FIJI ELECTRICITY AUTHORITY

BIDDING DOCUMENT

Tavua 33 kV Substation Project
CIVIL WORKS

TENDER NO: MR 109/2015

REVISION SCHEDULE:

Date	Notes	Prepared By		Rev No.
08/05/15	Civil Works for New and Existing 33kV Bays – DRAFT COPY	Shamit Prakash & Satvindar Singh		1
17/06/15	FINAL COPY	Ravind Narayan		2

INVITATION FOR BIDS

Date: **20th June, 2015**
Tender No: **MR 109/2015**

The Fiji Electricity Authority ("The Employer") invites sealed bids from reputable s and suitable Civil Engineering contractors for the extension of Tavua 33 kV Substation Project in Tavua.

The project includes the extension of existing 33kV busbar to accommodate a new bus section bay and two new line feeder bays, with associated protection and controls of AC and DC plant. Modification to an existing line feeder bay (Rarawai – Vatukoula feeder bay) is also required.

The bidder is required to submit a bid for:

The complete ONLY civil works for new and existing bays including pad works for three (3) 33kV Circuit Breakers, eight (8) Disconnectors, two (2) Bus support structures, three (3) Surge arrestor/VT support structures, and three (3) Cable support structures, laying of earth mats, digging cable trench and laying AC/ DC controls, 33kV underground cables and other associated requirement of an extension to the existing 33 kV busbar at Tavua Substation site in Tavua.

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 FEA Head Office, 2 Marlow Street, Suva, Fiji.

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

This tender closes at 4:00pm, on Wednesday 8th of July, 2015.

Each tender shall be sealed in an envelope with:

The envelope bearing only the following marking:

Tender- MR 109/2015 – Civil Works for 33kV Tavua Substation Extension

The Secretary, Tender Committee
Fiji Electricity Authority

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 will be returned to the Tenderers.

For further information or clarification please contact our Supply Chain Office on phone **(+679) 3224360 or (+679) 9991587.**

All bids for the contract shall be submitted on the appropriate forms provided and shall include the completed price schedule, technical schedule and schedules of experience etc. The bid shall be on the basis of a lump sum contract based on firm prices.

Bidders may obtain further information from, and inspect and acquire the bidding documents, at

Tavua 33 kV Substation Extension Project – Civil works
Tuvitu Delairewa
General Manager Corporate Services
2 Marlow Street, Suva, FIJI.
Phone: 679 3224 185
Email: TDelairewa@fea.com.fj

The deadline for submission of bids shall be **1600hrs (local time) on Wednesday, 8th July, 2015.**

During evaluation of bids the Authority may invite a bidder or bidders for discussions, presentations and any necessary clarification before awarding the contract price proposal.

A site visit is planned for Wednesday, **24th June, 2015 at 1100hrs (local time)**. Interested bidders are required to meet at the FEA's Tavua Substation in Tavua, Viti Levu. The GPS coordinates for Tavua Substation are 177° 28' 34.50612" E,17° 27' 22.553316" S. **Failure to attend the compulsory site visit will result in automatic disqualification of the tender bid.**

Section 1 - Instructions to Bidders

A. General

1. Scope of Bid

1.1 The Fiji Electricity Authority (hereinafter referred to as "the Employer"), wishes to receive bids for completion of New and Existing 33kV Bus and Feeder Bays Civil Works at its Tavua Substation, as defined in these bidding documents (hereinafter referred to as "the Works").

1.2 The successful bidder will be expected to complete the Works within 4 months from the date of commencement of the Works. The commissioning should be completed by October, 2015.

2. Eligible Bidders

2.1 This invitation is open to all Bidders who have sound Financial Background, and have previous experience in handling such civil projects.

3. Eligible Materials, Equipment and Services

3.1 The materials, equipment, and services to be supplied under the Contract shall have their origin from reputable companies as specified by FEA and from various countries and all expenditures made under the Contract will be limited to such materials, equipment, and services. Upon request, bidders may be required to provide evidence of the origin of materials, equipment, and services.

4. Qualification of the Bidder

4.1 To be qualified for award of Contract, bidders shall:

(a) submit a written power of attorney authorizing the signatory of the bid to commit the bidder; and

5. One Bid per Bidder

5.1 Each bidder shall submit only one bid either by itself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid will cause all those bids to be rejected.

6. Cost of Bidding

6.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs.

7. Site Visit

7.1 The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the design-build and completion of the Works. The costs of visiting the Site shall be at the bidder's own expense.

7.2 Site meeting attendance is compulsory at 11.00am Wednesday 24th June at Tavua Substation

7.3 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for

the purpose of such inspection, but only upon the express condition that the bidder, its personnel and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the inspection.

8. Clarification of Bidding Documents

8.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing by fax (hereinafter the term "fax" is deemed to include electronic transmission such as facsimile, cable and telex), or email at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which it receives earlier than 10 days prior to the deadline for submission of bids. Copies of the Employer's response, including a description of the inquiry, will be forwarded to all purchasers of the bidding documents.

9. Amendment of Bidding Documents

9.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by issuing addenda.

9.2 Any addendum thus issued shall be part of the bidding documents pursuant to Sub-Clause 9.1, and shall be communicated in writing or by fax to all purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by email and fax to the Employer.

10. Language of Bid

10.1 The bid, and all correspondence and documents related to the bid, exchanged between the bidder and the Employer shall be written in the English language.

11. Bid Form and Price Schedules

11.1 The Bidder shall complete the Bid Form and the appropriate Price Schedules furnished in the bidding documents in the manner and detail indicated therein, following the requirements of Clauses 15 and 16.

12. Bid Prices

12.1 Bidders shall give a breakdown of the prices in the manner and detail called for in the Schedules of Prices.

13. Bid Currencies

13.1 Prices shall be quoted in the following currencies:

(a) The prices shall be quoted in the Fijian currency and either in the currency of the bidder's home country.

14. Bid Validity

14.1 Bids shall remain valid for a period of **180 days** from the date of Deadline for Submission of Bids specified in Sub-Clause 21.1.

15. Format and Signing of Bid

15.1 The bidder shall prepare one original and two (2) copies of the technical proposal and the financial proposal, clearly marking each one as: "ORIGINAL-TECHNICAL & PRICE PROPOSAL", "COPY NO. I - TECHNICAL & PRICE PROPOSAL", etc. as appropriate. In

the event of discrepancy between the original and any copy, the original shall prevail.

15.2 The inner and outer envelopes shall

(a) be addressed to the Employer at the following address:

Tuvitu Delairewa
General Manager Corporate Services
2 Marlow Street, Suva, FIJI.
Phone: 679 3224 185
Facsimile: 679 331 1882
Email: TuvituD@fea.com.fj

and

(b) bear the following identification:

- Bid for: Tavua 33kV Substation Extension Project – Civil works
- Bid Tender Number: **MR 109/2015**
- DO NOT OPEN BEFORE 1600Hrs **8th July, 2015**

15.3 In addition to the identification required in Sub-Clause 20.3, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause 22.

15.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

16. Deadline for Submission of Bids

16.1 Bids must be received by the Employer at the address specified above no later than **1600 hours (local time) Wednesday, 8th July.**

16.2 The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause 11, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadlines extended.

17. Late Bids

17.1 Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 23 will be rejected and returned unopened to the bidder.

17.2 No bid may be modified by the bidder after the deadline for submission of bids, except in accordance with Sub-Clauses 23.2 and 28.2.

Section 2

Employer's Requirements – Part I
Scope of Works

PART 1 - SCOPE OF WORKS

1. *GENERAL DESCRIPTION*

The scope of works for this contract for **Tavua 33kV Substation Extension Project – Civil Works** is to carry out civil works for new and existing bays including pad works for 33kV circuit breakers, disconnectors, bus, surge arrestor/VT, and cable support structures and carry out other necessary works required for the extension of existing 33kV bus.

Tavua Substation is an existing operational substation site. The main item for civil and electrical works under the scope includes:

1. Remove existing entire substation gravel surfacing
2. Re-lay with new gravel surfacing as per IEE standard
3. Lay new weed mats
4. FEA shall carry out earth Integrity testing and reinforcement – stop work until work is completed
5. Dig cable trench for AC/ DC controls, 33kV underground cables, and lay new PVC conduits for the associated cables. – FEA shall provide conduits
6. Modification to Substation grounding system. The earthing installation rates shall include excavation, backfilling and reinstatement of the ground. Driving the earth rods and making of the earth connections are FEA responsibilities.
7. Civil works required for 33kV Busbar Extension, new bus section, 240V light pole, lightning mast and line feeder bays padding.
8. Electrical works required to carry out foundation works for two (2) 15.5m lightning mast
9. Electrical works required to carry out foundation works install one (1) switchyard light including pole and two 400W lights
10. Reorientation of fencing works

2. MAJOR PLANT & MATERIAL INCLUDING SPARE PARTS

2.1 INSTALLATION & OTHER SERVICES

2.1.1 Civil Works

All civil works relating to the padding for outdoor switchyard equipment shall be carried out by the Contractor.

