractor to supply and install necessary support structures to hold the 33kV cable when it is terminated towards the 33kv outdoor Breaker side. Contractor to supply and install any cables supports required in order to terminate the power cables towards the 11kV switchgear side. Contractor to terminate neutral cables at the transformer and ground ends.

k) Transformer and yard lights (Supply and install):
   1. 4 Philips 100W LED lights fixed to transformer fire walls
   2. 8 x 8m high street light poles with 2 x 100W Philips LED flood lights each complete with all LV wiring from the EFL switchboard.
   3. Street light poles to be complete with all concrete foundations. Foundation to be 300mm above ground level. Poles to be cyclonic proof.

l) Lightening Mast –Design supply and installed on the transformer fire wall and near the transformer perimeter as per the design provided by the consultant. Incase if EFL gives the design perimeters for the Lightening Mast then contractor shall take that into consideration and design and install the lightening mast accordingly.

m) Transformer yard grounding system – minimum 95mm2 bare copper. Bidder to adjust this design with respect to their earthing design requirements.

n) Construction of access road from the Queens road to new transformer pad. A concept drawings is provided under appendix for bidding purposes. Once awarded, the contractor to provide a detailed drawing showing the works that will be carried out in terms the access road inside the zone substation. Access road to be of FRA Standard "R - 308 TYPICAL CROSS SECTION UNSEALED SINGLE LANE SECONDARY, COUNTRY & RESIDENTIAL ROAD"

o) Remove the existing fence and existing roller gate in order to construct the access road and construct new fencing as marked on the Substation overview diagram once the transformer has been placed. Construct a primary fence of 6m high and 16m in length just behind the New Transformer pads. Contractor to design and construct new roller door for the substation entrance once the project has been completed. Note that contractor is not supposed to use any old material taken out from the existing fence in order to build the new fence, the fence removed from the site shall be brought back to Kinoya and scrapped.

p) Mesh Earth GRID minimum 95mm sq bare copper cable laid every 1.5m below the transformer pad and connected via CAD weld to the main grid. The rebar also to be connected to the from the Pad to the mesh grid below the transformer – 4 locations. Contractor to provide all required bare copper cable and CAD welding material. Contractor to carry out all cad welds which will be inspected and approved by EFL representative. Contractor must redo any poor or unsatisfactory cad weld joints.

q) Install crush metal 40mm x 100mm thick with weed control geo fabric mats for the extended substation area and on all areas that will be disturbed for any of the works. Contractor to fill the Transformer bund with AP65 crushed metal (Blast Granite rocks Blue/Grey) of 200mm height from floor level once the transformer has been installed and commissioned. Water drain management and piping to the main Suva City council drain.

r) EFL will free issue all control cables (AC and DC) except the control cable for oil separator pit alarm. The contractor to pick up all EFL free issue material from EFL's Kinoya Depot and return and credit to the depot any unused/remaining material. Contractor to transport all cables from Kinoya Deport and return all drums and remaining cables to Kinoya Stores.

s) Transformer bunds shall have 1 x 415V 60A GPO and 2 x 240V 16A GPO at each bund. All necessary wiring from the EFL distribution board till the Bund shall be contractor's responsibility.

1.2.2 ELECTRICITY, WATER, GAS AND OTHER SERVICES

All electricity and water will be provided on site by EFL. , Gas and other services necessary to execute and complete the Works on site shall be the contractor's responsibility. The contractor must supply and install their own outdoor 3 phase and single phase AC Supply at the works site connected to substation AC board. After completion of works, bidder to remove these and take away from site. Contractor to run their own water supply from EFL mains. This is done so that bidders will not require access to EFL zone substation building for such services should they be required to work unsupervised. Temporary fencing and gate will have to be constructed by contractor inorder to allow them to carry out unsupervised works within the zone substation compound as per concept drawing. Bidder to also provide their own toilet facility at site. Contractor is not to use the EFL building for storage of any of their tools, equipment or material. Security of all material, tools, equipment stored at site is the responsibility of the contractor.

1.2.3 STANDARDS

All civil works shall be carried out in conformity with Fiji Building Code, AS/NZS or the British Standard Institution. All electrical works shall be carried out in conformity to the IEC Standards in general. British or Australian standards may be applied where necessary. Any national or international standard may be used if such standards are not less exacting than corresponding standards IEC, BSI or Fiji Building Code. In all instances, a copy of the relevant standard adopted shall be forwarded to the Engineer.

1.3 GENERAL WORK SCOPE

1.3.1 PRELIMINARY WORKS:

a) Site Survey

1.3.2 SITE CLEARING AND BARICADING :

a) Removal Existing crush metal and barricade work area with danger tape, temporary fencing gate, water supply, electricity and toilet facilities

1.3.3 EXCAVATION:

a) Cutting and filling earth
   - Formation levels shall be as approved by the Employer's Representative.

b) Surface chipping
   - Area covered by earth mat.

1.3.4 CABLE CONDUITS, CONCRETE TRENCH LAYING:

a) Contractor to provide proposed design

1.3.5 FOUNDATIONS:

Concrete Bund base and wall together with fire walls for transformers complete with excavation, backfilling, form works, concrete works and reinforcement bars.

2 Nos. 33kV /11 kV Power Transformers (MVA)

1 No. Oil/Water containment and drainage system. Outlet to be as per Environmental Management Plan.

1.3.6 **LIGHTNING PROTECTION SYSTEM:**

- As per section 2 Technical Specification.

1.3.7 **WATER DRAINAGE SYSTEM:**

a) Surface water drainage system
- Internal surface water drainage system shall be directed as per the Environmental Management Plan.

1.3.8 **CONSTRUCTION & MAINTENANCE OF ROADS:**

a) Approach Road
b) Structures for approach road
c) Access road and structures

1.3.9 **BOUNDARY FENCE REMOVAL AND REINSTATMENT**

a) The contractor to remove the fence as per attached concept drawing and reinstate fence once work has been completed. Supply all required materials.
b) Carry out all required design and construction works.

1.3.10 **FENCE & GATE**

a) Chain link fence and gate to access the two transformers. Reinstate all fencing after completion of works.

1.3.11 **EXTERNAL LIGHTING**

Shall include all transformer yard extension lighting (Philips LED 100W, IP65 rated) with two HPM Daylight Switch. 6lights to be mounted inside fire wall and 8 street lights on outside with new poles. All mounting to be rust free.

1.3.12 **MISCELLANEOUS WORKS**

- Any work other than that listed above

2. TECHNICAL SPECIFICATIONS

2.1 REMOVING OF EXISTING MASONRY/CONCRETE - Unwanted foundations shall be demolished or up-rooted. The Contractor shall clear all areas required for the work. All unwanted materials, debris, etc. shall be removed from the employer's premises.

2.2 **EXCAVATION OF CABLE TRENCH -** The exact location of each trench shall be agreed at the site with the Employer's Representative before the installation work begins. Permits for excavation shall be obtained from the Employer's Representative.

2.2.1 Trenches shall be kept as straight and shall be excavated to approved formations and dimensions. Trenches shall have vertical sides and shall be close timbered and strutted where necessary to prevent subsidence.

2.2.2 The depth of excavated trenches for the installation of HV cables and MV cables shall be according to the Employer's Standards of 1500mm and 1000mmm wide. The Employer's Representative shall make these standards available to the Contractor upon his request.

