SITE SPECIFIC DESIGN DETAIL THE FOR THE JAMESON PARK GRUONDBD AND TRU INSTALLATION – ON THE PIPELINE SECTION BETWEEN JAMESON PARK & SECUNDA

REV. 001

Document No.: _____ Date Issued: _____ Electrical Department Approval Date : _____

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EXECUTIVE SUMMARY

Transnet Pipelines requires an additional anode ground-bed to be installed between Jameson Park and Secunda due to the deterioration of the pipeline coating in this section.

A 3 phase 100V/100A automatically controlled transformer rectifier unit has been proposed for this section of the pipeline.

The necessary field measurements have been carried out and the appropriate calculations and computer modelling exercises have been performed to arrive at a suitable ground-bed design.

The proposed ground-bed is to consist of a 100m long horizontal ground-bed which will be constituted from 30 MMO anodes connected via a main ring cable.

1. INTRODUCTION

Cathodic Protection is applied to buried steel pipelines to compliment the protection provided by coating or wrapping of the pipeline to prevent product leakages due to corrosion.

Transnet Pipeline's CP Department has decided to install additional units along the Jameson Park to Secunda pipeline to compensate for the deteriorated coating so that the pipeline can be Cathodically Protected.

2. PIPELINE DATA

The following pipeline parameters have been used:

PIPELINE DETAIL	
Pipeline Length	74800m
Pipeline Diameter	16”
Pipeline Wall	Steel API 5L X52
Coating	PVC
CP System	Impressed Current Cathodic Protection
Wall Thickness	6.35mm to 9.52mm
Pipeline Depth	1.5m
MAOP	80 Bar

3. SCOPE OF WORK

Refer to the main scope of works for our typical installation specification while considering the attached design specification.

4. CONSTRUCTION OF THE JAMESON PARK TO SECUNDA GROUND-BED AND NSTALLATION OF A TRU INSIDE OF A VANDAL PROOF ENCLOSURE

4.1 installation of a three-phase 100V/100A automatically controlled TRU. The TRU shall be supplied as per cathodic protection transformer rectifier units, forced drainage units and natural drainage units specification PL652 rev001.

4.2 The TRU shall be installed inside of a Rocla concrete enclosure.

4.3 A maximum 10-Ohm (low impedance) TRU earthing system shall be installed around the TRU.

4.4 A total length of 100m by 2.5m deep horizontal ground-beds shall be installed as per ground bed installation design.

4.5 The ground bed shall be installed with a suitable irrigation system to help maintain a low resistance to earth in order to enable the launch of protective current.

4.6 TRU shall be connected to a single 2.5m deep, 0.3m diameter, and 100m long horizontal Ground bed.

4.7 The anode ground beds shall consist of 30 by 2m canisters containing MMO anodes and coke breeze and 31 by 1m spacer canisters filled with coke breeze as per drawing number PL1210409. The bottom 300mm of the ground-bed shall be filled with coke breeze, such that the actual ground-bed dimension will be 0.3m x 0.3m x 100m. The anode canisters will be buried in the coke breeze.

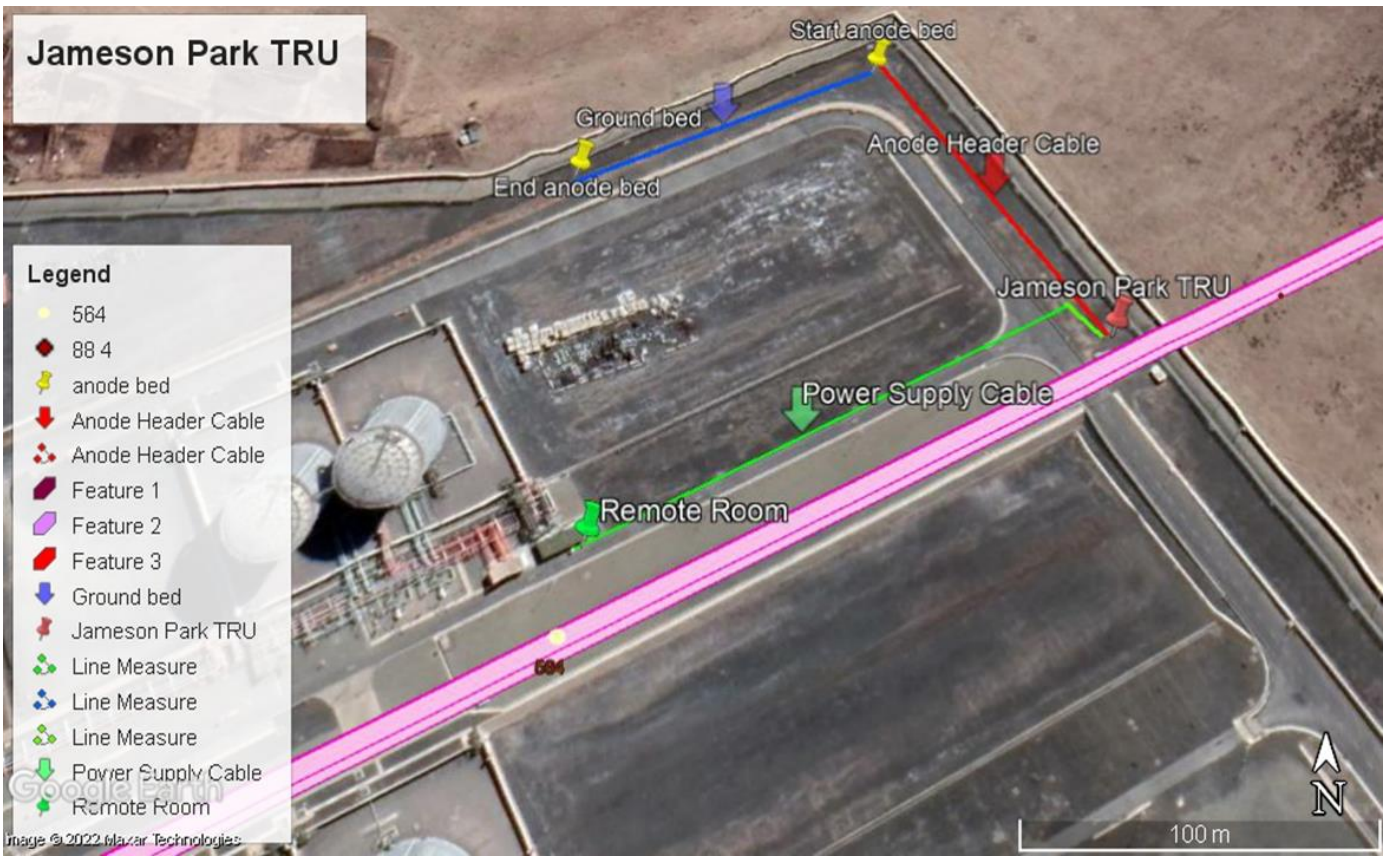
4.8 The anodes shall be connected individually to a ring main cable consisting of a single core 35mm² PVC/PVC cable, such that there is redundancy built into the system. Each connection to the ring main shall be individually made, using suitable line taps and an epoxy splicing kit. Sufficient time shall be allowed to allow the epoxy to cure, before backfilling of the Groundbed commences.

