

**ELECTRICAL METHOD OF STATEMENT FOR
33kV OPEN CUT UNDERGROUND CABLING WORKS**

FOR

**33KV POWER SUPPLY TO NENEW DEVELOPMENT
AT SETIA SELALU, KILANG JAYA,
SELANGOR DARUL EHSAN**

**PROJECT CODE:
PR602-SS-KILANGJAYA**

**CLIENT:
SES CORPORATION SDN. BHD.
Company No.:
1, Jalan ...**

Consultant:

Electrical Contractor:

HDD Contractor:

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Attached Documents:

Appendix A1 - Attached the cross-section of cable trench Dwg No. SP001-Rev 1

Appendix A2 - Attached the cross-section of cable trench Dwg No. SP002-Rev 0

Appendix B - Attached Drawing No. MNSB/AAA/KILANGJAYA/33KV/2022-01

Appendix C - Attached the cross-section of cable trench Dwg No. BU002

Appendix D1 - Attached the Joint Bay Layout Dwg No. MNSB/ST/JB1, 3 & 5/Feeder 1 & 2

Appendix D2 - Attached the Joint Bay Layout Dwg No. MNSB/CB/JB2 & 4/Feeder 1 & 2

Appendix E1 - Attached the Instruction Manual for Straight Through Joint

Appendix E2 - Attached the Instruction Manual for Cross Bond Joint

Appendix F1 - Attached the (6+1way) Earthing Link Box (Outdoor)

Appendix F2 - Attached the (3+1way) Earthing Link Box (Indoor)

Appendix G1 - AIS Outdoor & Indoor 3M Termination 33kV

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Appendix H1 – Certificate of Calibration -MT525-UK (Megger).

Appendix H2 - Certificate of Calibration - VLF 6022CMF – Page 1 & 2

Appendix H3 - Certificate of Calibration – (Shirla) – Page 1 & 2

1.0 INTRODUCTION

1.1 Purposed

The purpose of this proposal is to describe and define the method of cable trenching and cable laying for 33kV Power cable and Optic Fiber Cable.

It is the intention of this proposal to act as a guide to personnel engaged in this activity, not to supersede or override any specification, codes, standards or statutory regulations or contract documents.

1.2 Scope

6 x 1C 630mm² XLPE cable and 1 x Optic Fiber Cable -24 fiber for 1 circuit configurations for Feeder 1 and 2 from PMU Kilangjaya to SSU Selalu-Park.

3 x 1C 630mm² XLPE cable and 1 x Optic Fiber Cable -24 fiber for 1 circuit configurations for Feeder 1 and 2 from SSU Selalu-Park to Kilangjaya Development.

All underground cable to be installed using HDD method unless necessary, open cut method to be used to installed the PN10 HDPE conduits. Final adjustment will be done during work on site if necessary.

2.0 CABLE TRENCHING

2.1 Excavation of Tarmacadam Road

- a) Excavation using backhoe tarmacadam road to the depth of trench 1.5m.
- b) Fill up the trench with 150mm sand bedding.
- c) Lay 6 nos. of 150mm and 1nos of 100mm dia. PN10 HDPE pipes.
- d) Backfilled with 100mm sand layer over the pipes.
- e) A 33kV concrete slab is placed to protect the power and optic fibre cable.
- f) Reinstatement with sand and crusher run until 75mm below trench level.
- g) Compactor is used to compact the reinstatement.
- h) Pouring a tar binder over layers of crusher run.
- i) Lay tarmacadam to the correct levels and compacted with a roller

2.2 Open Cut and Pipe Joint Between HDD Pipes (Check-points)

- a) Excavation using backhoe tarmacadam road to the depth of trench 1.5m.
- b) Pipe Joint using 6 inches and 4 inches PN10 HDPE connected using pipe joint.