2.2.3 The Contractor shall use no power excavation tools for excavation within outdoor transformer yard. The contractor shall take all precautions to avoid damaging any other power cables along the cable route.

2.2.4 All excavation, cable laying and back filling shall be carried out only under the direct supervision of a responsible contractors officer and only in the presence of a representative of the Employer's

2.2.5 All backfilling material for 33kV and 11kV trench to be supplied by the contractor i.e. fine sand. All Hep tape to be provided by EFL.

2.2.6 Contractor's responsibility to organize for the disposal of all extra excavated soil.

2.3 **DE-WATERING -** All excavation works are to be kept dry and clean to ensure work is not affected or interfered with by water entering the excavations. The Bidder is to allow in his Tender for the costs of pumping, de-watering or other methods of dealing with the water during and after excavation. No concrete, masonry, brickwork or other materials shall be placed or built until the surfaces are properly drained.

2.4 **CONTROL & POWER CABLE CONDUIT and CABLE LADDERS -** The Contractor is responsible for all civil works required for building in cable conduits and Trench with covers. Cable entries into buildings shall be through conduits. The trench to run from the transformer pad to the 11kV switch gear in the switch room,

2.4.1 Power cable which passes under roads, hard standing areas or where they would otherwise be at risk shall be laid in approved ducts. Each cable should be in individual conduits and shall be installed and the whole surrounded in a minimum of 150 mm C10 concrete.

2.4.2 33kV, 11kV and control cable conduits shall be encased in concrete casings with minimum thickness of 150mm and at depths of 1200mm and 600mm respectively on entry to the substation.

2.4.3 2 x earthing conduits for each transformer shall be encased in concrete casings with minimum thickness of 50mm.

2.4.4 AC conduits shall be encased in concrete casings with minimum thickness of 100mm separately.

2.4.5 DC conduits shall be encased in concrete casings with minimum thickness of 100mm separately.

2.4.6 Cable entries into buildings shall be sealed with approved using suitable materials ROXREC to prevent entry of any water, dust, vermin, etc. Cable entry to the control building shall be provided for future requirements.

2.4.7 All cable ducts shall be laid in straight lines and regular gradients between cable pits, as directed. All ducts shall be kept clear from earth, debris and other obstructions during and after being laid.

2.4.8 Conduit stubs protruding from transformer pads shall extend upwards by 50mm from the top of bund wall so as to inhibit ingress of oil/water should oil/water held in the bund fill up to maximum holding capacity.

2.4.9 Cable ducts shall be of Polyvinyl Chloride (PVC) type material approved by the Employer's Representative and obtained from an approved manufacturer.

2.4.10 Each cable conduit shall be housed with galvanized draw wires of sufficient strength and size to pull cables that shall run within the conduits. The galvanized draw wires shall run the full length of the conduits.

2.5 **CONCRETE BEDS & CASINGS -** Concrete beds and casings shall be applied to all underground cable conduits under roads, buildings, floors and foundations. All casings shall be of lean concrete and of 150mm minimum thickness.

2.6 OIL CONTAINMENT/DRAINAGE SYSTEM - Each bund shall be equipped with an approved oil/water sump and an approved oil/water drainage system. These shall be designed to address three (3) main risks: 1) Catastrophic failure

causing prolonged fire. 2) Catastrophic failure causing large amounts of oil spreading off site. 3) Minimise oil pollution during normal operation. This is as stipulated in the Ausgrid NS189 standard for Oil Containment for Major Substations.

2.6.1 The bund base of each transformer shall be designed to have a 3% slope directing all oil/water towards the designated oil/water sump.

2.6.2 The sumps shall have an approved non-slip surface applied onto the inside walls and base.

2.6.3 The Ausgrid NS189 standard details two (2) drainage systems that can be installed for transformer bunds. These are the Closed Drainage PPS System and the Gravity Drainage System with Oil Containment Tank. The selection of the oil containment system that is most feasible for the transformer bunds shall be made by the Contractor as according to Ausgrid NS189 standard. The design of which shall be submitted for employer's approval prior to any construction and installation works.

2.6.4 As detailed in Ausgrid NS189, the selection criteria for the oil containment system shall be based on a Life Cycle Cost (LCC) analysis together with an assessment of site constraints, site risks, environmental aspects and impacts upon project schedule.

2.6.5 The Contractor shall ensure that the breakout of any fire will be contained within the bund and not transferrable under any circumstance to the oil/water separators or oil tanks to be installed as per the design to be submitted for approval.

2.6.6 The oil containment system shall allow for effective discharging of storm water in the event of heavy rainfall or spraying down of the transformers in the event of a fire.

2.6.7 The oil containment shall be 130% of the total oil volume of the transformer oil (9,900L)

2.6.8 An alarm for oil separator pit overflow shall be installed in the first pit and wired to EFL protection panel for remote monitoring.

2.7 **TRANSFORMER PADS -** Two transformer pads shall be designed to accept a total transformer weight of 50 Tons per transformer. This is to account for future upgrades to higher rated and larger transformers.

2.7.1 The main transformer pads shall be constructed to dimensions 5000 x 3000 mm (LxW); the height of which shall be determined by the Contractor following completion of geotechnical studies. The transformer pad shall extend upwards from the bund base by a maximum 400mm. The Contractor shall ensure that the pad dimensions are sufficient to cover the transformer base footprint and all cable conduit stub-ups. Thickness of pad to be minimum 300mm.

2.7.2 The Contractor shall ensure that the transformer pad surface is levelled to a maximum deviation of ±2mm. The Contractor's engineer shall satisfy himself with the levelling of the two transformer pads.

Note: EFL reserves the right to remove the scope for Geo Technical study and issue the contractors the Geo technical report to work with from its end, therefore contractor has to provide a separate price for Geo technical investigation study report for Wailekutu Substation in case if the scope is removed then bidders will be asked to remove the cost of Geo technical investigation report from the total lump sum bid.

2.8 **TRANSFORMER FOUNDATION -** The transformer foundations are to be designed to accept all normal applied dead and imposed loadings without causing any significant settlement. In addition, foundations shall be designed to accommodate any additional imposed loadings during installation and removal of the transformer. This shall be constructed with a minimum 300mm base thickness and an approved steel reinforcement layout.

2.9 **FILLING & REINSTATEMENT -** If it is required to fill the land, the Contractor shall get approval for the filling material and method of construction before the commencement of work.

2.9.1 Filling for trenches, excavations and levelling of the site shall be deposited in layers not exceeding 300 mm of un compacted thickness, each layer watered when necessary and well rammed or otherwise compacted to within 98% of the maximum dry density obtained by the use of a Proctor Standard Compaction Test.

2.9.2 Any fill material used within 500 mm of concrete structures cement bound materials shall have a soluble sulphate content not exceeding 2.5g per litre when tested in accordance with BS 1377, special precautions shall be taken to protect the concrete or cement bound materials to the approval of the Employer's Representative.

2.9.3 Where excavations whether in rock or other material, are made to a greater depth than detailed, the intervening space shall be brought up to the proper level in plain concrete at the Contractor's expense.

2.9.4 Any formation encountered in the excavations which is not sufficiently strong to carry the loads which will be imposed on it, shall be excavated to an adequate load bearing stratum and replaced with mass concrete.

