

On Mine Routing Document - Capital Expenditure Application

Project Leader	Jacques Breet	Vote Number	805220232003
Title	N3 BEV CHARGING BAY 2		
Mine	Nchwaning 3	Department	Engineering

This document must accompany the Capital Application until the latter is sent to Head Office by the Mine Accountant.

Capital Approval Level

- Senior General Manager & Financial Manager
- Executive Operations (Mines) & Senior Executive Finance
- One ARM and One Assore Exco Member
- Two ARM and Two Assore Exco Member
- Board Approval Capital

Type of Application

- Capital Application
- Vote Revision

PLEASE EXPEDITE AND FORWARD PROMPTLY!

Designation	Comments	Signature
Mine Accountant	To allocate Vote Number and Review	Signed by:Chrizel Chantal Waterboer Signed at:2024-11-15 09:13:04 +02:00 Reason:I approve this document Chrizel   <small>ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS</small>
Project Leader	Plan and complete Vote Application	Signed by:Jacques Sidney Breet Signed at:2024-11-15 09:30:15 +02:00 Reason:I approve this document Jacques   <small>African Rainbow Minerals</small>
Head of Department	Approve	Signed by:Sello Taku Signed at:2024-11-19 08:06:15 +02:00 Reason:I approve this document   <small>African Rainbow Minerals</small>
Engineering Manager	Approve	Signed by:Sello Taku Signed at:2024-11-19 08:06:27 +02:00 Reason:I approve this document Sello Ta   <small>African Rainbow Minerals</small>
Management Accountant	Review	Signed by:Nigel Morgan Coetze Signed at:2024-11-20 16:07:08 +02:00 Reason:I approve this document Nigel M   <small>ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS</small>
Financial Manager	Approve	Signed by:MECHIEL JOHANNES SMIT Signed at:2024-12-02 13:36:11 +02:00 Reason:I approve this document MECHI   <small>ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS</small>
Senior General Manager	Approve	Signed by:Xolani Qamata Signed at:2024-12-03 14:37:49 +02:00 Reason:I approve this document Xolani   <small>ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS</small>

©Assmang (Pty) Limited | P.O. Box 187, Santoy, 8491

NOTE: Uncontrolled Copy – This document is only valid if same as Master Document on DMMA

Page 1 of 3

POPI ACT: BRMO guarantees to keep and use your Information only for the purpose it was collected for. When that purpose is no longer effective, the Information will be destroyed beyond reconstruction, except when there is a statutory or regulatory obligation that requires BRMO to keep your Information for a specific period that is longer than the purpose for which it was received.



FORM

Document No: FOR-FIN-CC-GEN-G-33466

Revision No: 18.0

Next Revision Date: DD/11/2027

Effective Date: DD/11/2024

BLACK ROCK MINE OPERATIONS

1st Published Date: DD/02/2024

On Mine Routing Document - Capital Expenditure Application

Project Leader	Jacques Breet	Vote Number	805220232003
Title	N3 BEV CHARGING BAY 2		
Mine	Nchwaning 3	Department	Engineering

PLEASE NOTE ANY COMMENTS

Mine Accountant:

Project Leader:

Head of Department:

Engineering Manager:

©Assmang (Pty) Limited | P.O. Box 187, Santoy, 8491

NOTE: Uncontrolled Copy – This document is only valid if same as Master Document on DMMA

Page 2 of 3

POPI ACT: BRMO guarantees to keep and use your Information only for the purpose it was collected for. When that purpose is no longer effective, the Information will be destroyed beyond reconstruction, except when there is a statutory or regulatory obligation that requires BRMO to keep your Information for a specific period that is longer than the purpose for which it was received.