Existing cable trench and ducting system in the substation control building shall be utilized where possible.

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CHAPTER 5 - CIVIL WORKS

5.1 SITE CLEARANCE

All unwanted materials, debris, etc. shall be removed from the employer's premises.

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.

5.2 SITE FORMATION AND UPKEEPING

The whole of the excavations shall be carried out to the widths, lengths and depths shown on the approved drawings and in accordance with BS CP-8004 and BS 6031 or AS 3789. If top layer of soil is not suitable for the construction it shall be removed or stabilised. The Contractor is to provide all strutting and shoring necessary for the safe execution of the Works. Materials from the excavation may, if approved by the Employer's Representative, be used by the Contractor in the construction Works. Other excavated material shall be back filled where required or deposited where directed by the Employer. Surplus materials shall be removed from the Site by the Contractor. The Contractor shall at all times keep the site free from all surplus materials, rubbish and offensive matter.

The bottom of all excavated areas shall be trimmed, levelled and well rammed. Concrete shall not be deposited thereon until the bottom has been inspected and approved by the Employer's Representative.

All excavation works are to be kept dry and clean, in order that 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.

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. Filling for trenches, excavations and levelling of the site shall be deposited in layers not exceeding 250 mm uncompacted thickness, each layer watered when necessary and well rammed or otherwise compacted to within 95% of the maximum dry density obtained by the use of a Proctor Standard Compaction Test. Any fill material used within 500 mm of concrete structures cement bound materials shall have a soluble sulphate content not exceeding 2.5 g per litter when tested in accordance with BS 1377 or AS 1289, special precautions shall be taken to protect the concrete or cement bound materials to the approval of the Employer's Representative. 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.

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.
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.

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. The Earthworks standard that should be used is - BS 6031 or AS 3789.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 slops etc. shall be ensured. 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. If 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.

Explosives shall not be used.

Stone chipping used for substation surfacing are to be clean hard crushed stone graded from 16 - 40 mm. 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. Approved weed mats has to be installed in the entire yard before stones chips are installed. Geo mat and geo fabric may also be used in areas where water is present. Stone chipping shall be laid and lightly compacted to a minimum finished thickness of 100 mm.

5.4 CABLE TRENCHES & DUCTS

5.4.1 Control and Power Cable Trenches

The Contractor is responsible for all civil works required for cable runs between outdoor switchgear and building in concrete cable trenches. Cable entries into buildings shall be through ducts or in concrete cable trenches.
Conduits provided shall be sized to suite the cables provided. All other main cable trenches shall have additional capacity of 30% future use. Cable entries into buildings shall be sealed using suitable materials to prevent entry of any water, dust, vermin, etc. Cable entry to the control building shall be provided for future requirements.

5.4.2 Ducts

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 laying. Cable ducts may be pitch fibber, PVC, plastic or other material approved by the Employer's Representative and obtained from an approved manufacturer.

5.4.3 Concrete Beds and Casings

Concrete beds and casings to cable ducts and under roads, buildings, floors and foundations shall be of lean concrete and of 150mm minimum thickness. Elsewhere the ducts shall be laid on and surrounded with approved granular material of 150mm minimum bed thickness and 300 mm minimum cover.

5.4.4 Cable Pits

Cable pits shall be provided at interval not exceeding 100 meters and also at the bends of all cable ducts.
Cable pits may be constructed in situ concrete or precast concrete. In each case, the material shall be in accordance with the relevant sections of this Specification. Cable pits shall be sized according to their depth, to provide sufficient working space and access for maintenance. Galvanised malleable iron steps are to be provided in all cable pits over one meter deep and built in as work proceeds. Rates shall include for all necessary crossings shifting any existing obstructions etc. Power cables shall be laid on and surrounded with sand fill in unlined trenches. Pre-cast concrete cable protection covers & PVC marker tape shall be provided over the full width and length of cables in sand filled trenches. Pre-cast concrete marker posts shall be provided along cable runs at 500 meters intervals. Rates shall include for all necessary crossings shifting existing any obstructions etc.

5.6 WATER SUPPLY & DRAINAGE SYSTEM

Embankments and cuttings shall have drainage facilities at their top or bottom. The formation level of switchyard area shall be formed with uniform cross-falls of about 1 in 300 in the same direction as the natural drainage path of the surrounding Area Provision shall be made for the disposal of surface water from roads.

A surface water drainage system covering the switchyard shall be installed. The system may be discharged to natural watercourses or to soak ways as approved. Surface water from roofs of buildings shall be drained to down pipes connected with the site drainage system. The number of runs and out falls and pipe sizing must be sufficient to cope with the severest precipitation, with a factor of safety of 1.2 within switchgear and other areas. It

is to be ensured by the contractor that the surface water discharged from the substation does not cause any damage to the properties through which such water is discharge up to natural water courses as approved.

5.7 FENCE

Existing switchyard fence will be reoriented during the busbar extension works, and circuit realignment works. The Contractor shall be responsible for erecting a new fence for the outdoor switchyard.

5.8 MISCELLANEOUS WORK

Shall be carried out according to the relevant clause of this specification.

Section 3
Form of Proposals and Appendices

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1 NOTES ON SCHEDULES

The Schedules are intended to provide the Employer with essential supplementary information in an organized format. Examples of more commonly used Schedules are given herein. Others may be devised and added in accordance with the requirements of the Instructions to Bidders.

All the Schedules are essential for bid evaluation and some in contract execution; they should all be incorporated in the Contract, and appropriate changes introduced with the approval of the Employer or its representative.

The schedules are to be completed and submitted as part of the Technical Proposal and Price Proposal in accordance with the Instructions to Bidders Clause 13, Documents Comprising the Bid. **Bidders whose Bids do not contact the data in the required format will be treated as non-responsive.**

2 SCHEDULE OF PRICES & CONDITIONS OF PAYMENT

2.1 *CONTRACT PRICE*

The Contract Price is comprehensive in that, in consideration of the Contractor meeting all obligations, conditions and liabilities under the Contract, including the Contractor's allowance for the cost of supply of all labour, materials, plant, supervision required to complete the Contract Works, overheads and profit, subject only such adjustment as is provided for the Contract.

2.2 *PAYMENTS TERMS*

1. All payments shall be due and payable by the Employer in accordance with the payments terms detailed below.
2. The payments shall be made on completion of milestones as identified and agreed by both the Employer's Representative and the Contractor.
3. The payments will be made based on the following schedule:

	Particulars	*Milestone*	*Payment (% of contract price)*
1	Advance payment	As per clause 13.2 of Section 3 - Conditions of Particular Application	NIL
2	Civil Works , fence and resurface switchyard	Progress of all civil works per substation	90%
3	Retention	12 months after issuing of performance certificate	10%

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.

CONTRACT DETAILS

Contractor Name: _____
Contractor Address: _____
Contractor Representative:_____
Contract Description: _____
Location of Works: _____
Timing of Works (approximate): Start Date:_____ End Date:_____

RESPONSIBILITIES

Name	***Position Held***	***Safety Responsibilities***	***Contact Number (Direct)***

EMERCENGY CONTACT DETAILS

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

SCOPE & TASK DETAILS

List Major Tasks

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.

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.

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.

ACCESSING SITE/TIMES OF WORK

If work is going to be carried out at FEA 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.

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.

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.

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.

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.

EMERGENCY PROCEDURES

Identify specific emergency procedures or equipment required for the contract.

INCIDENT REPORTING & INVESTIGATION

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

SPECIALISED WORK OR LICENSING

List any special licences required for the contract.

TRAINING & INDUCTION REQUIREMENTS

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

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.

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

2 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

As a minimum, the following documents & drawings shall be submitted with the Bid.