2.9.5 Unless otherwise described, directed or permitted, imported filling shall consist of pervious naturally occurring material, free from mud, silt, clay, peat, vegetable or injurious matter and water soluble salts harmful to copper and other metals. Filling shall be imported only from approved areas.

2.10 **STABILITY OF FILL AND EMBANKMENT -** The Contractor shall be responsible for the stability of embankments, which formed either by cutting or filling, and precautions taken to protect the earthworks from deterioration under adverse weather conditions. Wherever applicable the recommendations contained in the following codes of practice shall be followed in calculations, detailing and performance of the earthworks and drainage. **Earthworks - British Standard Code of Practice BS 6031-1981**.

2.10.1 All top surfaces of earthwork shall be finished off level and regular and the sides of cuttings and embankments shall be properly trimmed to the detailed slopes. The soil stability of such slopes etc. shall be ensured.

2.10.2 The Contractor shall construct where necessary open ditches, bunds, culverts, etc., to divert and protect the site in both the short and long-term from flash floods.

2.10.3 Should any slips occur in the excavations, banks or filling during the execution of the Works or during the period of maintenance from any cause whatsoever, the Contractor shall execute the necessary remedial work in such manner, and with such materials as approved by the employer's representative, at the Contractor's expense.

2.11 **READY MIXED CONCRETE – <u>30MPA</u>** Ready-mixed concrete shall be provided as defined in BS 5328, which batched off the Site, may be used only with the agreement of the Employer's Representative and comply with all requirements of the Contract.

The concrete shall be carried in purpose made agitators operating continuously, or truck mixers. The concrete shall be compacted and in its final position within 2 hours of the introduction of cement to the aggregates, unless a longer time is agreed by the Employer's Representative. The time of such introduction shall be recorded on the delivery note together with the weight of the constituents of each mix.

2.11.1 When truck-mixed concrete is used, water shall be added under supervision, either at the Site or at the central batching plant, as agreed by the Employer's Representative but in no circumstances shall water be added in transit.

2.11.2 Unless otherwise agreed by the Employer's Representative, truck mixer units and their mixing and discharge performance shall comply with the requirements of BS 5328 part 3.

2.11.3 The bidder must provide the test results of the slump test and of the sample concretes immediately as they are available,

2.12 **BUND WALL -** Commencement of wall construction shall be done following the installation of the transformers. Each transformer bund base shall be surrounded by a low enclosing bund wall designed to a maximum 800mm height which shall account for 130% of the total oil storage capacity of each transformer. An approved non-slip surface shall be applied to the inside bund walls and bases by the Contractor. The Contractor shall ensure that all bunds are designed as according to AS 1940-2004. The bund walls shall be designed for all expected imposed loadings with provision for vertical extension of EI 240 (4 hours) rated fire resistance fire wall.

2.13 11kV and 33kV CABLE laying and LV AC/DC cables

2.13.1 The contractor shall dig and lay 11kV Cables from the switch room to the transformers and shall dig and lay 33kV cables from the new transformer till the 33kV out door switch gear. The cables shall be free issued from EFL. The contractor to carry out 12 x 11kV Termination and 6 x 33kV towards the Transformer end, carry out 6 x 33kV termination towards outdoor Breaker end and 12 x 11kV termination towards the 11kV switchgear end.

2.13.2 The DC and AC control cable to be enclosed in concrete trenches.

2.14 **STONE CHIPPING AND ACCESS ROAD -** Stone chipping used for substation surfacing are to be clean hard crushed stone graded to 40mm (minimum depth 300mm). The formation in areas where stone chipping are to be used shall be well compacted to the approval of the Employer's Representative, and treated with an approved total weed killer, used in accordance with the manufacturer's instructions.

2.14.1 The contractor is to carefully remove the existing crush metal and expose the area where trenching is to be done. All area where excavated material will be placed is to be made free from crush metal and weed mats removed. Crush metal outside area of work is not to be contaminated by any works carried out. All crush metal removed is to be neatly piled at a location designated by EFL representative. All crush metal with new weed mats are to be reinstated after completion of works. The contractor must provide new crush metal for any shortfall and contaminated crush metal. All crush metal is to be washed before application. The contractor to supply and spread the AP40 crush metal for the new areas inside the substation which currently do not have crush metal.

2.14.2 Road works– the existing road from queen's road till the EFL Wailekutu substation Road to be leveled and all pot holes filled with AP40 and compacted up to 98% to support a load of 50Tonne. Construction of new road inside the Substation as per the route shown in the attached concept drawings. Contractor to provide details of the compaction.

2.15 **CHAIN LINK FENCE AND GATE -** Chain link fences shall be constructed of galvanised steel wire, and shall be of such manufacture that when any one segment is cut, remaining segments within the pattern retain their rigidity. The bottom of the fence shall be fixed down with staples to a continuous concrete sill in accordance with BS 1722, Part 10.

1. Fiji Building code applicable.
2. Fence route length 30m approx., **contractor to verify the total length during site visit.**

3. Construction of Primary fence for the Transformer, approx. 16m in length and 6m in height.
4. Remove all existing chain-link, post, and barb wire, no 8 wire completely once the new boundary has been completely done with proper landscaping to ensure the fence is fully secured always and continuous.
5. Mark all pegs to ensure a straight line. Contractor to ensure civil instrument gadgets and survey for marking with the hire of recognized Civil Engineer from the Municipal Council.
6. Seek approval of all materials on site with EFL engineers
   a. All fence post to be class "C" Grade galvanized post

   b. All post to be bent 45 degrees

   c. Spiral razor barbed wire

   d. 3.5mm galvanized chain link

   e. 1.5mm galvanized wire

   f. 12mm deformed rod

   g. Standard concrete blocks – 3 rows of block where required..

7. Install :
   a. Dig and lay 95mm copper earth mat 1m outside fence and make cad weld connection T 95mm2 copper cable and connections 95mm lug for each post.

   b. Dig new fence foundation to match the existing Fencing.

   c. Design and Prepare foundation structural steel and boxing.

   D. Each Galvanized posts to be 2.4m Apart.

   f. Secure each post – no welding allowed

   g. Seek EFL Civil engineer approval before pouring concrete

   h. Concrete foundation pads using standard concrete ready mix 20MPA

   i. Install minimum 3 rows of 6" block with 12mm steel rods, the blocked should be stepped if necessary to suit the landscaping where relevant.

   j. Lay 40mm Electrical pipe for earth leads

   k. New Chain link height to match existing fence height, 3.5 mm galvanized full lengths with No 8 binding wire.

   l. All chain link binding at 10cm intervals to the No.8 binding wire using galvanized 1.5mm wire. Maximum gap between chain link and concrete not more than 10mm or 1cm.

m. The fence shall be pulled taut and supported by three rows of high tensile reverse twisted galvanized barbed wire with 150mm spacing.

n. Brace every 10 post or change of angle with brace both sides.

o. To make and weld earth tail 50mm by 50mm x 4mm with hole 12mm at the centre at every pole.

p. The contractor to put the danger sign notice as supplied by EFL on every 3 pole.

8. Upon installation of new fence, Cover all flat area with weed mat and 150mm thick 40mm crush metal.
9. The existing gate shall be relocated to a new location and new gate needs to be designed and installed by the contractor.