4.9 The Service Provider is required to cast in concrete the anodes tail cables to a minimum thickness of 600mm as per drawing number 2684358-C-CP-DD-180.

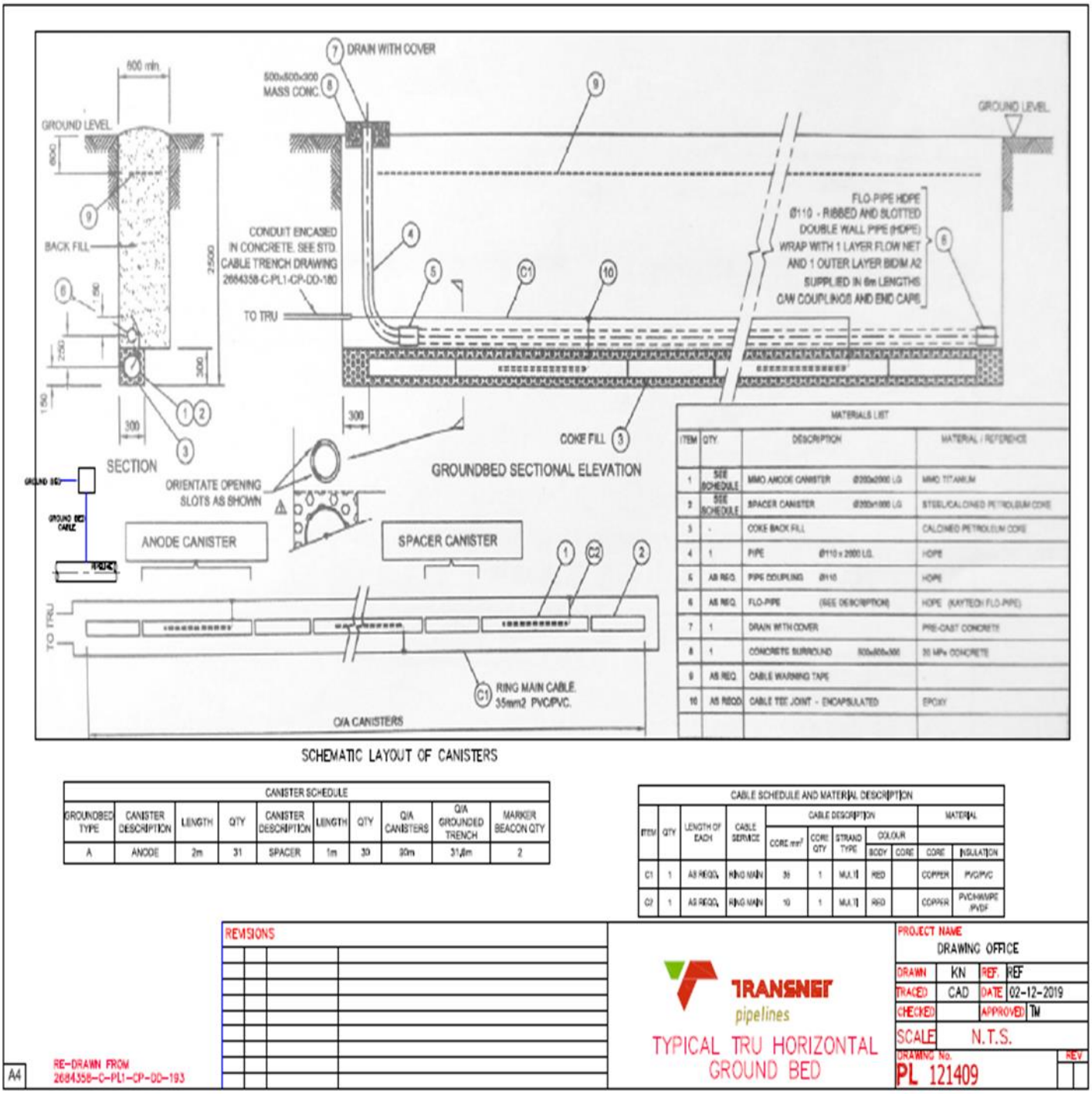
4.10 A 1X10mm² X 20m monitor cable shall be installed and terminated inside the rectifier for pipe monitoring.