Printed on 14/11/2024

Time 2:50 PM



FORM

Document No: FOR-FIN-CC-GEN-G-33466

Revision No: 18.0

Next Revision Date: DD/11/2027

Effective Date: DD/11/2024

BLACK ROCK MINE OPERATIONS

1st Published Date: DD/02/2024

On Mine Routing Document - Capital Expenditure Application

PLEASE NOTE ANY COMMENTS

Management Accountant:

Financial Manager:

Senior General Manager:

©Assmang (Pty) Limited | P.O. Box 187, Santoy, 8491

NOTE: Uncontrolled Copy – This document is only valid if same as Master Document on DMMA

Page 3 of 3

POPI ACT: BRMO guarantees to keep and use your Information only for the purpose it was collected for. When that purpose is no longer effective, the Information will be destroyed beyond reconstruction, except when there is a statutory or regulatory obligation that requires BRMO to keep your Information for a specific period that is longer than the purpose for which it was received.

Printed on 14/11/2024

Time 2:50 PM

Capital Application Form

PART A – REFERENCE INFORMATION			
Operation Name	Nchwaning 3	Vote No.	805220232003
Application Date	13/11/2024	Project Leader	Jacques Breet
Project Title	N3 BEV CHARGING BAY 2		
Project Value	R 106,153,799.00		
Project Start Date	February 2025	Project End Date	June 2026

Capital Approval Level

- Senior General Manager and Financial Manager
- Executive Operations (Mines) and Senior Executive Finance
- One ARM and One Assore Exco Member
- Two ARM and Two Assore Exco Members
- Board Approval

Type of Capital

- Consolidated Assessment
- Capital Application
- Replacement Capital

EXECUTIVE SUMMARY

The capital application is to apply for funding to construct and equip a second underground battery charging bay at Nchwaning 3, it will service the second fleet of BEV's. The first charging bay was successfully completed and commissioned in September 2022 and is servicing the first fleet of BEV's, the team has considered all the key learnings and revised the design accordingly.

BEV Motivation Overview

- Transitioning from a diesel fleet to a full BEV fleet drastically reduces the heat load and ventilation requirements for the Nchwaning 3 operation. This not only reduces the capital expenditure and power consumption of the ventilation system, but BEV's also

Capital Application Form

- provide the underground workers with much improved working conditions by improving air quality and reducing heat, vibration and noise.
- Although the BEV fleet is slightly more expensive over the LOM, when assessing the operation holistically, including ventilation requirements, power requirements, infrastructure and maintenance, the BEV's provide a significant benefit over the LOM with potential upside going into the future with this technology.
 - Transitioning to a hybrid fleet (only replacing the primary vehicles with BEVs) will still result in a significant heat load reduction and reduced ventilation requirements. A significant benefit is still realised over the LOM by replacing the Load and Haul vehicles only.

Capital Application Form

BUDGET SUMMARY

Description	R	Percentage
Design & Build	R 47,276,470.00	
Charging	R 24,838,607.00	
Equipping	R 9,840,033.00	
Project team	R 3,144,937.00	
Sub-Total	R 85,100,047.00	
Escalation	R 6,808,004.00	8%
Contingency	R 9,190,805.00	10%
Fees	R 5,054,943.00	5%
Total	R 106,153,799.00	
Amount approved in 5 year plan	R 40,189,204.00 Y1 R 70,331,103.00 Y2	

Expenses that need to be capitalised include any costs directly attributable to bringing the assets to its intended working condition. This includes costs of outside contractors as well as the time spent by resources on capital projects.

CATEGORISATION:

Complexity	✓	Guide	Project Value R'mil	✓
High Complexity	✓	Requires design, multi-disciplinary inputs and site construction work	>R500m	
			>R250m	
			>R70m	✓
			>R30m	
Low Complexity		Equipment related or provision of services where no design work is required	<R30m	
			<R5m	

Capital Application Form

PART B – QUALITY ASSURANCE

Heads of Departments (HODs) or Specialists

Name and Designation	Comment (from specialist and other stakeholders)	Signature
Sello Taku Manager Engineering		<p>Signed by:Sello Taku Signed at:2024-11-19 08:07:02 +02:00 Reason:I approve this document Sello Ta</p>  <p>ARM African Rainbow Minerals</p>
Malcolm Smit Manager Finance		<p>Signed by:MECHIEL JOHANNES SMIT Signed at:2024-12-02 13:37:01 +02:00 Reason:I approve this document</p>  <p>ARM African Rainbow Minerals</p>

Capital Application Form

Designation	Recommended by	Signature	Recommendation signatures required
ARM Technical			Projects >R1m or as requested
Executive Operations Support			Projects >R5m
Executive Projects			Projects >R70m

Recommendation comments where applicable.