2.16 **LIGHTENING PROTECTION –**

2.16.1 General Requirements

The lightning protection system shall:

- be designed according to recommendations and requirements of AS 1768 as a minimum to ensure that all buildings and equipment at the substation is shielded from lightning at all times (where existing lightning protection exists, its adequacy must be assessed based on this)
- be designed to ensure that lightning masts (where provided) are strategically located within the substation boundaries to ensure lightning protection coverage is optimized
- be designed to ensure that lightning masts must be connected by a dedicated insulated conductor directly to the substation earth grid and be supported to the structure with necessary clamps

The earthing system shall:

- be designed for effective operation of the protection equipment under earth fault conditions
- be designed to ensure a system of equipotential bonding is provided for protection of personnel
- be designed to ensure that the step and touch potentials are kept to safe levels
- be designed to ensure that the transfer of voltages out of the substations is controlled
- be designed to ensure that the interference to telecommunications systems is limited
- be designed to provide earthing system for all buildings and structures (including switchyards), and equipment to be connected to an effective earth shall include, without limitation, the following:
    - the earth grid
    - all accessible exposed metal parts containing or supporting high voltage conductors, including metal parts mechanically connected to the exposed metal parts
    - metallic substation enclosures of all substation equipment
    - surge protection devices
    - cable sheaths, screens and armoring
    - exposed metal of all floor and reinforcing
    - metallic fences

- be designed based on the methodology as described in AS 2067, AS/NZS 3000 and IEEE Standard 80
- be designed by computer analytical methods (such as through use of CDEGS software or similar) and not by empirical calculations
- provide the types of earthing conductor and connection and jointing methods recommended

2.17 **MISCELLANEOUS WORK -** Shall be carried out according to the relevant clause of this specification.

3. EARTHING SYSTEMS

3.1 GENERAL

3.1.1 The earthing of all equipment and the provision of earthing systems, electrodes and connections shall be in accordance with the recommendations in the "Guide for safety in Substation Grounding" IEEE No. 80 and the requirements of this Chapter.

3.1.2 Steelworks and supporting structures shall be bonded and earthed to the substation earthing system. Earth connections shall be made approximately 250 mm above the top of the finished foundation level. Connections shall be made also to the earth terminals of each transformer.

3.1.3 Except where the earth connection is bonded to the steelwork, insulated clamps shall be provided for supporting the earthing connection to high level equipment and the earth screen. There shall be an extension of the earth bar system into the substation buildings for connecting to indoor switchgear, control, relay and ancillary equipment.

3.1.4 All necessary studs, connectors and earth bars shall be provided to permit the connection of each switchboard, motor or other electrical equipment supplies under the Contract to the transformer yard general earthing system.

3.1.5 The provision for earthing shall be such that no reliance is to be placed on the conductivity of metal to metal joints without the use of special connectors however lightning arresters must be directly connected to the earthing grid.

3.1.6 The earthing copper conductor shall be minimum 185mm^2 in cross sectional diameter. Total route length is 500m inclusive of the joints. Number of T-joints is 40 and number of lug joints 8.

3.1.7 Trench earthing copper 50mm X 5mm flat bar route length – 50m and 25 insulator holders.

3.2 EXTENT OF WORK

3.2.1 The Contract includes the Complete design of the substation earthing system including, connections of Plant supplied under this Contract to the main earthing system and all Site Tests as specified in this specification.

3.2.2 The main earth system shall be installed prior to the construction of the transformer and equipment foundations.

3.2.3 The Contractor will be required to prepare installation drawings and schedules of material to be provided. These drawings and schedules shall be submitted to the Employer's Representative for approval together with calculations of step, touch and mesh potentials.

3.2.4 The contractor shall connect the new earthing grid to the existing earthing grids. The Employer's Representative shall approve the position at which the connections are made and the number of connections.

3.3 DESIGN OF EARTHING SYSTEMS

3.3.1 The grounding system shall be designed according to the guideline given in ANSI/IEEE Standard 80.

3.3.2 The site shall be provided with earth grid of buried conductors designed for an earth fault current specified 31.5kA for duration of 3 second, keeping the step and touch voltages within the limits as recommended in the guide ANSI/IEEE std. 80.

3.3.3 The design of earth grid over the area occupied by the new transformer yard and associated apparatus shall be based on a maximum grid spacing of 17m x 15m.

3.3.4 The Contractor shall carry out Site tests of the ground resistivity not later than one month after the award of the Contract and his final design of the earthing system shall be submitted and approved prior to foundation excavation works.

3.3.5 Earthing points shall be provided by the Contractor such that the combined resistance of the earth grid and earthing points does not exceed 1 ohm, however combined resistance shall be considered for acceptance provided that the conditions recommended above are satisfied. It is the Contractor's responsibility to provide design calculations.

Note: EFL reserves the right to remove the scope for consultancy for Lightening protection study and earth grid design report and issue the contractors the lightening protection and earthing study report to work with from its end, therefore contractor has to provide a separate price for Lightening protection and earthing study report for Wailekutu Substation in case if the scope is removed then bidders will be asked to remove the cost of lightening protection and earthing design report from the total lump sum bid.

3.4 CONSTRUCTION OF EARTH GRIDS

3.4.1 The earth grids shall be of hard drawn high conductivity copper conductor 200mm^2, and shall be installed at minimum depth of 600mm approved by the Employer's Representative below the ground level. After the construction of footings and foundations the area shall be backfilled. Cad weld shall be used where two earth conductors are to be joined.

3.4.2 Connections for the transformer neutrals shall be provided using 50X5mm copper bar.

3.5 **EARTHING POINTS -** The number of earthing points shall be verified by Site earth resistivity tests after the letting of the Contract.

3.5.1 Each will consist of at least 15mm diameter copper rod electrodes, driven into undisturbed soil. Each electrode will be complete with approved non-ferrous clamps for the connection of earthing conductors and with a hardened steel tip and cap driving by means of a power hammer.

3.5.2 Test link chambers and covers for each earthing point are to be provided and the Contractor for the approval of the Employer's Representative shall submit a drawing showing the proposed arrangement.

3.6 CONNECTION OF EARTHING POINTS AND SYSTEM NEUTRALS

3.6.1 The electrodes of an earthing point shall be connected to the test link and there shall be duplicate conductors from each test link to the earth grid.

3.6.2 Any neutral points for high voltage systems within the substation will have duplicate connections to earth grid.

3.6.3 Conductors interconnecting the electrodes to a test link and between the test links and the earth grid will have a cross-sectional area of not less than 150 sq. mm. There will be at least two connections from each steel support etc. to the earth grid. Duplicate connections may be in the form of rings.

3.6.4 Earthing conductors will be of soft annealed high conductivity copper stranded in accordance with Table 4 in BS.6346. Earthing conductors will normally be buried directly in the ground but where necessary they may be cleated to walls, fixed to cable racks or laid in the cable trenches as convenient.

3.7 EARTHING EQUIPMENT

3.7.1 The frames of all electrical apparatus and the bases of all structural steelwork shall be connected by branches running to a group of equipment. All earth terminals and neutral current transformers shall be connected to the earth grid.

3.7.2 Earthing of new 33kV/11 kV transformer yard shall be properly performed with copper strip 50mmX5mm, which enable connection to the equipment installed in and linked to main grid with more than two wires.

3.8 JOINTING AND BONDING

3.8.1 Connections to plant and equipment shall be made using the earthing terminals specified in the Contract. Where a strip has to be drilled to fit an earth terminal the hole shall not be greater than half the width of the strip.