1. Evidence of Bidder's experience in works similar to this
2. List of standards the Bidder intends to follow, for civil works

Section 6
Drawings

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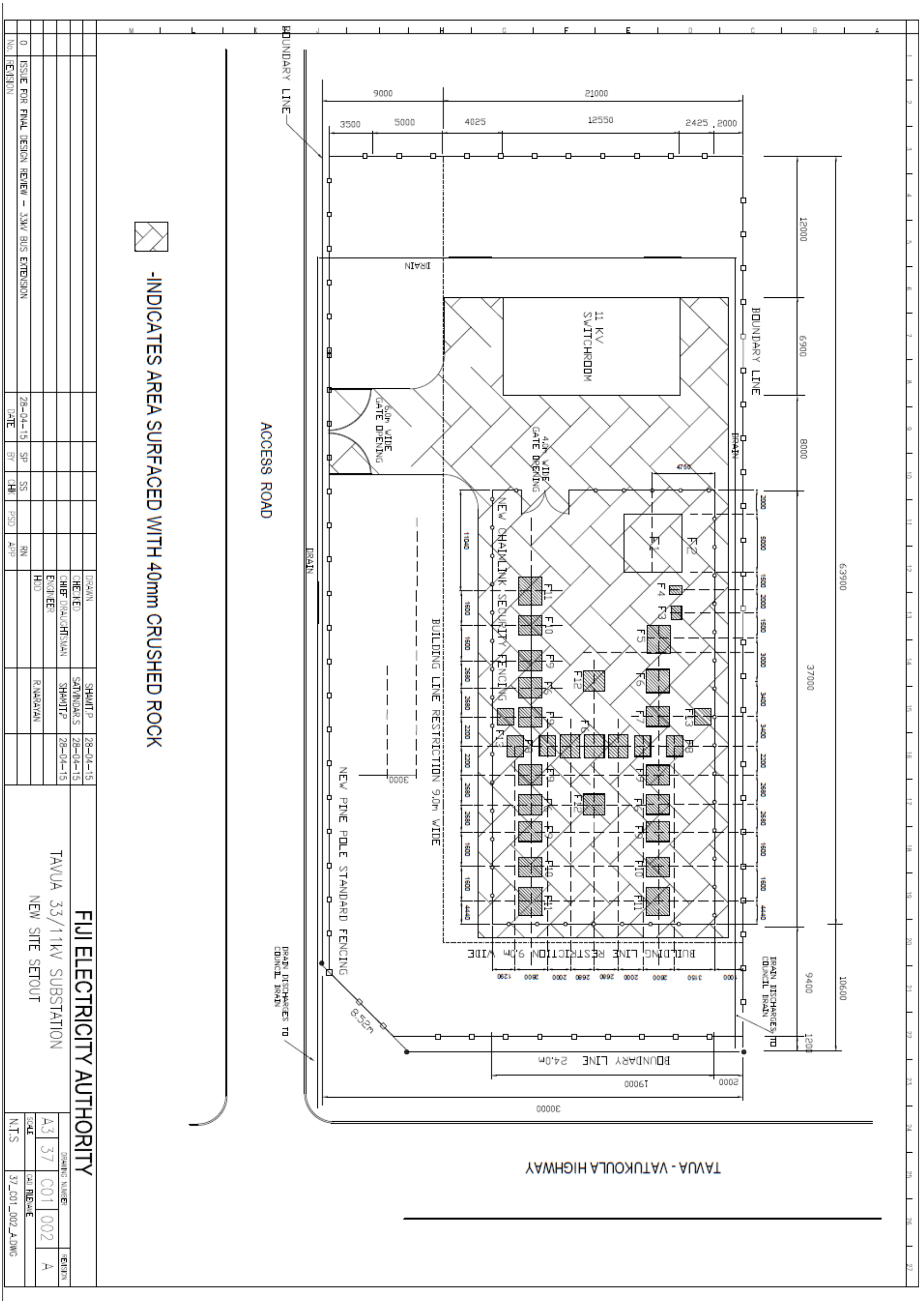
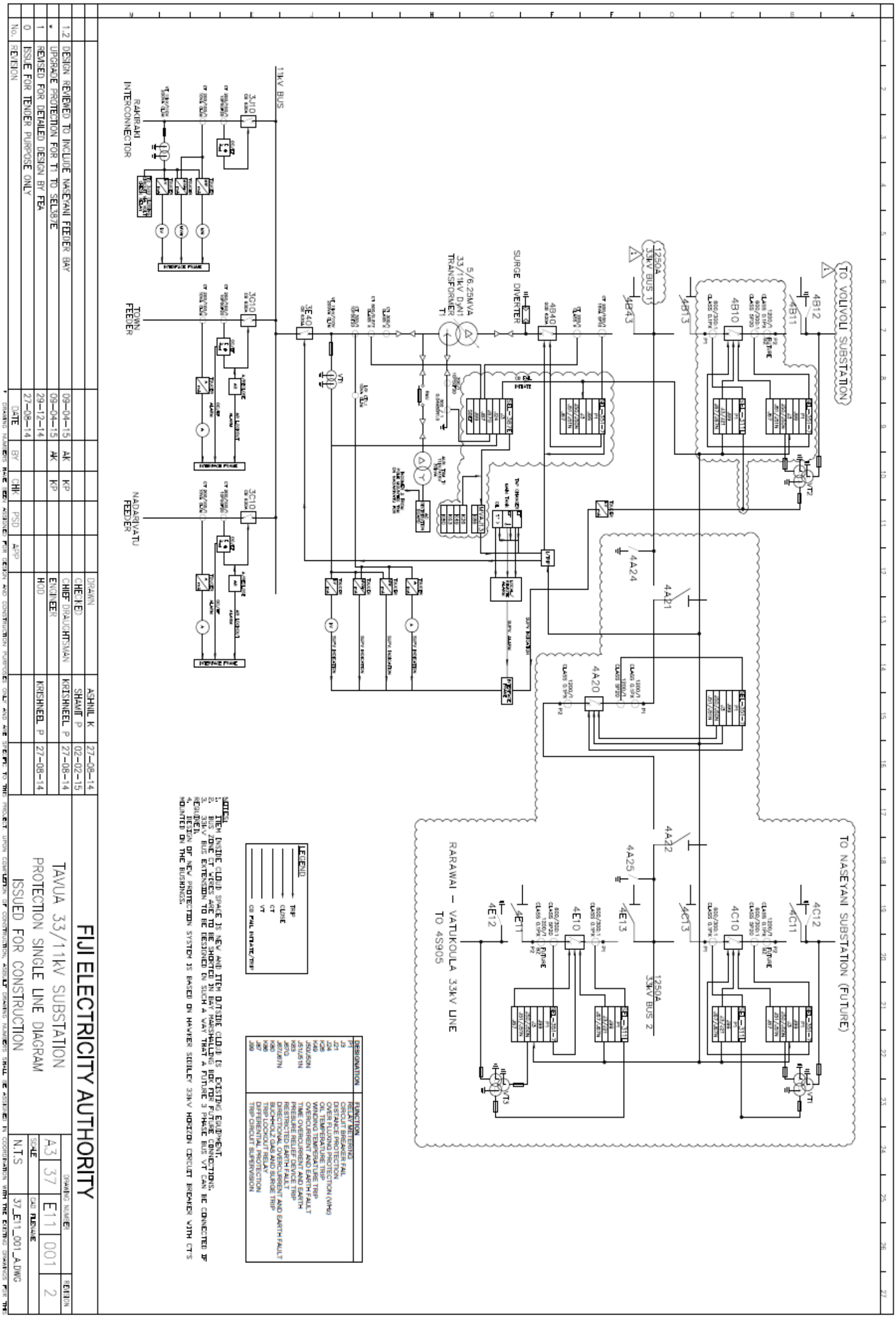
1. Tavua Substation 33kV Bus Extension – New Site Layout



2. Tavua Substation 33kV Bus Extension – Protection Single Line Diagram



No.	REVISION	DATE	BY	CHK	PSD	APP
0	ISSUE FOR TENDER PURPOSE ONLY	27-08-14				
1	REVISED FOR DETAILED DESIGN BY FEA	29-12-14				
*	UPGRADE PROTECTION FOR T1 TO SEL387E	09-04-15	AK	KP		
1.2	DESIGN REVIEWED TO INCLUDE NASEYANI FEEDER BAY	09-04-15	AK	KP		

	DRAWN	ASHNIL K	27-08-14
	CHECKED	SHAMIT P	02-02-15
	CHIEF DRAUGHTSMAN	KRISHNEEL P	27-08-14
	ENGINEER		
	HOD	KRISHNEEL P	27-08-14