Capital Application Form

PART C – APPROVALS

In this section all relevant stakeholders required to approve the application.

Signatories – Application is signed according to the Delegation of Authority

NAME	SIGNATURE	DATE
<i>Operational Capital ≤R15m In Plan</i>		
SGM	Xolani Qamata	<small>Signed by Xolani Qamata Signed at 2024-12-03 14:37:24 +02:00 Reason I approve this document Xolani</small>  
Financial Manager	Malcolm Smit	<small>Signed by MECHL JOHANNES SMIT Signed at 2024-12-03 14:37:24 +02:00 Reason I approve this document MECHL</small>  
<i>Operational Capital >R15m ≤R30m In Plan</i>		
Executive Operations (Mines):		
Senior Executive Finance		
<i>EXCO >R30m ≤R60m In Plan</i>		
ARM EXCO member 1		
Assore EXCO member 1		
<i>EXCO >R60m ≤R120m In Plan</i>		
ARM EXCO member 2		
Assore EXCO member 2		
<i>Board Approval >R120m in Plan</i>		
Company Secretary		

Comments by signatories where applicable.

Capital Application Form

PART D – MOTIVATION

1 PROJECT BACKGROUND

BRMO has embarked on a journey to reduce investment in underground ventilation by replacing its existing primary TMM fleet with battery-operated machines. These machines operate by using battery power and batteries need to be charged and exchanged regularly. For this, infrastructure is needed in strategic areas.

2 SCOPE OF THE PROJECT

Complication:

The safe exchange of batteries on the BEV's require the use of specialised lifting equipment as batteries weigh in excess of 5 tons. They need to be lifted and lowered into position with the use of overhead cranes. Special battery chargers and charging stations are used to charge the batteries.

Opportunity:

This application is to design, build, and equip a charging bay to enable the safe and efficient use of Battery Electric Vehicles.

3 ALTERNATIVES CONSIDERED

No alternatives considered.

4 BUSINESS CASE

The project is a prerequisite for the BEV's. It will allow for the safe charging and exchanging of batteries in order for the BEV's to function effectively as per design criteria. The project also includes a service area.

BUSINESS DELIVERABLES

A well-designed and complete charging bay will allow the BEV fleet's batteries to be safely charged and exchanged.

Capital Application Form

FINANCIAL MOTIVATION

Assumptions:

Net Present Value (NPV)	N/A
Internal Rate of Return (IRR)	N/A
Pay Back Period	N/A

CASHFLOW ESTIMATE

Cash flow is estimated per below:

	FY2425	FY2526
N3 BEV BATTERY BAY 2	R 30,945,473.00	R 54,154,574.00

5 TECHNICAL SUMMARY

The design and civil works will be managed by the BRMO Project team. It will be based on the same principles as Bay 1 and include lesson learned from the use of Bay 1. Chargers and posts are acquired from the OEM (Epiroc) and will be installed by BRMO. All electrical infrastructure will be installed by the BRMO onsite team.

GEOLOGY AND MINERAL RESOURCES

N/A

MINING METHOD AND PLAN SUMMARY

Mining works will be completed by the end of November 2024; final scanning is scheduled for the first week in December 2024.