4.11 A permanent reference (PRE) cell and a coupon with a 5 meters tail cable shall be installed 300mm from the pipeline and terminated inside the rectifier, as per drawing number 2684358-C-PL1-CP-DD-181.

5. RECTIFIER INSTALLATION LAYOUT



6. GROUND-BED CONSTRUCTION LAYOUT



CANISTER SCHEDULE

GROUNDBED TYPE	CANISTER DESCRIPTION	LENGTH	QTY	CANISTER DESCRIPTION	LENGTH	QTY	C/A CANISTERS	C/A GROUNDED TRENCH	MARKER BEACON QTY
A	ANODE	2m	31	SPACER	1m	30	92m	31.4m	2

CABLE SCHEDULE AND MATERIAL DESCRIPTION

ITEM	QTY	LENGTH OF EACH	CABLE SERVICE	CABLE DESCRIPTION				MATERIAL	
				CORE mm²	CORE QTY	STRAND TYPE	COLOUR BODY	COLOUR CORE	CORE / INSULATION
C1	1	AS REQD.	RING MAIN	35	1	MULTI	RED		COPPER / PVC/PVC
C2	1	AS REQD.	RING MAIN	10	1	MULTI	RED		COPPER / PVC/NWPE /PVDF

REVISIONS

TRANSNET pipelines

TYPICAL TRU HORIZONTAL GROUND BED

PROJECT NAME	DRAWING OFFICE		
DRAWN	KN	REF.	REF
TRACED	CAD	DATE	02-12-2019
CHECKED		APPROVED	TM
SCALE	N.T.S.		
DRAWING No.	PL 121409	REV	

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RE-DRAWN FROM 2684358-C-PL1-CP-DD-193

SITE SPECIFIC DESIGN DETAIL FOR REFINED PRODUCTS PIPELINE SECTION BETWEEN TARLTON AND RUSTENBURG

REV. 001

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1. INTRODUCTION

Cathodic Protection is applied to buried steel pipelines to compliment the protection provided by coating or wrapping of the pipeline to prevent product leakages due to corrosion.

For many years this pipeline section has relied on the Hexriver TRU installed inside of a ROCLA just 5Km away from Rustenburg depot within the TPL servitude. Currently the power supply transformer has been vandalised and as a result our pipeline remains unprotectected and susceptible to corrosion.

The Transnet Pipeline's CP Department has made a decision to relocate the TRU to a location inside of the Rustenburg depot and to convert the TRU to FDU. The power supply will be supplied from within the depot.

2. PIPELINE DATA

The specific pipeline section for the Tarlton to Rustenburg refined products pipeline data is shown on the table below:

PIPELINE DETAIL	
Pipeline Length	62300m
Pipeline Diameter	8"
Pipeline Wall	Steel API 5L X52
Coating	PVC
CP System	Impressed Current Cathodic Protection
Wall Thickness	6.35mm to 9.52mm
Pipeline Depth	1.5m
MAOP	80 Bar

3. SCOPE OF WORK

Refer to the main scope of works for our typical installation specification while considering the attached design detail. This includes the supply and installation of the FDU and other complementary activities for the complete relocation of this FDU.

4. RELOCATION AND INSTALLATION OF TRU FOR THE REFINED PRODUCTS PIPELINE BETWEEN TARLTON AND RUSTENBURG

4.1 The Contractor must supply and install a single phase 100V/100A automatically controlled FDU. The FDU shall be supplied as per cathodic protection transformer rectifier units, forced drainage units and natural drainage units' specification PL652 rev001.

4.2 THE Contractor shall install the FDU inside rocla concrete enclosure, as per the Transnet Pipelines cathodic protection installation specification.