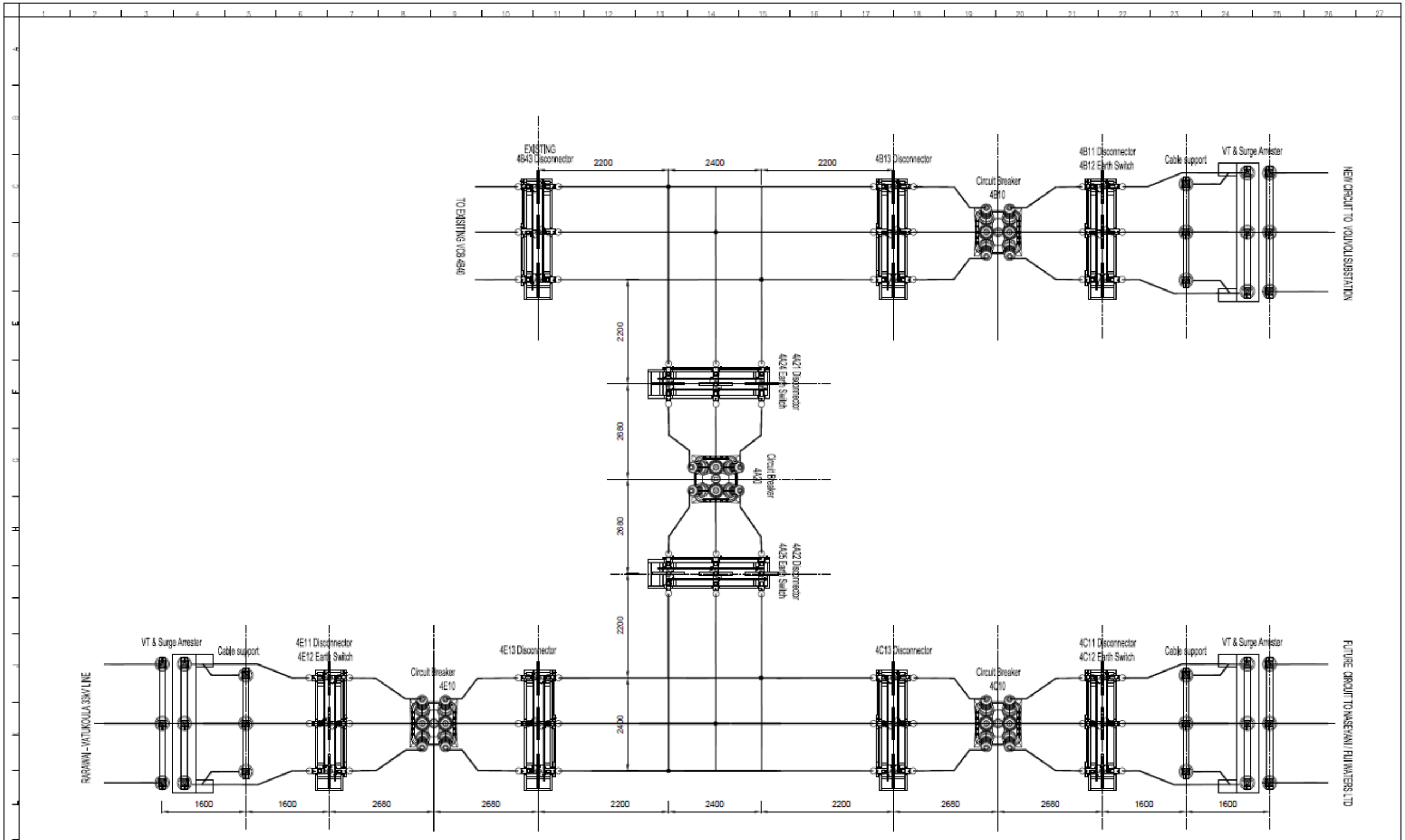
* DRAWING NUMBERS HAVE BEEN ASSIGNED FOR DESIGN AND CONSTRUCTION PURPOSES ONLY AND ARE SPECIFIC TO THIS PROJECT. UPON COMPLETION OF CONSTRUCTION, AS-BUILT DRAWING NUMBERS SHALL BE ASSIGNED IN COORDINATION WITH THE EXISTING DRAWINGS FOR THE FACILITY, AS PER FEA'S DOCUMENTATION STANDARDS & ARCHIVING PROTOCOLS.

FIJI ELECTRICITY AUTHORITY

TAVUA 33/11kV SUBSTATION
PROTECTION SINGLE LINE DIAGRAM
ISSUED FOR CONSTRUCTION

DRAWING NUMBER			REVISION
A3	37	E11 001	2
SCALE		CAD FILENAME	
N.T.S		37_E11_001_A.DWG	

3. Tavua Substation 33kV Bus Extension – Proposed Layout



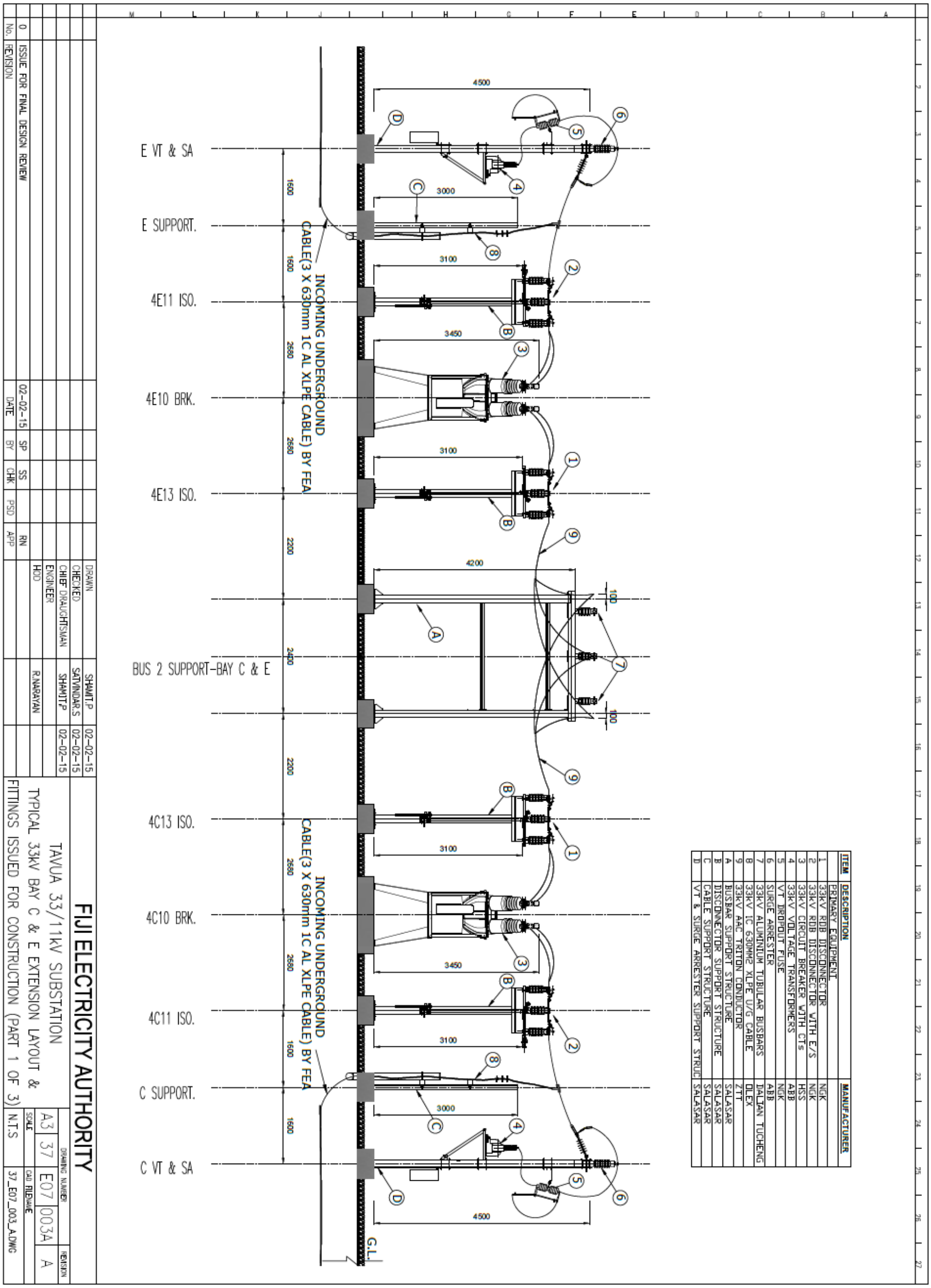
							DRAWN	SHAMIT.P	02–02–15
							CHECKED	SATVINDAR.S	02–02–15
							CHIEF DRAUGHTSMAN	SHAMIT.P	02–02–15
							ENGINEER		
							HOD	R.NARAYAN	
0	ISSUE FOR FINAL DESIGN REVIEW	02–02–15	SP	SS		RN			
No.	REVISION	DATE	BY	CHK	PSD	APP			