3.8.2 Joints in earthing strip shall employ chemical welding or high compression joints.

3.8.3 The main EFL Grid and the Transformer Grid shall be connected in at least 4 point

4. INSPECTION AND TESTS

4.1 The Authority's Engineer representative shall have the right to inspect the works and to confirm conformity to the contract specifications.

4.2 Should any inspected works fail to conform to the specifications, the Authority may reject them and the Contractor shall make all alterations necessary to meet the specification requirements.

4.3 Nothing in this clause shall in any way release the Contractor from any other obligations under this contract.

5. SITE CONDITIONS

5.1 The site is located at the 33kV/11kV Wailekutu Substation. The Contractor shall be deemed to have visited the site of the works to satisfy him/her as to the accuracy of all information supplied to the Tenderers and to the feasibility of construction of the works.

5.2 The proposed location is in a Substation equipped with therefore all necessary Safety Gear must be worn by the Contractor's Staff at all times.

5.3 The Contractor may only enter the site upon provision of access by an Authorized EFL representative. The Contractor is not to execute any work without direct supervision from the EFL representative. The times for work are 8am to 4.30pm Monday to Thursday, and 8am to 4pm on Fridays. Work during weekends would require prior approval from management.

6 SETTING OUT

6.1 All tenderers shall inspect and examine the site, its surroundings, and shall satisfy himself before submitting his tender, as to the form and nature of the site, the nature and type of existing work, the quantities and natures of the work and materials necessary for the completion of the Works and the means of access to the site, the accommodation he may require, the availability, conditions and rates of pay of labour and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his tender.

6.2 The Contractor shall be responsible for the correct detailed setting out of the Works as indicated in the Tender Documents and shall, at his own cost, amend any errors during the progress of the Works arising from inaccurate setting out.

6.3 If a tenderer has any doubt as to the meaning of any portion of the Works, he shall when submitting his tender, include a statement of the interpretation upon which he replies and upon which his tender has been prepared and submitted.

6. MATERIALS, WORKMANSHIP AND PLANT

6.1 Materials in all trades shall be new and the best of their kinds specified and necessary complying with relevant standards (Fiji, Australia, New Zealand or USA) where applicable and subject to approval or rejection by the Engineer.

6.2 The Contractor shall at all times ensure that adequate protection is provided to finished work and materials to be used in the construction of the work. Where necessary, make good any damage to property.

6.3 The Contractor shall provide all workmen, both skilled and unskilled, plant, equipment and materials necessary for the expeditious completion of the work.

7. OCCUPATIONAL HEALTH AND SAFETY

7.1 The Contractor shall comply with the Health and Safety at Work Act, 1996 and regulations and Amendments thereto and the Energy Fiji Limited HSE Policy.

8. GENERAL FOREMAN

8.1 The Contractor shall appoint a competent General Foreman who shall be constantly on the works during the progress of the same, to whom instructions may be given by the Engineer.

8.2 The Engineer may require the Contractor to dismiss the General Foreman or other person shall he be incompetent or shall misconduct himself or for any other good reason to be assigned by the Engineer to the Contractor.

9. MAINTENANCE AND DEFECTS

9.1 Period of maintenance shall be 1 year (12) calendar months after practical completion of works. All defects during this period shall be made good by the Contractor, at his cost.

10. CLEANING UP

10.1 On completion, remove all surplus materials from site and leave site in a clean and tidy condition.

10.2 The Contractor shall remove and cart away all rubbish and trade debris as it accumulates during the progress of the works.

11. PROGRAM

11.1 Within seven (7) days of acceptance of his tender, the Contractor shall submit to the Authority, for approval a Program showing the order in which he proposes to carry out the works. **The contractor shall ensure all civil and earth grid works shall be complete by the 30th May 2021 Construction and installation of the pad, bund walls, fire wall, fences and gate and other miscellaneous work as specified by the employer's representative shall take place following installation and commissioning of the two new transformers.**

12. INSURANCE

The Contractor is to effect the following insurance policies:

12.1 Contractor's All Risk Insurance - $500,000

12.2 Public Liability Insurance - $500,000

12.3 Workmen's Compensation - $250,000

12.4 PI insurance Cover

13. PRICE AND PAYMENT

13.1 The Contract Price is to be on a Lump Sum basis. The tenderer is to submit a breakdown of the various components of the project.

13.2 The Contractor's request for payment shall be made to the Authority in writing, accompanied by invoice(s) describing, as appropriate, and services performed, together with other documents as may be required by the Authority. Payments shall be made promptly by the Authority, within thirty days of submission of an invoice/claim by the Contractor.

13.3 The Contractor is eligible for payment after completion of the Contract. No partial payments will be made.

14. VALIDITY

14.1 The Tendered Price is to remain valid for a period of 60 days after the closing date of the tender.

15. PRICE SCHEDULE

No.			TOTAL PRICE (VIP)
1	Design for both the transformer pads and road layout		
2	Consultancy for Geo Technical investigation		
3	Consultancy for Lightening Protection and earth grid design report for the two new Transformers.		
4	Backfilling and Compaction inside the Substation		
5	Construct Two new Transformer Pads, bund wall, Fire wall, Oil Separator Pit and Drainage		
6	Chain-link Fence and gate		
7	Access Road		

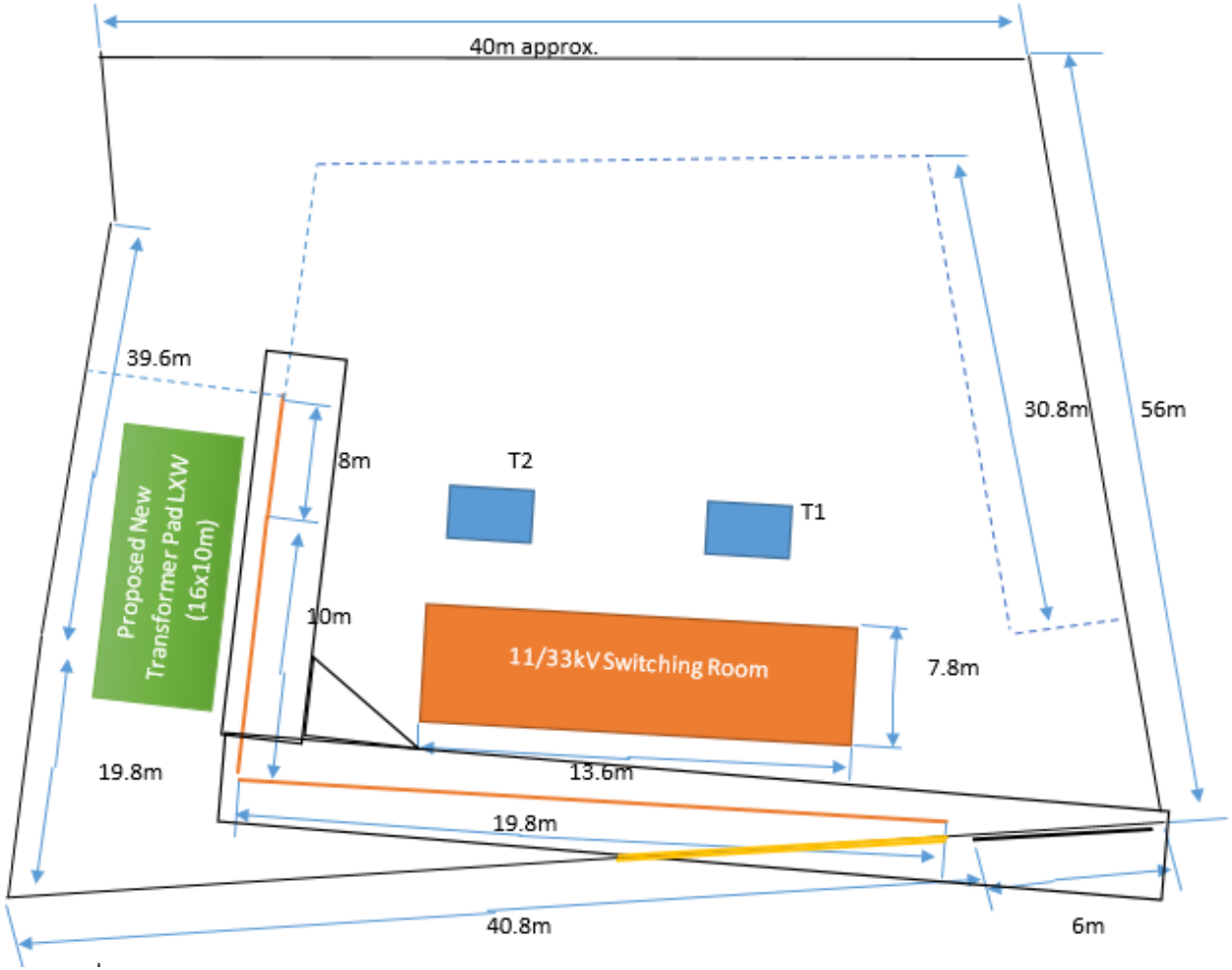
8	Construct and install lightning Mast, Earthing and Installation of Earth Grid		
9	Philips LED 100W flood lights (IP65 rated) and street lights		
10	HV/LV /control Cable Trench works		
11	11kV and 33kV cable termination, supply and installation of 33kV cable support structure.		
12	Two units of Brother Ferrule MachineE850TKW with Complete accessories (Ferrule tubes and Labels)		
13	Other (Specify)		
	Total Cost		