[Appendix A1 - Attached the cross-section of cable trench Dwg No. SSP001-Rev.1](#)

2.2 Open Cut and Pipe Joint Between HDD Pipes (Pulling-pits)

- a) Excavation using backhoe tarmacadam road to the depth of trench 1.5m.
- b) Pipe Joint using 6 inches and 4 inches HDPE Double Wall Corrugated Pipe (Split Pipe).

[Appendix A2 - Attached the cross-section of cable trench Dwg No. SSP002-Rev.0](#)

3.0 OPEN CUT WORKS AT SELALU-PARK.

The open-cut will be conducted section by section and the work only can be done after working hours (night works) and the road must be open back to the user the next morning complete with premix.

[Appendix B - Attached Drawing No. MNSB/KLY/SSP/33KV/2022-01](#)

3.1 Excavation of Tarmacadam Road

- a) Excavation of tarmacadam road, excavated soil to be removed from site, reinstatement with sand and crusher run including supply and erect of sand and tarmacadam road.
- b) Excavation using backhoe along tarmacadam road to the depth of trench 1.5m.
- c) Fill up the trench with 100mm sand bedding.

3.2 Feeder 1 and Feeder 2 from PMU Kilangjaya to SSU Selalu-Park Park.

- a) Lay the PN10 pipes (6 x 150mm²) for 6 x 1C 630mm² XLPE cable in flat formation (2 layers) and 1 x 100mm² for 1 x Optic Fiber Cable (24 fiber).

[Appendix C - Attached the cross-section of cable trench Dwg No. SS002](#)

Feeder 1 and Feeder 2 from Kilangjaya to SSU Selalu-Park.

- b) Lay the PN10 pipes (3 X 150mm²) for 3 X 1C 630mm² XLPE cable in trifold formation and 1 x 100mm² for 1 x Optic Fiber Cable (24 fiber).

[Appendix C - Attached the cross-section of cable trench Dwg No. SS002](#)

- c) Backfilled with 300mm sand layer over the pipe.
- d) A 33kV concrete slab is placed to protect the power and optic fiber cable.
- e) Reinstatement with sand and crusher run including supply and erect of sand and tarmacadam road resurfacing.
- f) Compactor is used to compact the reinstatement.
- g) Pouring a tar binder over layers of crusher run.
- h) Lay tarmacadam to the correct levels and compacted with a roller.
- i) All the cable pipes must be laid underneath any existing pipes and drains.

3.4 Working Hours

- a) Open Cut and Trenching Works
 - Between 9.00 pm to 5.00 am (Monday to Friday), 2.00pm to 5.00am (Saturday) & 9.00am - 5.00am (Sunday)
 - Estimate 12m of pipe to be lay each night. At 6 am, road will be open back for the parking user, complete with premix as specify by client.

4.0 CABLE INSTALLATION

In this method of laying underground cables which the cable is laid in pipe duct along the cable route and also installation on the cable ladder which the cable is laid bare on the cable ladder along the cable route.

4.1 Lay Cable Underground in Pipe Duct

Drum Mounting

- a) Each drum should be mounted on jacks, cable trailer or cable stands so the cable is preferably pulled from the top and always in the direction opposite to that indicated by the arrow on the drum.
- b) Prior to removing the cable drum battens, ensure the drum-spindle is level and that the drum turns freely.
- c) If it is necessary to roll a drum into position prior to mounting, ensure the drum is rolled in the direction indicated by the arrow on the drum.
- d) Cable drums should be positioned in line with the direction of cable pull.

Setting up Winch and Pipe Cleaning

- a) Set the winch at the one end
- b) Slip the steel mesh cable stocking on to the end of the cable and the winch rope attached.
- c) Commences pulling.
- d) Inside of all pipe must be clean clear from mud, soil and sand.
- e) Duct Brushes to be used for cleaning the duct from mud, soil and sand.
- f) Cable Rollers to use for cable pulling through cable in open trench, joint bay and substation floor.
- g) Cable socks to be used for cable and conductor pulling through cable ducts.