FIJI ELECTRICITY AUTHORITY

TAVUA 33/11kV SUBSTATION
EXISITNG & PROPOSED 33kV SUBSTATION LAYOUT
ISSUED FOR CONSTRUCTION

DRAWING NUMBER				REVISION
A3	37	E07	002	A
SCALE		CAD FILENAME		
N.T.S		37_E07_002_A.DWG		

4. Tavua Substation 33kV Bus Extension – Typical General Arrangement



ITEM	DESCRIPTION	MANUFACTURER
	PRIMARY EQUIPMENT	
1	33kV RDB DISCONNECTOR	NGK
2	33kV RDB DISCONNECTOR WITH E/S	NGK
3	33kV CIRCUIT BREAKER WITH CTs	HSS
4	33kV VOLTAGE TRANSFORMERS	ABB
5	VT DROPOUT FUSE	NGK
6	SURGE ARRESTER	ABB
7	33kV ALUMINIUM TUBULAR BUSBARS	DALIAN TUCHENG
8	33kV 1C 630MM2 XLPE U/G CABLE	DLEX
9	33kV AAC TRITON CONDUCTOR	ZTT
A	BUSBAR SUPPORT STRUCTURE	SALASAR
B	DISCONNECTOR SUPPORT STRUCTURE	SALASAR
C	CABLE SUPPORT STRUCTURE	SALASAR
D	VT & SURGE ARRESTER SUPPORT STRUC	SALASAR

No.	REVISION	DATE	BY	CHK	PSD	APP
0	ISSUE FOR FINAL DESIGN REVIEW	02-02-15	SP	SS		RN

DRAWN	SHAMIT.P	02-02-15
CHECKED	SATVINDAR.S	02-02-15
CHIEF DRAUGHTSMAN	SHAMIT.P	02-02-15
ENGINEER		
HOD	R.NARAYAN	

FIJI ELECTRICITY AUTHORITY

TAVUA 33/11kV SUBSTATION

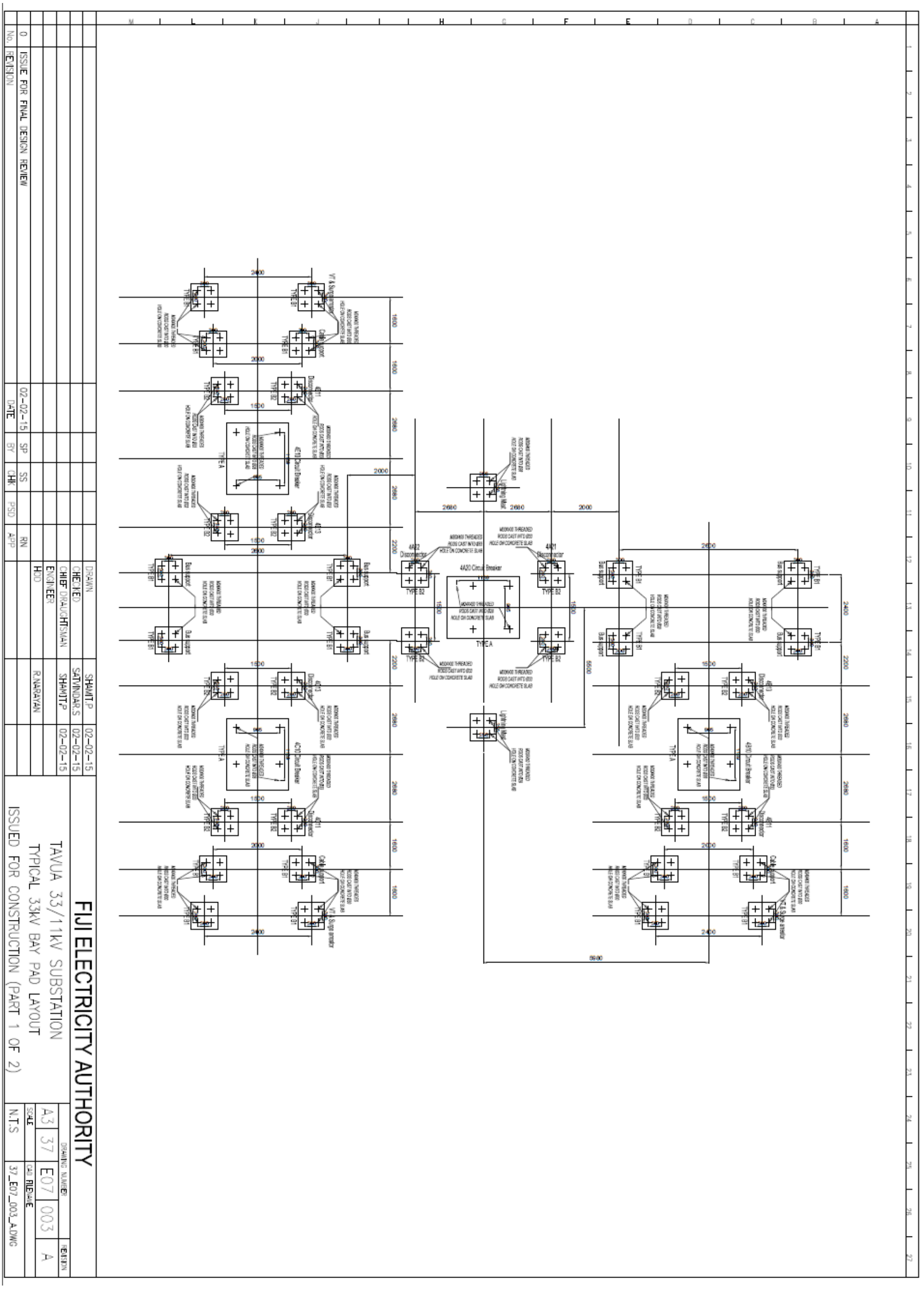
TYPICAL 33kV BAY C & E EXTENSION LAYOUT & FITTINGS ISSUED FOR CONSTRUCTION (PART 1 OF 3)

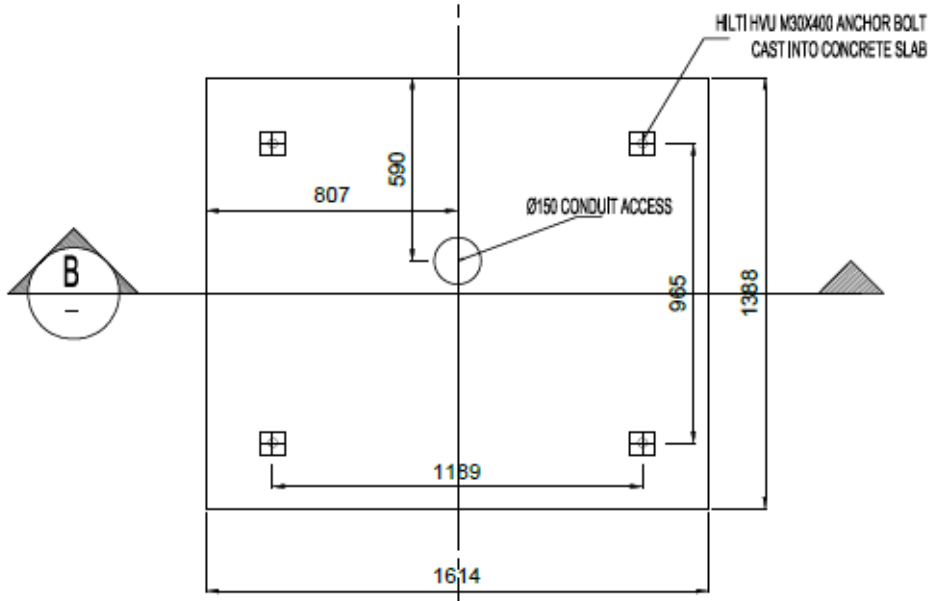
DRAWING NUMBER			REVISION
A3	37	E07	003A	A