METALLURGICAL

N/A

SITE AND INFRASTRUCTURE

A suitable site was identified based on the below factors:

Capital Application Form

Safety
Ventilation
Flooding
Fire risk (New technology in battery safety)
Traffic Management

Mining
Slyping to be done
Expansion properties
Services available
Electricity (availability & capacity)
Water
Wi-Fi

Operational
Location w.r.t working areas and tips (Current)
Location w.r.t working areas and tips (Future)
Accessibility from Seam 1 & Seam 2 sections
Start– and end of shift travelling

Technical
Location w.r.t workshop
Maintenance strategy

Infrastructure is based on OEM specification and the charging bay design will be based on the principle design of battery bay no 1. Lessons learned have been included in the design.

ENGINEERING

As per detailed design.

CIVIL & EARTHWORKS

Civils and Mining works as per Mining scope.
See annexure list – Detail bill of quantities and rock mechanic recommendation.

STRUCTURAL

All structural installations will be as per design criteria to ensure the required SWL and other related standards are complied with.

MECHANICAL

Included in Civil scope (overhead cranes) to comply with BRMO standards.

Capital Application Form

CONTROL AND INSTRUMENTATION

The area will be equipped with Wi-Fi to ensure all the required communication and instrumentation systems function as per design.

ELECTRICAL

The electrical infrastructure will be as per design/load requirements. Review of the current electrical infrastructure and future requirements has commenced and has been included in a separate capital application.

FIRE CONTROL

As per BRMO standards and risk assessments. "Inpanel" charger fire suppression and automatic fire doors costs have been included in this capital application.

6 OTHER PROJECT CONSIDERATIONS

MARKETING

N/A

LEGAL & FISCAL

N/A

HUMAN RESOURCES

Organisational requirements and labour planning are in line with the overall BEV strategy.

SAFETY AND HEALTH

Product to comply with MHSA requirements as well as BRMO SHEQ policy. The Mines Safety Rules and Regulations will be followed; the contractors will supply a Mine Standard Safety File before the commencement of any work. Equipment will be supplied with a complete risk assessment, vehicle data specification packs and maintenance/operator manuals.

ENVIRONMENTAL

Water management (pumping and oil separator) has been included in the design criteria.

SUSTAINABLE DEVELOPMENT

N/A

Capital Application Form

PROCUREMENT

The Mine's tender procedure and procurement policies will be followed and adjudication done accordingly.

ONGOING OPERATIONAL COST

Maintenance cost included in business plan.

7 PROJECT MANAGEMENT SUMMARY

EXECUTION APPROACH

Mining team will function under supervision of the shaft in line with recommendations of the BRMO project team. BRMO project team will manage construction and equipping phase.

SCHEDULE

Project plan to be finalised, estimate of 17 months based on scope of work.

PROJECT RESOURCES

OPERATIONAL READINESS REQUIREMENTS

Current Dump Truck and Front End Loader Operators are trained and licensed to operate the BEV equipment.

RISKS

Mining and construction risks will be managed as per BRMO standard operating procedures and as per controls identified in issue base risk assessments.

Business risk – Not building a second battery charging bay will negatively affect production as the replacement BEV TMM will not be able to be put into production.

8 CONCLUSION AND RECOMMENDATION

A well-designed and functioning Charging Bay is a critical part to ensure the successful implementation and sustainability of the Battery Electric Vehicles. It will allow for the safe charging and changing of batteries on the BEV fleet.

It is therefore recommended that the capital application, to the value of R 106,153,799.00 be approved.

Capital Application Form

APPENDIX 1 SUPPORTING DOCUMENTS AS APPLICABLE

SPECIALISTS STUDIES

N/A

APPENDIX 2 SPECIFICATIONS, QUOTATIONS, BILLS OF QUANTITIES

- 1) Presentation – Design principle
- 2) Cost overview per element
- 3) General Lay out Design
- 4) Rock Mechanic Recommendation



ASSMANG

MANGANESE

BLACK ROCK MINE OPERATIONS

Nchwaning 3 BEV Charging Bay no2 Capital Application



Executive Overview

The Capital application is to construct and equip a second underground Battery Charging Bay at Nchwaning 3 shaft which will service the second fleet of BEV's.