Note: If EFL provides the Consultancy Reports for Item 1 & 2, this costs will then therefore be removed during the evaluation stage or during the award stages or after the award stages if this work has not already been engaged by the contractor.

All local bidders to provided prices in FJD VIP.

16. Bidder to provide DRAWINGS AND ATTACHMENTS

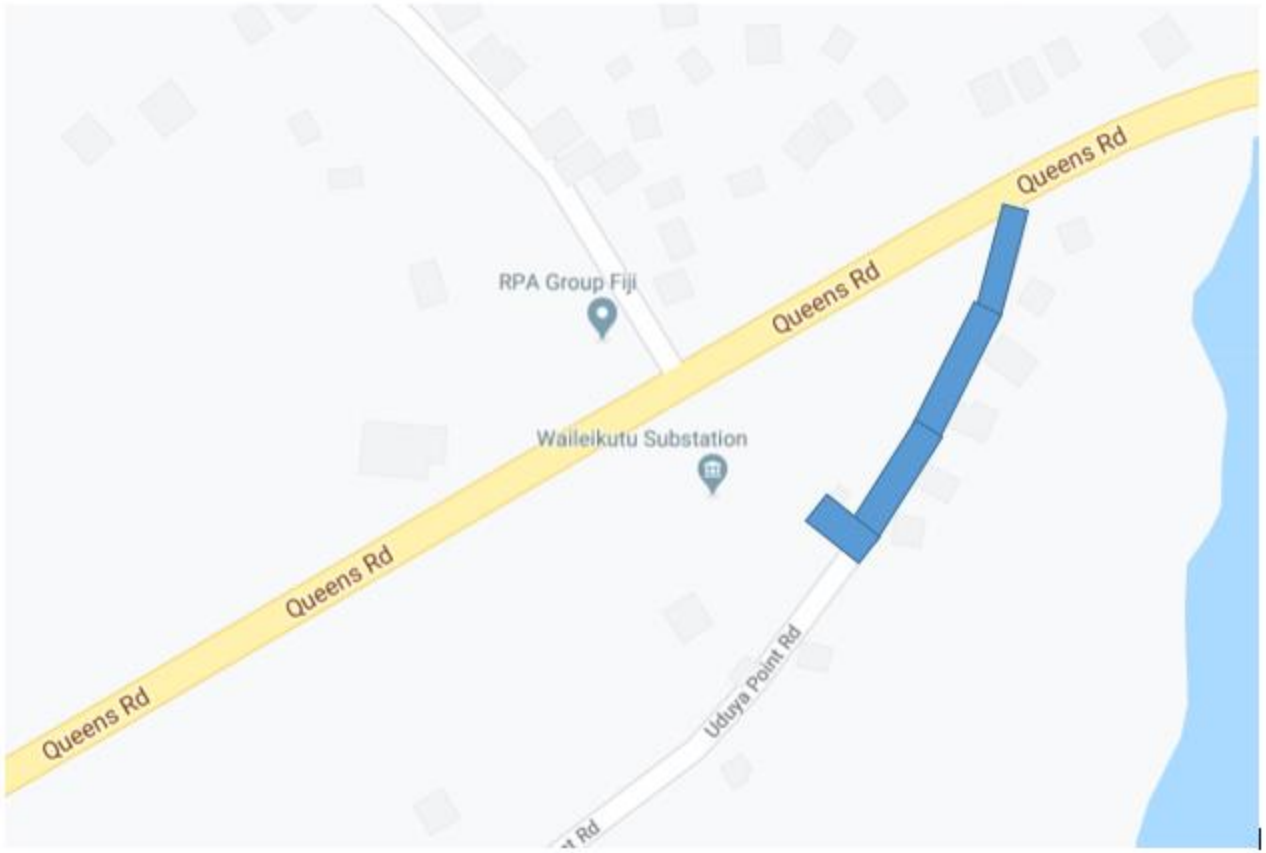
WAILEKUTU SUBSTATION OVERVIEW DRAWING



Key:

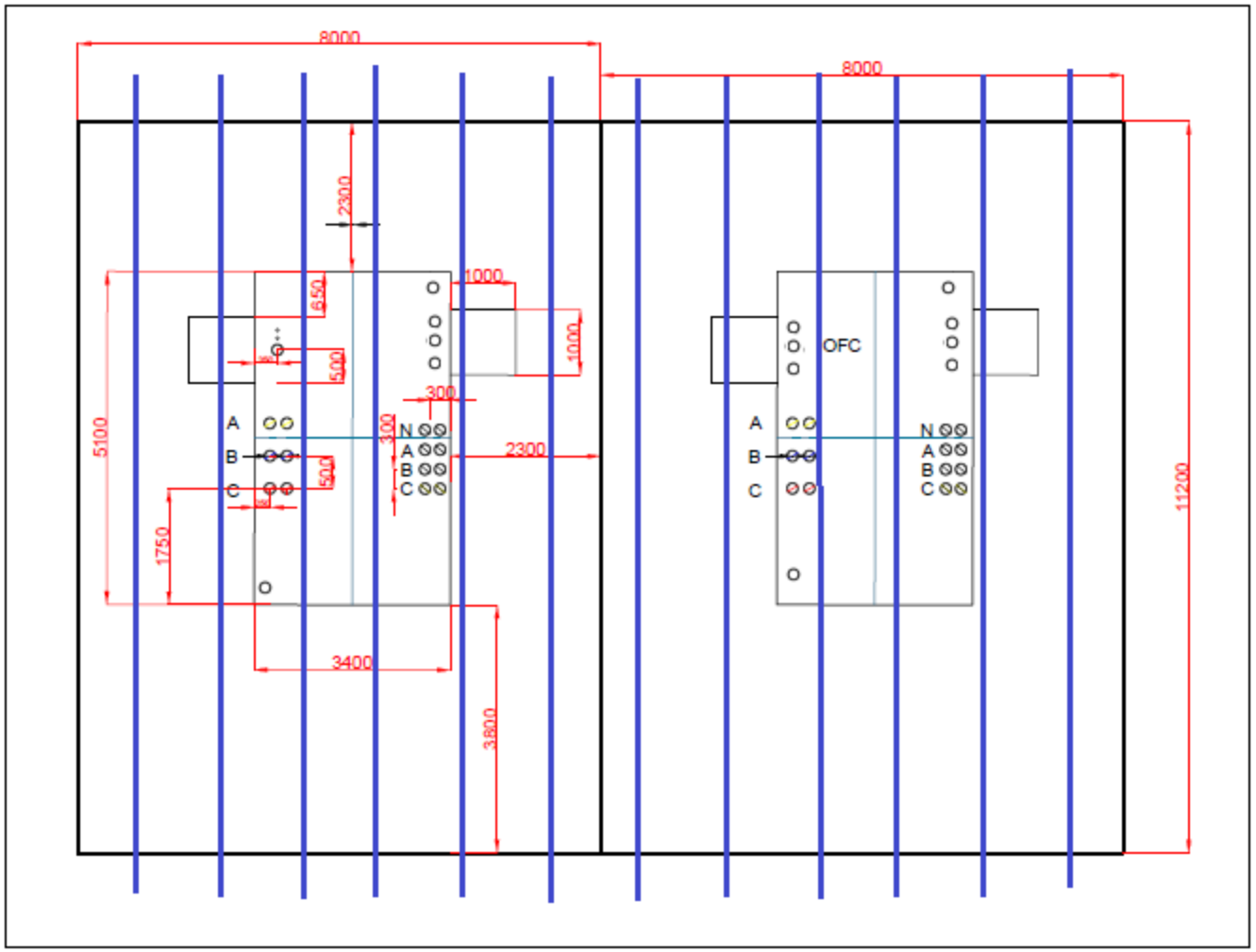
1. Outside Boundary :
2. Inside Boundary :
3. Inner Fence to be removed :
4. Outer Fence to be removed:
5. Roller Gate :
6. Existing Transformer Pads:
7. Area to be crush Metaled:
8. New road inside the Substation:

ACCESS ROAD ROUTE



Key:

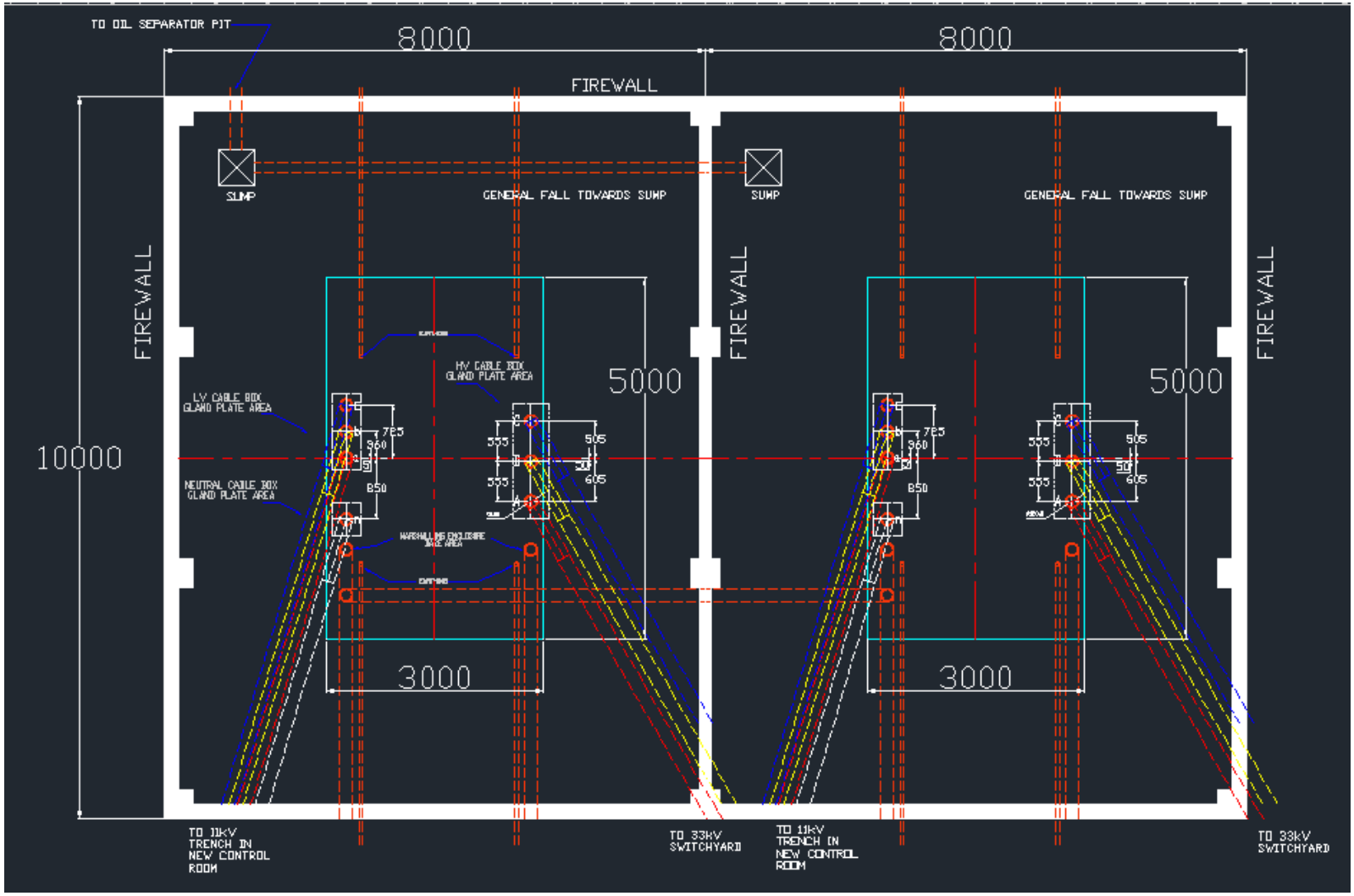
Route for the construction of the road access:


8000
8000
2300
650
1000
1000
500
300
5100
A
B
C
N
A
B
C
300
2300
500
1750
3400
3800
OFC
11200
EARTH GRID

Appendix 1: Wailekutu Substation Location, -18°1042252"S, 178.3862.9"E

Typical Drawing of a 10/12MVA transformer Foundation Pad.

Note, this is not the final drawing, this is just a design concept.



SECTION 2

1 CONTRACTOR HEALTH & SAFETY PLAN

The bidder shall complete the following sub-sections to provide details in relation to the Health and Safety plans for the project.