4.3 A maximum 10-Ohm (low impedance) FDU earthing system shall be installed around the FDU.

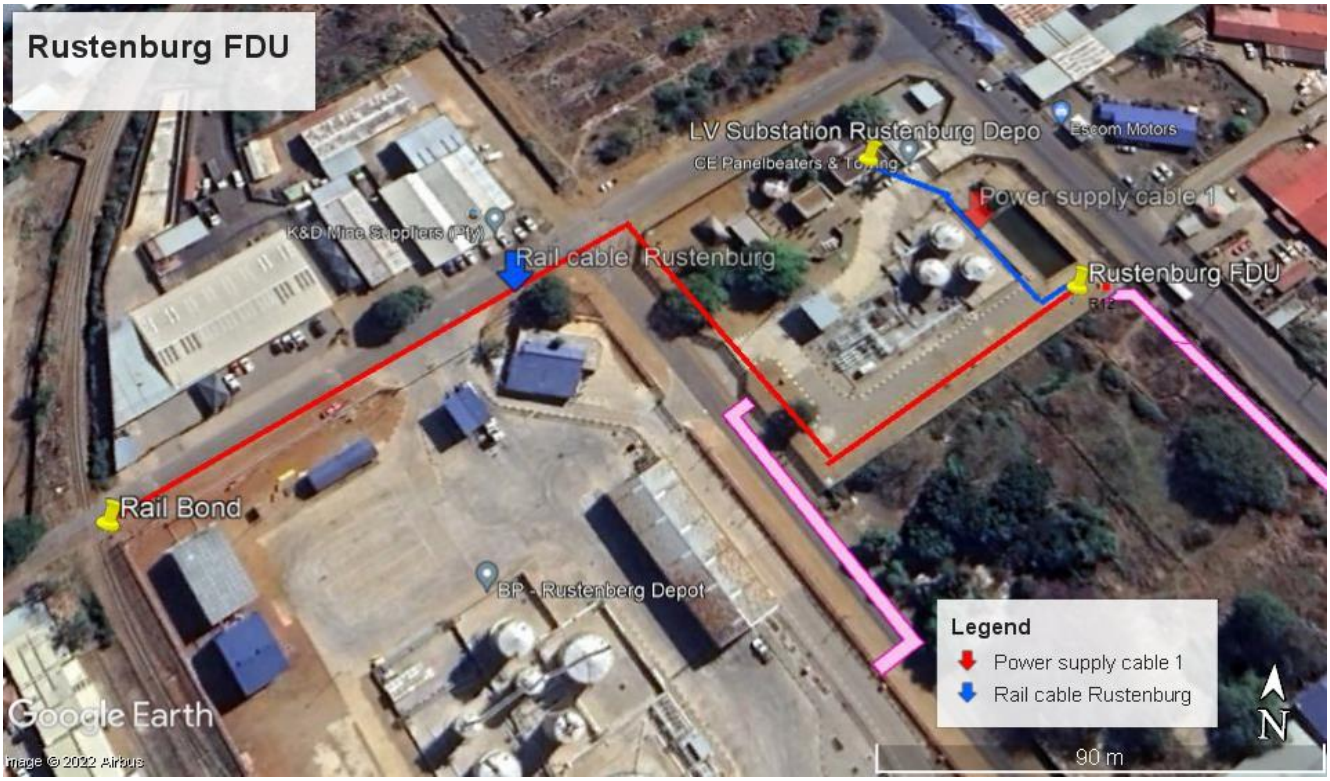
4.4 The total length of the rail cable shall be 100m. the first 10m shall consist of 2 X10m of 70mm^2 kwena cable which shall be spliced onto a 35mm2 4 core armoured red cable. This cable shall be buried at a depth of 1.5m and encased in concrete.

4.5 The rail cable is required to cross a busy road which is approximately 50m wide and requires Horizontal Directional Drilling (HDD) installed in a sleeve to cross the road.

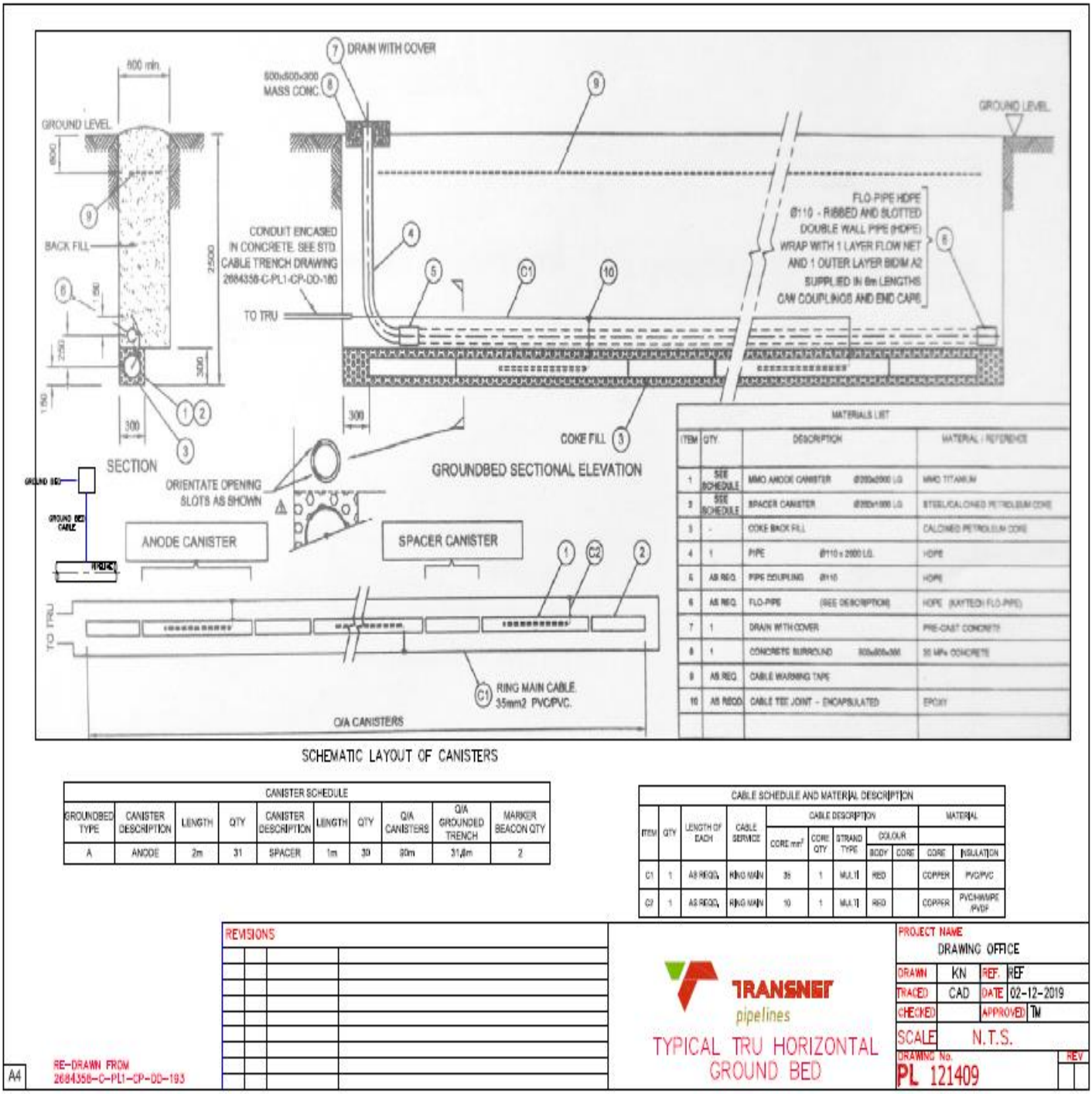
4.6 The 1X16mm² X 20m black monitor cable shall be installed and terminated inside the rectifier for pipe monitoring and shall be labelled as such.