SCALE: N.T.S

CAD FILENAME: 37_E07_003_A.DWG

5. Tavua Substation 33kV Bus Extension – Typical 33kV Bay Pad Layout



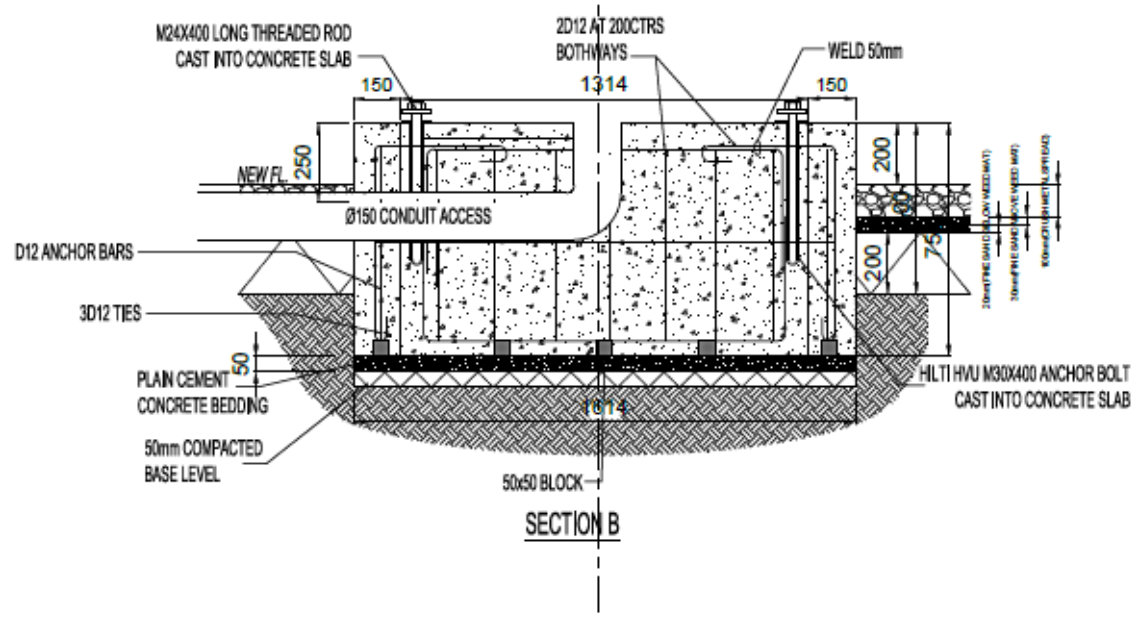


TYPE A - FOUNDATION PLAN CIRCUIT BREAKER

Type A - Steel cutting & bending schedule

Serial No.	Steel Dia.	Steel Type	Cut/ Bend	Length/piece	Quantity	Total Length
1	Ø12mm	long	450 / 1514 / 450	2,414m	7	16,898m
2	Ø12mm	long	450 / 1514 / 450	2,414m	7	16,898m
3	Ø12mm	short	424 / 450 / 50 / 50	1,174m	14	16,436m
4	Ø12mm	long	450 / 1288 / 450	2,188m	9	19,692m
5	Ø12mm	long	450 / 1288 / 450	2,188m	9	19,692m

NOTE:
Concrete to be of 25mpA ready mix tested & inspected as per approved plan



SECTION B

No.	REVISION	DATE	BY	CHK	PSD	APP
0	ISSUE FOR FINAL DESIGN REVIEW – 33kV BUS EXTENSION	04–05–15	SP	SS		RN

DRAWN	SHAMIT.P	04–05–15
CHECKED	SATVINDAR.S	04–05–15
CHIEF DRAUGHTSMAN	SHAMIT.P	04–05–15
ENGINEER		
HOD	R.NARAYAN	

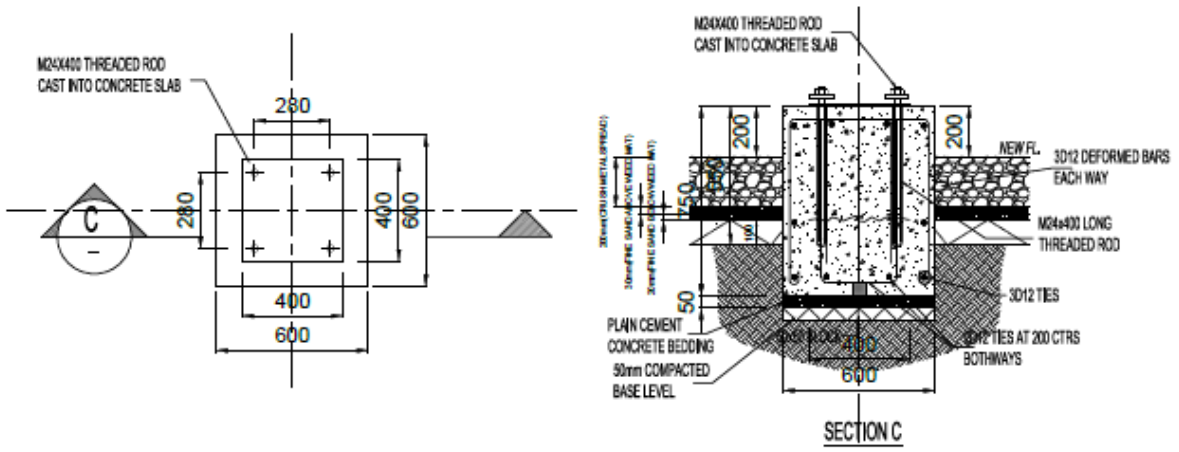
FIJI ELECTRICITY AUTHORITY

TAVUA 33/11kV SUBSTATION
TYPE A FOUNDATION PAD DETAIL–CIRCUIT BREAKER

DRAWING NUMBER				REVISION
A3	37	E07	019	A

SCALE	CAD FILENAME
N.T.S	37_E07_019_A.DWG

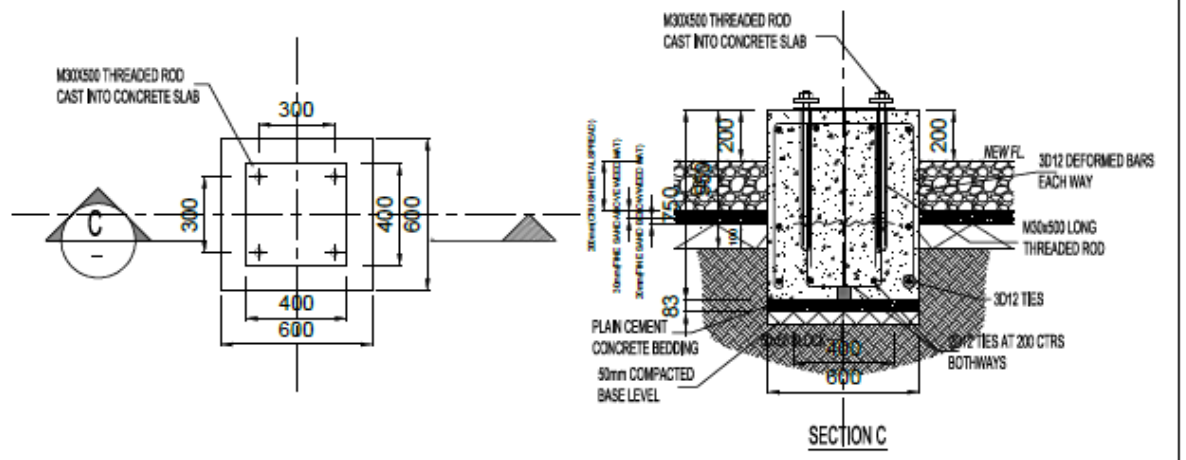
7. Tavua Substation 33kV Bus Extension – Type B Foundation Pad Detail – SA, VT, Disconnectors, Bus & Cable Support



TYPE B2 - TYPICAL DISCONNECTOR FOUNDATION PLAN

Type B1 - Steel cutting & bending schedule						
Serial No.	Steel Dia.	Steel Type	Cut/ Bend	Length/piece	Quantity	Total Length
1	Ø12mm	long	600 / 650 / 150 / 150 / 650	1,900m	3	5,700m
2	Ø12mm	short	650 / 300 / 650	1,600m	3	4,800m
3	Ø12mm	short	650 / 275 / 650	1,275m	3	3,825m
4	Ø12mm	long	650	500m	10	5,000m

NOTE:
Concrete to be of 25mpA ready mix tested & inspected as per approved plan



TYPE B1 - TYPICAL BUS SUPPORT, CABLE SUPPORT, SA & VT & GANTRY FOUNDATION PLAN

Type B2 - Steel cutting & bending schedule						
Serial No.	Steel Dia.	Steel Type	Cut/ Bend	Length/piece	Quantity	Total Length
1	Ø12mm	long	600 / 650 / 150 / 150 / 650	1,900m	3	5,700m
2	Ø12mm	short	650 / 300 / 650	1,600m	3	4,800m
3	Ø12mm	short	650 / 275 / 650	1,275m	3	3,825m
4	Ø12mm	long	650	500m	10	5,000m