4.2 Lay cable in cable trays ladders

- a) Issued and Obtain PTW by AP to work in Substation.
- b) Follow all the safety regulation for working in 'LIVE' substation, with complete of Personal Protective Equipment (PPE).
- c) Before commencing the work, the area shall be cleared of all debris, materials, or other obstructions.
- d) The cables are drawn in full length without jointing. Therefore, approximate length of cable is established prior to installation.
- e) The cables are installed on the tray in a way that their continuity is ensured at all times.
- f) Due to the self-weight of sub main cables, care is taken to avoid damaging the cable outer sheath during cable drawing on cable tray due to dragging.
- g) All sub main cables are installed on the tray in a trefoil formation.
- h) The sub main cables are tied to the tray by cable ties in order to ensure that all the cables are in place at all times.
- i) Cable Cleats Trefoils cable ties will be used for Single Core Cables.
- j) At both end of the cables, a marking is done for ease of identification.
- k) Colored sleeve (Red, Yellow and Blue) are inserted at the end of the cables.
- l) A sufficient additional length is allowed for the termination of the cable into Switchgear panel.

5.0 CABLE JOINTING

5.1 Cable Joint Excavations

- a) Mobilize adequate equipment and machinery to the jointing pit point.
- b) Excavate the jointing pit. A pit in the trench should be excavated to the following dimensions:
 - i. 1.5 meters wide
 - ii. 6.0 meters long in either direction of the joint
 - iii. 1.5 meters depth to allow the connection to be made in staggered formation.

[Appendix D1-Attached the Joint Bay Layout Dwg No. MNSB/ST/JB1,3 & 5/Feeder 1 & 2 Rev.1](#)

[Appendix D2-Attached the Joint Bay Layout Dwg No. MNSB/CB/JB2 & 4/Feeder 1 & 2 Rev.1](#)

5.2 Cable Jointing Works.

- a) This joint must be installed by skilled jointer who is fully conversant with the required installation techniques and jointer competent certificate must be submitted to the Engineer prior to work.
- b) Before joining any cable, it must be positively identified by approved testing methods and marked at both ends of the cable.
- c) Check cable insulation with megger or megaohm meter.
- d) Water barrier within the cables must be checked prior to joining the cables to ensure no moisture has penetrated into the cable.
- e) If moisture is detected, the cable must be stripping the cable back to the point where no moisture is present.
- f) All jointing equipment shall be installed in accordance with the manufacturer's instructions supplied with the equipment kit to which they relate.
- g) All cable ends are to be sealed after cutting.
- h) Pipe ends must be sealed to prevent any foreign matter such as sand, mud, etc get into the pipe.
- i) Remove all the debris, stone, rubbish, etc from the pit to an approved dump site.
- j) Backfilled with fine sand layer over the joint.
- k) A 33kV Concrete slab is placed to protect the cable and joint.

[Appendix E1 - Attached the Instruction Manual for Straight Through Joint](#)

[Appendix E2 - Attached the Instruction Manual for Cross Bond Joint.](#)

6.0 LINK BOX INSTALLATION

- a) Link Boxes is for earthing and bonding cable sheaths of underground power cables, that the circulating currents and induced voltages are eliminated or reduced.
- b) Cross bonding, with appropriate insulation withstand between Phases.
- c) The link box is installed with cable joints and terminations to provide shield break accessibility for HV test purposes and to limit voltage build-up on the cable sheath – over voltages on the sheath can be caused by fault currents, switching operations and lightning effects.
- d) Link boxes must be installed on the planter box area within the ROW and their locations are as per approved photo earlier. The link box must not install on the walkway area.

6.1 Fitting the Earthing Cable to Link Box

- a) An integral component of a Specially Bonded System is the use of bonding leads with the correct physical and electrical properties for high voltage power cable system earthing – 300sqmm single core are available for use with 33kV link box installations above ground (6+1way) or gantry mounted (3+1way) applications.
- b) Connect the earthing cable using cable link 300mm² and crimping the cable link using crimping tools.
- c) Arrange all earthing cable straight to linkbox.