4.7 The permanent reference (PRE) electrode and a DC coupon each with 10 meters tail cable shall be installed 300mm from the pipeline and shall face the pipeline and shall be terminated inside the rectifier, as per drawing number 2684358-C-PL1-CP-DD-181.

5. RECTIFIER'S INSTALLATION LAYOUT



6. ANODES INSTALLATION DESIGN



MATERIALS LIST

ITEM	QTY	DESCRIPTION	MATERIAL / REFERENCE
1	SEE SCHEDULE	MMO ANODE CANISTER Ø200x2000 LG	MMO TITANIUM
3	SEE SCHEDULE	SPACER CANISTER Ø200x1000 LG	STEEL/CALCINED PETROLEUM COKE
3	-	COKE BACK FILL	CALCINED PETROLEUM COKE
4	1	PIPE Ø110 x 2000 LG.	HDPE
5	AS REQ.	PIPE COUPLING Ø110	HDPE
6	AS REQ.	FLO-PIPE (SEE DESCRIPTION)	HDPE (KAYTECH FLO-PIPE)
7	1	DRAIN WITH COVER	PRE-CAST CONCRETE
8	1	CONCRETE SURROUND 600x600x300	35 MPa CONCRETE
9	AS REQ.	CABLE WARNING TAPE	-
10	AS REQD.	CABLE TEE JOINT - ENCAPSULATED	EPOXY

SCHEMATIC LAYOUT OF CANISTERS

CANISTER SCHEDULE

GROUNDBED TYPE	CANISTER DESCRIPTION	LENGTH	QTY	CANISTER DESCRIPTION	LENGTH	QTY	C/A CANISTERS	C/A GROUNDED TRENCH	MARKER BEACON QTY
A	ANODE	2m	31	SPACER	1m	30	90m	31,8m	2

CABLE SCHEDULE AND MATERIAL DESCRIPTION

ITEM	QTY	LENGTH OF EACH	CABLE SERVICE	CABLE DESCRIPTION					MATERIAL	
				CORE mm²	CORE QTY	STRAND TYPE	COLOUR BODY	COLOUR CORE	CORE	INSULATION
C1	1	AS REQD.	RING MAIN	35	1	MULTI	RED		COPPER	PVC/PVC
C2	1	AS REQD.	RING MAIN	10	1	MULTI	RED		COPPER	PVC/HMWPE /PVDF

REVISIONS

TRANSNET pipelines

TYPICAL TRU HORIZONTAL GROUND BED

PROJECT NAME: DRAWING OFFICE

DRAWN	KN	REF.	REF
TRACED	CAD	DATE	02-12-2019
CHECKED		APPROVED	TM
SCALE	N.T.S.		
DRAWING No.	PL 121409	REV	

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RE-DRAWN FROM 2684358-C-PL1-CP-DD-193

SITE SPECIFIC DESIGN DETAIL THE FOR REFINED PRODUCTS PIPELINE SECTION BETWEEN ALRODE AND LANGLAAGTE

REV. 001

Document No.: _____ Date Issued: _____ Electrical Department Approval Date : _____

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1. INTRODUCTION

Cathodic Protection is applied to buried steel pipelines to compliment the protection provided by coating or wrapping of the pipeline to prevent product leakages due to corrosion.

For many years this pipeline section has relied on the Crousus FDU installed inside of a cabinet just outside the Langlaagte depot next to the railway line within the rail servitude. Currently the power supply transformer has been vandalised and as a result our pipeline remains unprotected and susceptible to corrosion.

The Transnet Pipeline's CP Department has made a decision to relocate the FDU to a location inside of the Langlaagte depot and to upgrade the FDU as it is outdated. The power supply will be supplied from within the depot.

2. PIPELINE DATA

The specific pipeline section for the Standerton to Secunda Gas pipeline data is shown on the table below:

PIPELINE DETAIL	
Pipeline Length	22500m
Pipeline Diameter	12"
Pipeline Wall	Steel API 5L X52
Coating	PVC
CP System	Impressed Current Cathodic Protection
Wall Thickness	6.35mm to 9.52mm
Pipeline Depth	1.5m
MAOP	80 Bar

3. SCOPE OF WORK

Refer to the main scope of works for our typical installation specification while considering the attached design detail. This includes the supply and installation of the FDU and other complementary activities for the complete relocation of this FDU.

4. RELOCATION AND INSTALLATION OF AN FDU FOR THE REFINED PRODUCTS PIPELINE BETWEEN ALRODE AND LANGLAAGTE

4.1 The Contractor must supply and install a single phase 100V/100A automatically controlled FDU. The FDU shall be supplied as per cathodic protection transformer rectifier units, forced drainage units and natural drainage units' specification pl652 rev001.

4.2 THE Contractor shall install the FDU inside a heavy-duty concrete enclosure, as per the Transnet Pipelines cathodic protection installation specification.

4.3 A maximum 10-Ohm (low impedance) FDU earthing system shall be installed around the FDU.

4.4 The total length of the rail cable shall be 100m. the first 10m shall consist of 2 X10m of 70mm^2 kwena cable which shall be spliced onto a 35mm2 4 core armoured red cable. This cable shall be buried at a depth of 1.5m and encased in concrete.