NOTE:
Concrete to be of 25mpA ready mix tested & inspected as per approved plan

No.	REVISION	DATE	BY	CHK	PSD	APP
0	ISSUE FOR FINAL DESIGN REVIEW – 33kV BUS EXTENSION	04–05–15	SP	SS		RN

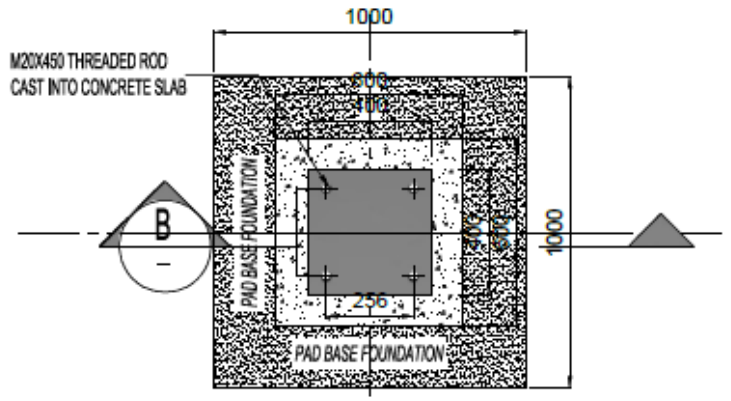
DRAWN	SHAMIT.P	04–05–15	
CHECKED	SATVINDAR.S	04–05–15	
CHIEF DRAUGHTSMAN	SHAMIT.P	04–05–15	
ENGINEER			
HOD	R.NARAYAN		

FIJI ELECTRICITY AUTHORITY

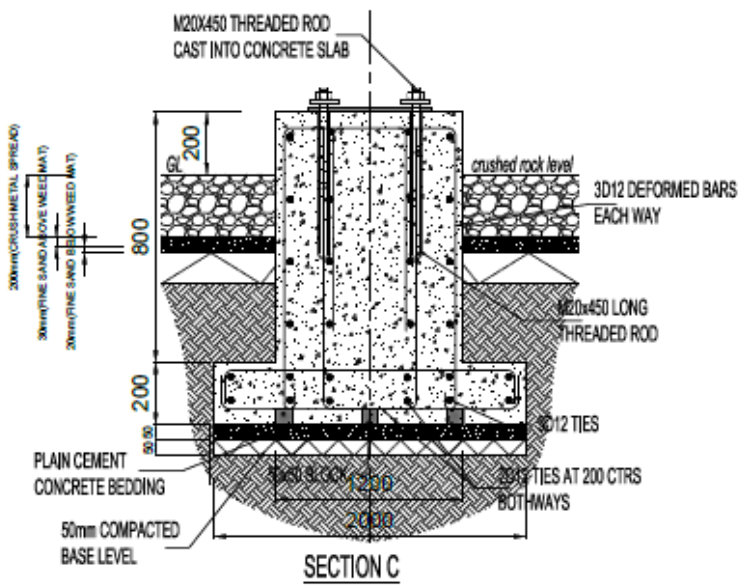
TAVUA 33/11kV SUBSTATION
LIGHTNING MAST FOUNDATION PAD DETAIL

DRAWING NUMBER				REVISION
A3	37	E07	020	A
SCALE		CAD FILENAME		
N.T.S		37_E07_020_A.DWG		

8. Tavua Substation 33kV Bus Extension – Lightning Mast Foundation Pad Detail



LIGHTNING MAST BASE PLATE
FOUNDATION PLAN



SECTION C

Lightning Mast - Steel cutting & bending schedule

Serial No.	Steel Dia.	Steel Type	Cut/ Bend	Length/piece	Quantity	Total Length
1	Ø12mm	long	100 900 100	1,100m	5	5,500m
2	Ø12mm	short	900 100 100	1,100m	5	5,500m
3	Ø12mm	short	500 875 875 50 50	2,350m	3	7,050m
4	Ø12mm	long	900 900 450	2,250m	3	6,750m
5	Ø12mm	long	200 650 650	1,500m	3	4,500m
6	Ø12mm	long	900	900m	14	12,600m
7	Ø12mm	long	500	500m	17	8,500m

NOTE:
Concrete to be of 25mpA ready mix tested & inspected as per approved plan

No.	REVISION	DATE	BY	CHK	PSD	APP
0	ISSUE FOR FINAL DESIGN REVIEW – 33kV BUS EXTENSION	04–05–15	SP	SS		RN

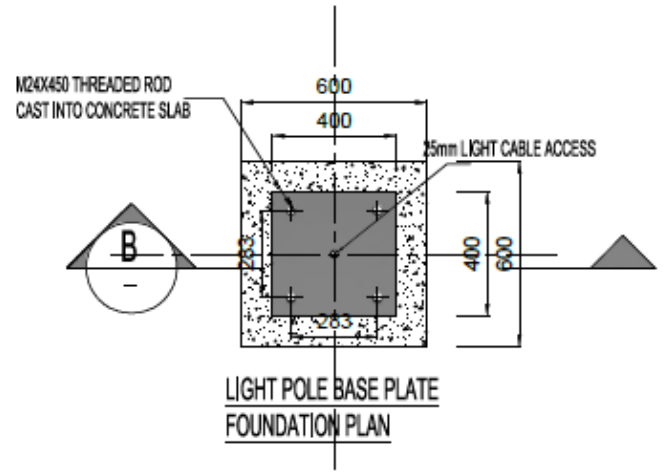
DRAWN	SHAMIT.P	04–05–15
CHECKED	SATVINDAR.S	04–05–15
CHIEF DRAUGHTSMAN	SHAMIT.P	04–05–15
ENGINEER		
HOD	R.NARAYAN	

FIJI ELECTRICITY AUTHORITY

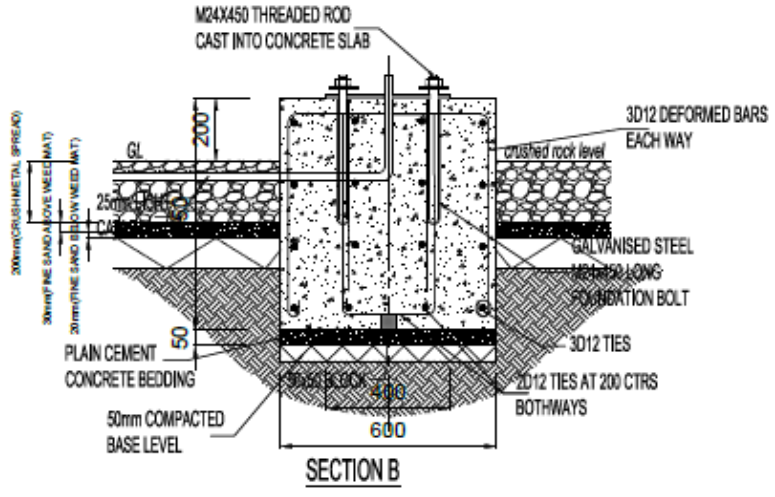
TAVUA 33/11kV SUBSTATION
LIGHTNING MAST FOUNDATION PAD DETAIL

DRAWING NUMBER				REVISION
A3	37	E07	021	A
SCALE		CAD FILENAME		
N.T.S		37_E07_021_A.DWG		

9. Tavua Substation 33kV Bus Extension – Light Pole Foundation Pad Detail



LIGHT POLE BASE PLATE
FOUNDATION PLAN



SECTION B

Light Pole – Steel cutting & bending schedule

Serial No.	Steel Dia.	Steel Type	Cut/ Bend	Length/piece	Quantity	Total Length
1	Ø12mm	long	500; 650, 150, 50, 650	1,900m	3	5,700m
2	Ø12mm	short	600; 600, 300, 600	1,600m	3	4,800m
3	Ø12mm	short	275; 500, 300	1,275m	3	3,825m
4	Ø12mm	long	500	500m	10	5,000m