[Appendix F1 - Attached the \(6+1way\) Earthing Link Box \(Outdoor\)](#)

[Appendix F2 - Attached the \(3+1way\) Earthing Link Box \(Indoor\)](#)

7.0 CABLE TEMINATION

7.1 Permit to work

- a) Issued and Obtain PTW by AP.

7.2 Safety and Precaution

- a) Please ensure that the working feeder is already isolated/grounded and 'Permit to Work' is issued.
- b) Cable Phasing confirmation has been done earlier before starting termination works preparation.
- c) It is assumed the jointing crew is experienced and has been trained in installation of this or similar termination.

7.3 Before Starting

- a) The cable and termination components have to be protected from dust, contamination and moisture.
- b) Resin Compounds are sensitive to moisture and must be kept dry. Ensure joint shell and internal components are dry before mixing the resin and whilst pouring the resin.
- c) Check to ensure that the kit you are going to use fits the cable.
- d) Refer to the kit label and the title of the installation instruction.

7.4 Preparation of terminations

- a) Insert the termination accessories into the cable for GIS or AIS termination.
- b) Connect the cable using the connector (mechanical connector).
- c) GIS: Push head termination and compress using compression tool.
- d) AIS: Crimping Cable Lug using crimping tool.

7.5 Jointing Works

- a) Setting, measure and mark the cable before cutting.
- b) Strip the outer jacket with the recommended tool up to the jacket cut mark.
- c) Bend the earthing cable over the cable outer sheath.
- d) Measure, mark and cut insulation cable according to the measurements prescribed form instruction manual.
- e) Open semiconductor using striping tools according to the measurements.
- f) Pulling out the insulation using appropriate hand tools.
- g) Make sure this step is done and ensure that the cable insulation is thoroughly cleaned and no traces of carbon remain.

7.6 Completing the Termination

- a) Plug in termination into the socket at switchgear if termination GIS type.
- b) Connect Cable at busbar switchgear with bolt and nut if termination AIS type.

[Appendix G1 - AIS Outdoor & Indoor 3M Termination 33kV](#)

[Appendix G2 - Pfisterer Plug In GIS Termination 33kV](#)

7.7 Fitting the Earthing Cable

- a) Bundle all earthing cable with HV tape and PVC tape.
- b) Connect the earthing cable using cable link 300mm² and crimping the cable link using crimping to LV cable Copper 300mm² 1C and straight to Linkbox 3+1.

8.0 TEST INSTRUMENTS

- a) Megger - High Voltage Insulation Tester.
- b) VLF 6022CMF – AC Test Set
- c) Shirla – Cable Sheath Tester

[Appendix H1 –Certificate of Calibration – MIT 515 \(Megger\).](#)

[Appendix H2- Certificate of Calibration - VLF 6022CMF - Page 1 & 2](#)

[Appendix H3- Certificate of Calibration - \(Shirla\) – Page 1 & 2](#)

9.0 SITE CLEANING

- a) Upon completion of all installation works, the equipment will be properly packed and ready for demobilization.
- b) Site area will then be cleaned from any other dumped and unused material.

10.0 PERSONNEL, HEALTH AND SAFETY

10.1 Occupational Safety and Health Requirements

The site supervisor or foreman shall be responsible for the site safety during work activity to be done at site. He shall be reporting to the main contractor safety site supervisor (SSS) if there any accident or incident during working hours.

Below is the main focus before doing the job task:

Project Engineer

Inform the work planning location and job task to site supervisor / 1 week early to prepare the material, manpower and safety precautions.