4.5 Supply and Install power cable 50m X 16mm2 4 core copper armoured cable.

4.6 The rail cable is required to cross a busy road which is approximately 50m wide and requires Horizontal Directional Drilling (HDD) installed in a sleeve to cross the road.

4.7 The 1X16mm^2 X 20m black monitor cable shall be installed and terminated inside the rectifier for pipe monitoring and shall be labelled as such.

4.8 The permanent reference (PRE) electrode and a DC coupon each with a 10 meter tail cable shall be installed 300mm from the pipeline and shall face the pipeline and shall be terminated inside the rectifier, as per drawing number 2684358-C-PL1-CP-DD-181.

5. RECTIFIER'S INSTALLATION LAYOUT

SITE SPECIFIC DESIGN DETAIL THE FOR REFINED PRODUCTS PIPELINE SECTION BETWEEN SASOLBURG AND KLERKSDORP

REV. 001

Document No.: _____ Date Issued: _____ Electrical Department Approval Date : _____

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1. INTRODUCTION

Cathodic Protection is applied to buried steel pipelines to compliment the protection provided by coating or wrapping of the pipeline to prevent product leakages due to corrosion.

For many years this pipeline section has relied on the Klerksdorp K1 FDU installed inside of a cabinet next to the railway line within the rail servitude. Currently the FDU and power supply transformer has been vandalised and as a result our pipeline remains unprotected and susceptible to corrosion.

The Transnet Pipeline's CP Department has made a decision to re install the FDU inside heavy duty concrete enclosure to upgrade the FDU as it is outdated. The power supply will be supplied from TFR.

2. PIPELINE DATA

The specific pipeline section for the Sasolburg to Klerksdorp refined products pipeline data is shown on the table below:

PIPELINE DETAIL	
Pipeline Length	137900m
Pipeline Diameter	8"
Pipeline Wall	Steel API 5L X52
Coating	PVC
CP System	Impressed Current Cathodic Protection
Wall Thickness	6.35mm to 9.52mm
Pipeline Depth	1.5m
MAOP	80 Bar

3. SCOPE OF WORK

Refer to the main scope of works for our typical installation specification while considering the attached design detail. This includes the supply and installation of the FDU and other complementary activities for the complete relocation of this FDU.

4. INSTALLATION OF AN FDU FOR THE REFINED PRODUCTS PIPELINE BETWEEN SASOLBURG AND KLERKSDORP

4.1 The Contractor must supply and install a single phase 100V/100A automatically controlled FDU. The FDU shall be supplied as per cathodic protection transformer rectifier units, forced drainage units and natural drainage units' specification pl652 rev001.

4.2 THE Contractor shall install the FDU inside a heavy-duty concrete enclosure, as per the Transnet Pipelines cathodic protection installation specification.

4.3 A maximum 10-Ohm (low impedance) FDU earthing system shall be installed around the FDU.

4.4 The total length of the rail cable shall be 50m. the first 10m shall consist of 2 X10m of 70mm^2 kwena cable which shall be spliced onto a 35mm2 4 core armoured red cable. This cable shall be buried at a depth of 1.5m and encased in concrete.

4.5 Supply and Install power cable 60m X 16mm2 4 core copper armoured cable.

4.6 The 1X16mm^2 X 20m black monitor cable shall be installed and terminated inside the rectifier for pipe monitoring and shall be labelled as such.

4.7 The permanent reference (PRE) electrode and a DC coupon each with a 10 meter tail cable shall be installed 300mm from the pipeline and shall face the pipeline and shall be terminated inside the rectifier, as per drawing number 2684358-C-PL1-CP-DD-181.

5. RECTIFIER'S INSTALLATION LAYOUT

SITE SPECIFIC DESIGN DETAIL THE FOR THE JAMESON PARK GRUONDBD AND TRU INSTALLATION – ON THE PIPELINE SECTION BETWEEN JAMESON PARK & COALBROOK

REV. 001

Document No.: _____ Date Issued: _____ Electrical Department Approval Date : _____

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EXECUTIVE SUMMARY

Transnet Pipelines requires an additional anode ground-bed to be installed between Jameson Park and Coalbrook due to the deterioration of the pipeline coating in this section.

A Single phase 100V/100A automatically controlled transformer rectifier unit has been proposed for this section of the pipeline.

The necessary field measurements have been carried out and the appropriate calculations and computer modelling exercises have been performed to arrive at a suitable ground-bed design.

The proposed ground-bed is to consist of a 100m long horizontal ground-bed which will be constituted from 30 MMO anodes connected via a main ring cable.

1. INTRODUCTION

Cathodic Protection is applied to buried steel pipelines to compliment the protection provided by coating or wrapping of the pipeline to prevent product leakages due to corrosion.

Transnet Pipeline's CP Department has decided to install additional units along the Jameson Park to Coalbroak pipeline to compensate for the deteriorated coating so that the pipeline can be Cathodically Protected.

2. PIPELINE DATA

The following pipeline parameters have been used:

PIPELINE DETAIL	
Pipeline Length	126000m
Pipeline Diameter	18”
Pipeline Wall	Steel API 5L X52
Coating	PVC
CP System	Impressed Current Cathodic Protection
Wall Thickness	6.35mm to 9.52mm
Pipeline Depth	1.5m
MAOP	80 Bar

3. SCOPE OF WORK

Refer to the main scope of works for our typical installation specification while considering the attached design specification.