NOTE:
Concrete to be of 25mpA ready mix tested & inspected as per approved plan

No.	REVISION	DATE	BY	CHK	PSD	APP
0	ISSUE FOR FINAL DESIGN REVIEW – 33kV BUS EXTENSION	04–05–15	SP	SS		RN

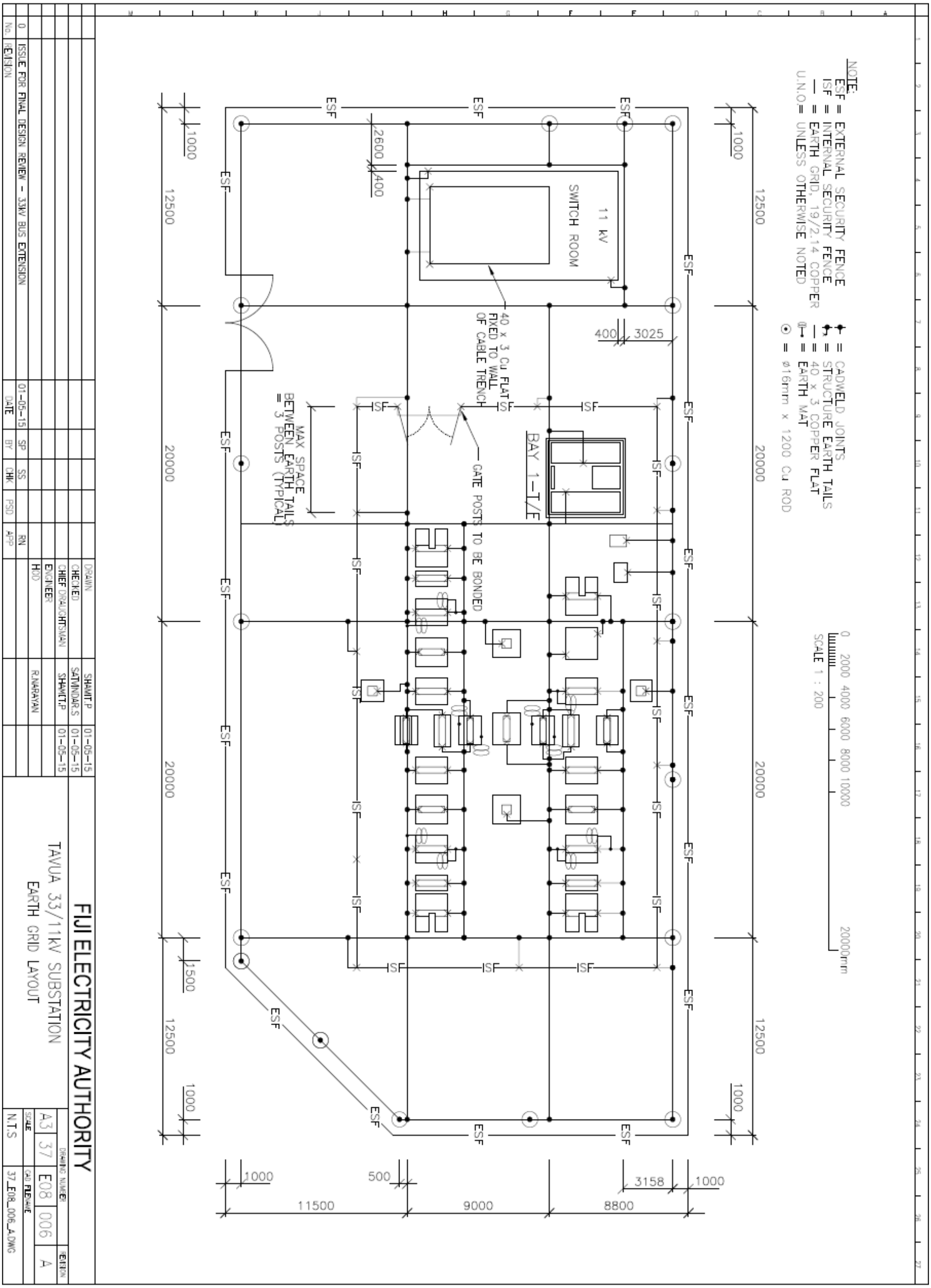
DRAWN	SHAMIT.P	04–05–15
CHECKED	SATVINDAR.S	04–05–15
CHIEF DRAUGHTSMAN	SHAMIT.P	04–05–15
ENGINEER		
HOD	R.NARAYAN	

FIJI ELECTRICITY AUTHORITY

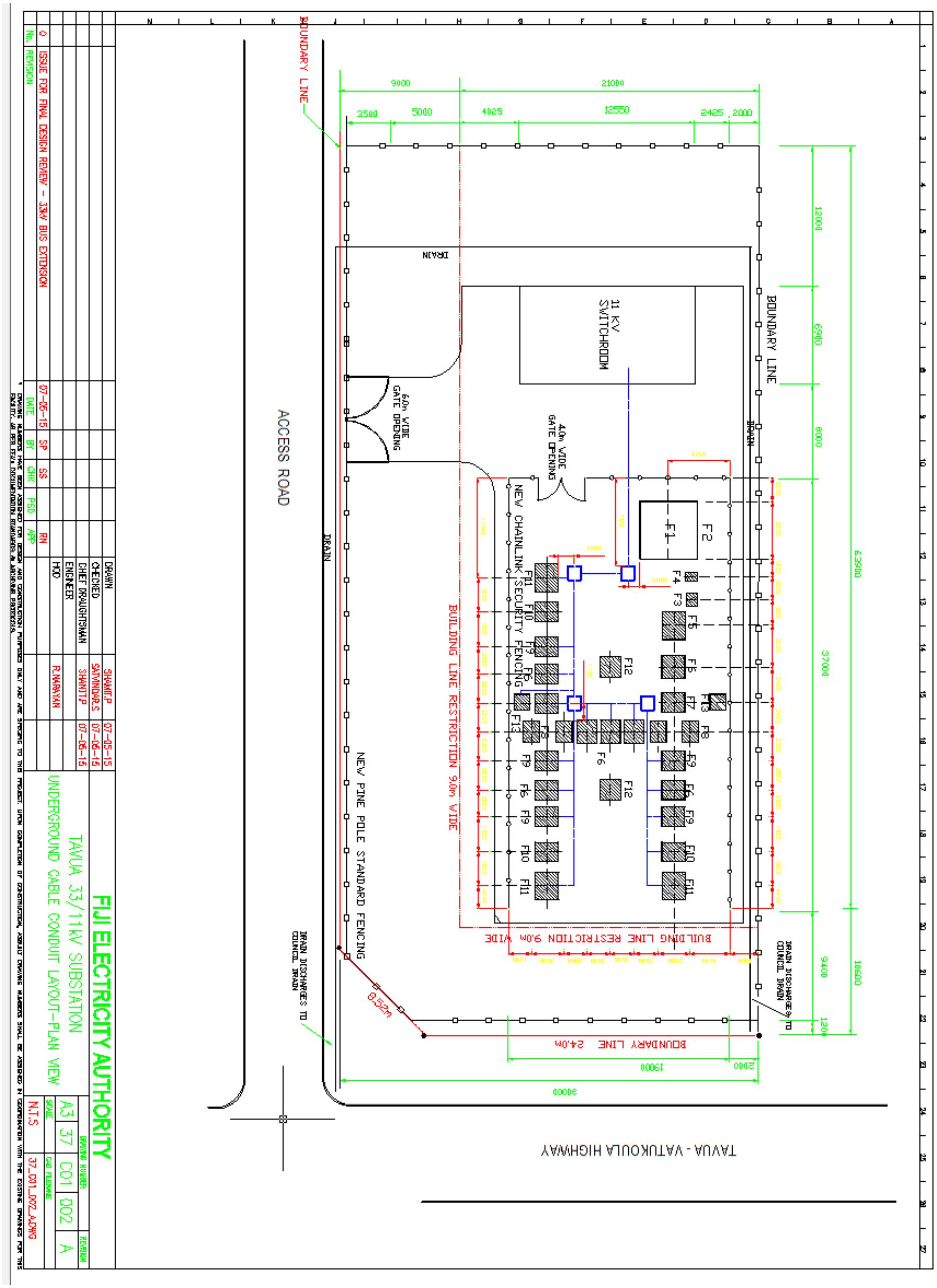
TAVUA 33/11kV SUBSTATION
LIGHT POLE FOUNDATION PAD DETAIL

DRAWING NUMBER				REVISION
A3	37	E07	022	A
SCALE		CAD FILENAME		
N.T.S		37_E07_022_A.DWG		

10. Tavua Substation 33kV Bus Extension – Earth Grid Layout



11. Tavua Substation 33kV Bus Extension – Underground Cable Conduit Layout – Plan View



12. Tavua Substation 33kV Bus Extension – Control & Protection Cable Layout