1.1 CONTRACT DETAILS

Contractor Name: _____

Contractor Address: _____

Contractor Representative: _____

Contract Description: _____

Location of Works: _____

Timing of Works (approximate): Start Date:_____ End Date:_____

1.2 RESPONSIBILITIES

Name	Position Held	Safety Responsibilities	Contact Number (Direct)

1.3 EMERCENGY CONTACT DETAILS

Contact	Name	Position	Contact Number (Direct)
First Contact			
Second Contact			
Third Contact			
Forth Contact			

1.4 SCOPE & TASK DETAILS

List Major Tasks

1.5 RISK ASSESSMENT

Risk assessment is a fundamental tool in management of risk. It Involves the identification of hazards and control measures. Describe how you plan to carry out this process for this particular application contract.

1.6 SAFE WORK PROCEDURES

After completing the risk assessment, you must compile a safe system of work describing how you plan to control the hazards you have identified. Complete the following section outlining how you will ensure that all employees and subcontractors understand the Safe Work Procedures (SWP). Also attach copies of the relevant SWP.

1.7 PERSONAL PROTECTIVE EQUIPMENT

Where risk assessment identifies the need for personal protective equipment (PPE), then PPE must be made available. List down below the PPE you will require for this project.

1.8 ACCESSING SITE/TIMES OF WORK

If work is going to be carried out at EFL premises, then it is important to determine when you will be accessing the Site. You may need to sign a PASS and sign in and out. This will avoid conflicts with other activities which may be continuing on site during contract works. Describe below your site access requirements.

1.9 FENCING & SEPARATION OF WORK

In order to protect our employees as well as general members of the public, the work areas should, so far as is possible, be physically isolated with barriers like bollards, cones, tapes, netting, etc. Describe below how you will fence or separate your work.

1.10 SIGNS AND WARNINGS

Sufficient signs should be erected or placed so that adequate warning is afforded around the worksite. Describe the kinds of notices you will be putting up and places where you will be putting this.

1.11 GENERAL STORAGE & DISPOSAL OF WASTE

Describe below what waste you anticipate producing and how you plan to store and/or dispose off waste. You must take into account the nature of the waste e.g. hazardous/flammable.

1.12 FIRST AID & INJURY MANAGEMENT

A first aid program for contractors is outlined in FEA Safety Manual. Please describe below any additional first aid needs and specific Injury management process for this contract.

1.13 EMERGENCY PROCEDURES

Identify specific emergency procedures or equipment required for the contract.

1.14 INCIDENT REPORTING & INVESTIGATION

Describe how incidents will be reported and investigated during the contract.

1.15 SPECIALISED WORK OR LICENSING

List any special licences required for the contract.

1.16 TRAINING & INDUCTION REQUIREMENTS

Training and inductions for contractors are to be completed in accordance with the EFL Training requirements. List any training required for the contract works in relation to safety, for example safe procedure training and attach training certificates:

1.17 SAFETY MONITORING

List any ongoing inspections, hazards management or incident reporting or investigation processes to be used during the works, if relevant.

Describe below your site access requirements.

1.18 SUBCONTRACTOR MANAGEMENT

Complete the attached Subcontractor List detailing the subcontractors to be used and the details of the subcontractor management:

Sub Contractor Name	Sub Contractor Representative Name	Description of Work	Date of Local Induction

1.19 PLANT & EQUIPMENT REGISTER

Complete the following table:

Type	Registration Include: Design, Design No. Item, Item No.	Purpose (Use on Site)	Inspection Date and Frequency	Inspected by

Contractor Signature: _____

Date: _____

1.20 CONTRACTOR CHEMICAL REGISTER

Complete the following table:

Product Name	Hazard	Controls Required	Location	Quantity

Contractor Signature: _____

Date: _____

2 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

As a **Mandatory** requirement to be considered for technical evaluation, the following documents & drawings shall be submitted with the Bid:

2.1 Typical plan and section drawings of transformer
2.2 Typical Foundation drawings of transformer
2.3 General chart of the design and Construction schedule clearly showing the dated up to 30th June, 2021.
2.4 Proposed design for the bund and firewall
2.5 Design Works for the proposed Road
2.6 Design Works for the proposed Fence and gate
2.7 Evidence of Bidder's experience in works similar to this.
2.8 Evidence of Bidder's subcontractor's experience in works similar to those subcontracted.
2.9 List of standards the Bidder intends to follow for the electrical works.
2.10 Geo Technical Contractor and experience
2.11 Lightening Protection and Earthing design sub-contractor and experience
2.12 Structural designer and experience profile approved by Suva City Council
2.13 Civil designer and experience profile and approved by Suva city Council
2.14 Inspection engineer
2.15 Contractors contract organization structure
2.16 Professional Indemnity Insurance cover in Fiji by Designer
2.17 Workers Compensation Insurance cover of $500,000
2.18 PI insurance cover
2.19 Public Liability Insurance cover the value of contract
2.20 All Risk insurance cover to the value of contract
2.21 Street light design and proposed street pole
2.22 Lightning proposed design and type of pole
2.23 Deviation list
2.24 Variation rates
2.25 Contractors Health and Safety Plan
2.26 Cable trench, conduits and LV AC / DC cables

TENDER SUBMISSION CHECK LIST

The Bidders must ensure that the details and documentation mention below must submitted as part of their tender Bid

Tender Number _____

Tender Name _____

1. Full Company Name: _____
   (Attach copy of Registration Certificate)
2. Director/Owner(s): _____
3. Postal Address: _____
4. Phone Contact: _____
5. Fax Number: _____
6. Email address: _____
7. Office Location: _____
8. TIN Number: _____
   (Attach copy of the VAT/TIN Registration Certificate - Local Bidders Only)
9. Company Registration Number: _____
   (Attach copy of the Business License)
10. FNPF Employer Registration Number: _____

    (For Local Bidders only)

11. Contact Person: _____

I declare that all the above information is

correct.

Name:_____

Position: _____

Sign: _____ Date: _____

Submission of Tender

Two (2) hard copies of the tender bids in sealed envelope shall be deposited in the tender box located at the Supply Chain Office at the EFL Head Office, 2 Marlow Street, Suva, Fiji.

Courier charges for delivery of Tender Document must be paid by the bidders.

This tender closes at 4:00 p.m. (16.00hrs Fiji time) on Wednesday 18th November, 2020.

Each tender shall be sealed in an envelope with the envelope bearing only the following marking:

MR 248/2020

Design & Construct 2 x 33kV/11kV Transformer Pads and Carry out Associated Civil Works for Wailekutu Substation

The Secretary, Tender Committee

Energy Fiji Limited

Supply Chain Office

Private Mail Bag,

Suva

It must also indicate the name and address of the tenderer on the reverse of the envelope.

All late tenders, unmarked Envelopes and envelopes without bidder's name and address on the reverse on the envelope will be returned to the Tenderers unopened. (Bids via e-mail or fax will not be considered).

The bidders must ensure that their bid is inclusive of all Taxes payable under Fiji Income Tax Act and must have the most current Tax Compliance Certificate.

For further information or clarification please contact our Supply Chain Office on phone **(+679) 3224360 or (+679) 9992400.**

Bidders are requested to submit a:

- **Valid Tax Compliance Certificate**
- **FNPF Compliance Certificate**
- **FNU Compliance Certificate**

The Tender Bids particularly the "Price" must be typed and not hand written.

(Tender Submission via email or fax will not be accepted)