4. CONSTRUCTION OF THE JAMESON PARK TO KENDAL GROUND-BED AND NSTALLATION OF A TRU INSIDE OF A VANDAL PROOF ENCLOSURE

4.1 installation of a Single-phase 100V/100A automatically controlled TRU. The TRU shall be supplied as per cathodic protection transformer rectifier units, forced drainage units and natural drainage units specification PL652 rev001.

4.2 The TRU shall be installed inside of a heavy duty concreter enclosure.

4.3 A maximum 10-Ohm (low impedance) TRU earthing system shall be installed around the TRU.

4.4 A total length of 100m by 2.5m deep horizontal ground-beds shall be installed as per ground bed installation design.

4.5 The ground bed shall be installed with a suitable irrigation system to help maintain a low resistance to earth in order to enable the launch of protective current.

4.6 TRU shall be connected to a single 2.5m deep, 0.3m diameter, and 100m long horizontal Ground bed.

4.7 The anode ground beds shall consist of 30 by 2m canisters containing MMO anodes and coke breeze and 31 by 1m spacer canisters filled with coke breeze as per drawing number PL1210409. The bottom 300mm of the ground-bed shall be filled with coke breeze, such that the actual ground-bed dimension will be 0.3m x 0.3m x 100m. The anode canisters will be buried in the coke breeze.

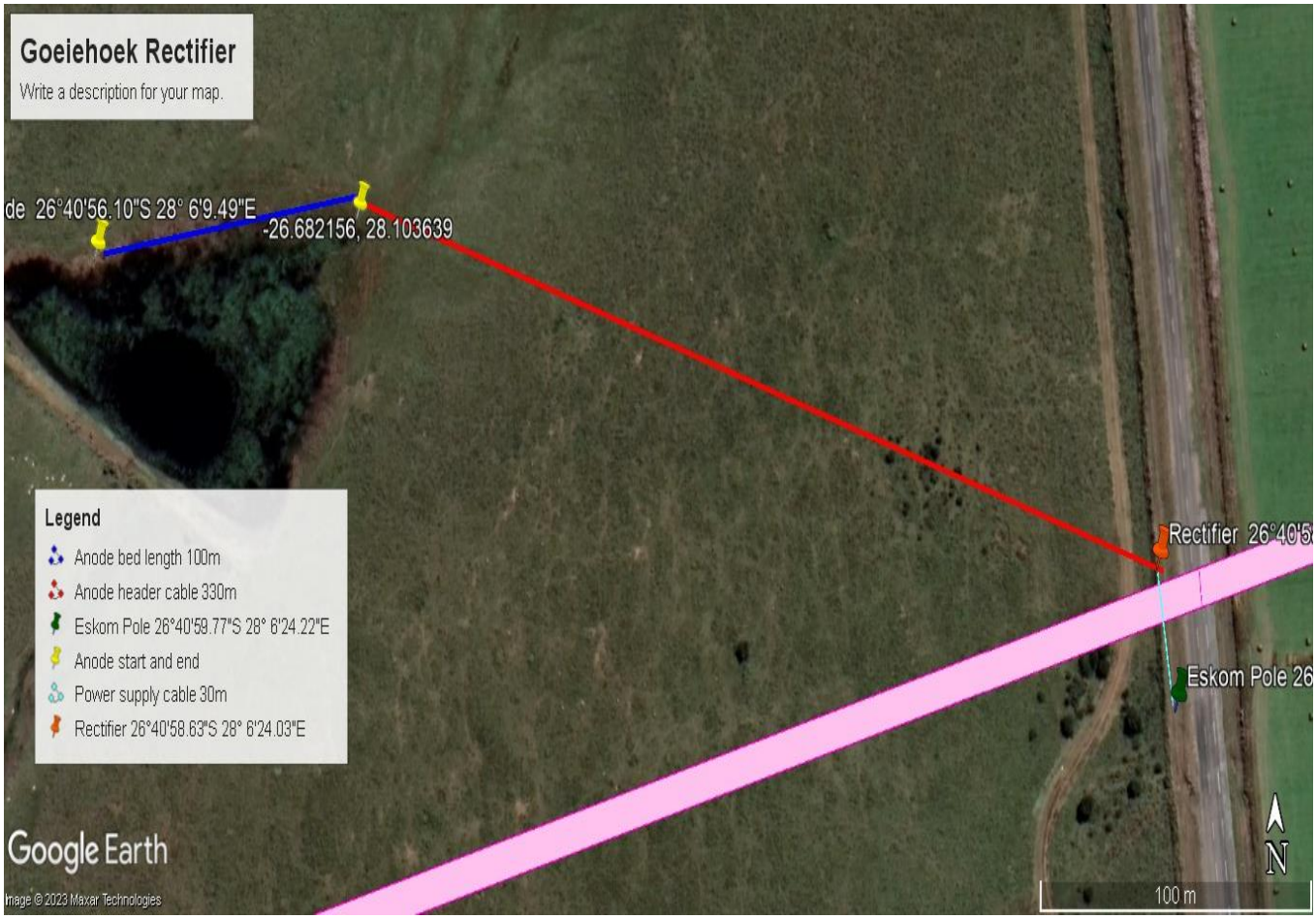
4.8 The anodes shall be connected individually to a ring main cable consisting of a single core 35mm² PVC/PVC cable, such that there is redundancy built into the system. Each connection to the ring main shall be individually made, using suitable line taps and an epoxy splicing kit. Sufficient time shall be allowed to allow the epoxy to cure, before backfilling of the Groundbed commences.

4.9 The Service Provider is required to cast in concrete the anodes tail cables to a minimum thickness of 600mm as per drawing number 2684358-C-CP-DD-180.