Site Supervisor

- To inform and select manpower groups.
- To request Permit to work
- To confirm and make sure the traffic controls follow the safety precaution and actions.
- To make sure all the workers used the PPE that provided
- To make sure all the area in good condition and tidy after work. Please take 15 minutes housekeeping before going home daily.
- To make sure all the material in safe and good condition by doing material checklist before start work daily.
- To make sure the manpower is healthy and taking care of safety and health welfare such as rest time, food and drink and etc.

Workers

- Follow the safety rules and regulations
- To make sure taking care of himself and others workers safety
- To use all the PPE provided
- Follow all the standard job task that been request by management team
- Do all the work with safety first
- No smoking during working hours
- No hand phone during working hours

10.2 Excavations Work

Before starting the excavation, make sure do a survey of the site and determine the presence if any of buried third party cable or services. Take safety precaution before doing surveying.

10.3 Protections of the Public

- a) All public walkways, sidewalks, and the thoroughfares bordering on or running through any excavation site shall be provided with substantial guardrails or board fences.
- b) In addition, temporary foot walks beyond the curb shall be substantially constructed and provide with protection on both sides. (if pedestrian area)

- c) A flagman or watchman shall be designated to warn the public of the approach of trucks and to direct the trucks in and out of the property. Danger or warning signs shall be posted at all truck entrance and exits.
- d) During the night, all public sidewalks shall be adequately illuminating and warning lights or flares shall be placed about the property to ensure safety for pedestrian and vehicular traffic.

11.0 JOB SAFETY ANALYSIS / RISK & HAZARD CONTROL.

11.1 Cable Trenching

Possible Hazard(s)

- Slips, trips & falls
- Weather condition
- Machinery accident
- Damage to underground services or other property
- Personal injury

Risk & Safety Control

- To do trial hole before start trenching works
- The area of the excavation work will be clearly defined by barricades and warning signs.
- An assessment of the ground conditions and working environment.
- Providing suitable and safe access to and from the work place including the work area.
- An assessment of the risks involved in carrying out the work.
- The most appropriate method to prevent any risk of injury.
- Electrical safety, including the location of underground and aboveground service cable and nearby overhead power lines.

11.2 Cable Installation Underground

Possible Hazard(s)

- Cable damage
- Weather condition
- Machinery accident
- Personal injury

Risk & Safety Control

- Check the cable condition before the installation.
- Machinery (backhoe, truck) operator must have a valid license & certificate.
- Clear obstruction, maintain good housekeeping.

11.3 Cable Installation on Cable Ladders

Possible Hazard(s)

- Slips, trips & falls
- Injury to personnel while handling gen set, crane & carrying out the gen set testing works etc.

- Cables damage.
- Electric shock while working on 33kV substation.

Risk & Safety Control

- Barricade working area & put 'DANGER' Signage.
- The works will commence once the approvals given by the engineer on the locations.
- Clear obstruction, maintain good housekeeping.

11.4 Cable Jointing & Termination

Possible Hazard(s)

- Carelessness, in proper handling of material, tools or equipment or performing unauthorized procedure during installation would seriously affect the operational characteristics of the joint.
- Slips, trips & falls
- Injury to personnel while handling gen set, crane and carrying out the gen set testing works etc.
- Faults in cables
- Electric shock while working on 33kV substation.

Risk & Safety Control

- Barricade working area & put 'DANGER' Signage.
- The works will commence once the approval is given by the engineer on the locations.
- Before start work, safety briefing, scope of work must be done.

12.0 PERSONNEL PROTECTIVE EQUIPMENT TO BE USED

- Safety helmet – head protection
- Long sleeves or jacket – hand and heat protection
- Safety shoes / rubber boots – leg
- Hand gloves – hand protection
- Sun glasses – eyes protection
- Ear plug / ear muff – ear noise protection'
- Dust mask – dust inhalation protection
- Others PPE required for the job task

Safety helmet 	Safety vests with reflection/ jacket. 	Safety shoes / rubber shoes for wet area. 
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Sunglasses. 	Hand gloves 	Dust mask 

END