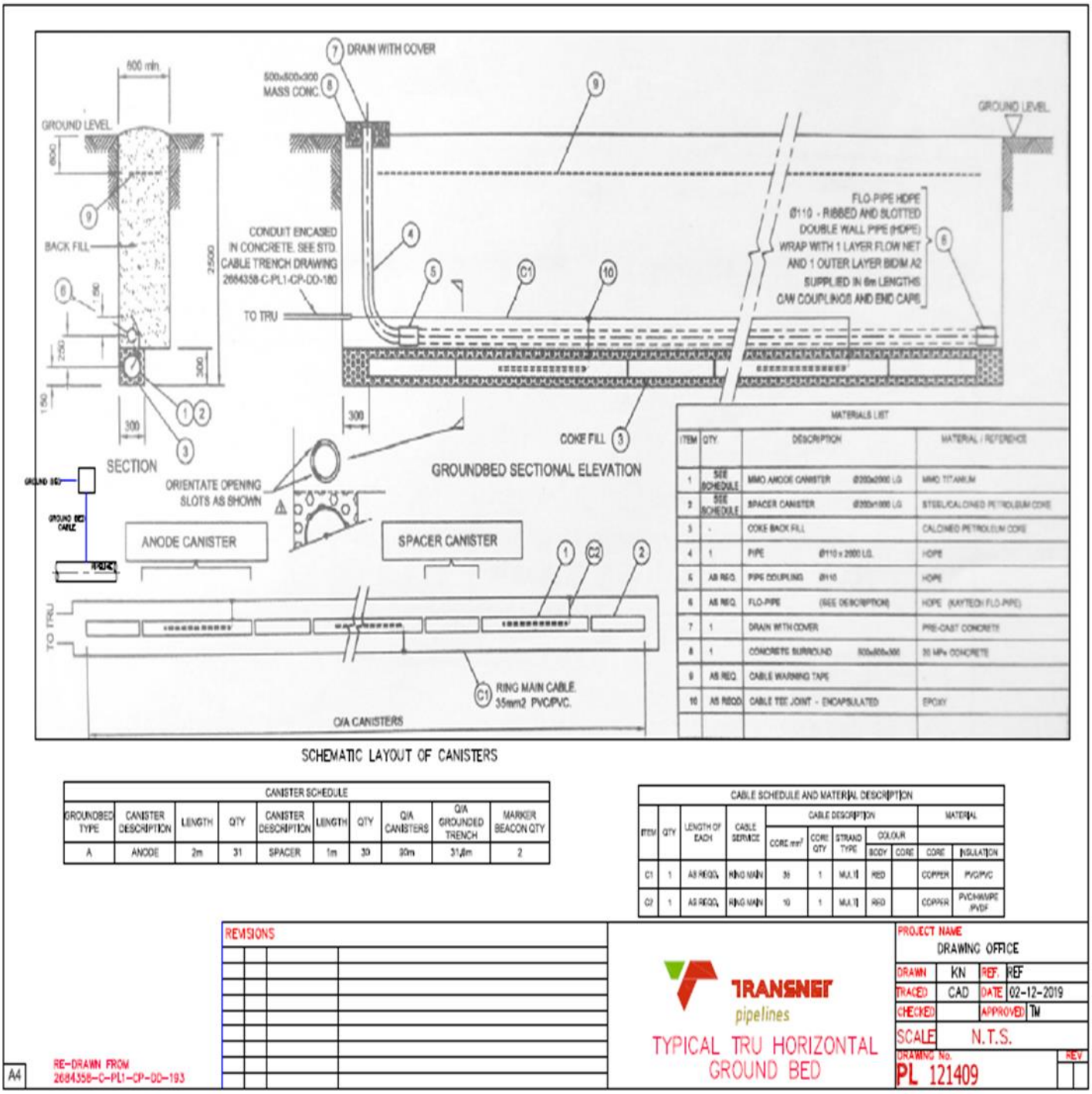
4.10 A 1X10mm² X 20m monitor cable shall be installed and terminated inside the rectifier for pipe monitoring.

4.11 A permanent reference (PRE) cell and a coupon with a 5 meters tail cable shall be installed 300mm from the pipeline and terminated inside the rectifier, as per drawing number 2684358-C-PL1-CP-DD-181.

5. RECTIFIER INSTALLATION LAYOUT



6. GROUND-BED CONSTRUCTION LAYOUT



CANISTER SCHEDULE

GROUNDBED TYPE	CANISTER DESCRIPTION	LENGTH	QTY	CANISTER DESCRIPTION	LENGTH	QTY	C/A CANISTERS	C/A GROUNDED TRENCH	MARKER BEACON QTY
A	ANODE	2m	31	SPACER	1m	30	92m	31.4m	2

CABLE SCHEDULE AND MATERIAL DESCRIPTION

ITEM	QTY	LENGTH OF EACH	CABLE SERVICE	CABLE DESCRIPTION				MATERIAL	
				CORE mm²	CORE QTY	STRAND TYPE	COLOUR BODY	COLOUR CORE	CORE / INSULATION
C1	1	AS REQD.	RING MAIN	35	1	MULTI	RED		COPPER / PVC/PVC
C2	1	AS REQD.	RING MAIN	10	1	MULTI	RED		COPPER / PVC/NWPE /PVDF

REVISIONS

TRANSNET pipelines

TYPICAL TRU HORIZONTAL GROUND BED

PROJECT NAME	DRAWING OFFICE		
DRAWN	KN	REF.	REF
TRACED	CAD	DATE	02-12-2019
CHECKED		APPROVED	TM
SCALE	N.T.S.		
DRAWING No.	PL 121409	REV	

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