The Charging Bay 1 was successfully completed and commissioned in September 2022 and is servicing the first fleet of BEV's. Key learnings was considered by the team and the design was revised accordingly. See photos on next slide.

Battery Charging Bay 1



Capital Cost Summary		
<u>Charging Bay</u>		
	CAPEX	
Description	Total	Notes
Consulting Design	R 3,902,519	Project consulting engineering team
Mining works	R 0	
TSL - Fibrecrete	R 2,466,240	Fibrecrete all pillars & hanging wall, Strap pillars
Civil works	R 38,029,979	All Civil & Structural works & Manitou rental
Overhead crane	R 2,877,732	2 x Overhead Cranes
Chargers & Posts	R 24,838,607	Chargers & Posts, Auto vent doors
Transformers	R 2,283,580	2 x Main Transformers, 1 x Portable transformer, Trailer
Cabling	R 3,206,453	Allowing for all cabling
Equipping	R 500,000	Special tools & equipment
Lubrication system	R 3,850,000	Lubrication system for hydraulic oil & lubes
BRMO project team	R 3,144,937	BRMO project team
	R 85,100,048	

CAPEX		
	Value	Notes
Project Capital	R 85,100,048	
Escalation	R 6,808,004	8%
Contingency	R 9,190,805	10%
Total cost	R 101,098,857	
Fees	R 5,054,943	5%
Total vote	R 106,153,800	

Stabilis	Unit cost	Units	Cost
Project	3918411.77	1	<u>3,902,518.27</u>

SUMMARY: REVISED ADDITIONAL FEES		Unit	Qty	Rate	Amount
Construction Value according to latest tender evaluation amount -	R 38,029,979.00				
Fee Engineering: R 1,857,000 + 9,5% (Construction Value - R19,066,000) =		Fee	1	R 3,658,578.01	R 3,658,578.01
Clerk of Works		Months	14	R 103,425.00	R 1,447,950.00
Trips		No	28	R 9,900.00	R 277,200.00
Off-site quality inspection		No	4	R 14,600.00	R 58,400.00
Site Surveys		No	20	R 13,762.00	R 275,240.00
Deduct Current Fee for Pre-works (Stage 1 and 2)		Sum	-1	R 1,814,849.74	-R 1,814,849.74
TOTAL ESTIMATED FEE (EXCL. VAT):					R 3,902,518.27

FEE BREAKDOWN: PROPOSED REVISED ADDITIONAL FEE PER STAGE:		Unit	Qty	Rate	Amount
Construction Value according to latest tender evaluation amount -	R 38,029,979.00				
Construction Value according to oriinal fee estimate -	R 26,809,605.00				
Stage 1: Design					R 639,561.32
Engineer		%	60	R 3,658,578.01	R 2,195,146.81
Deduct: Existing Fee					-R 1,555,585.49
Stage 2: Procurement					R 106,593.55
Engineer		%	10	R 3,658,578.01	R 365,857.80
Deduct: Existing Fee					-R 259,264.25
Stage 3: Construction Management					R 914,644.50
Engineer		%	25	R 3,658,578.01	R 914,644.50
Stage 4: Close-out					R 182,928.90
Engineer		%	5	R 3,658,578.01	R 182,928.90
Disbursements and other:					R 2,058,790.00
Clerk of Works		Months	14	R 103,425.00	R 1,447,950.00
Trips		No	28	R 9,900.00	R 277,200.00
Off-site quality inspection		No	4	R 14,600.00	R 58,400.00
Site Surveys		No	20	R 13,762.00	R 275,240.00
TOTAL ESTIMATED FEE (EXCL. VAT):					R 3,902,518.27
				ROUNDED	R 3,902,519.00

EXISTING ORDER (Based on estimated construction value of R 26,809,605,00:

BLACKROCK: NCHWANING III: CHARGING BAY 2

- Based on the cost structure of the existing charging bay, the preliminary design and procurement portion of the proposed new charging bay amounts to the following:

- 1.1 Stage 1: Design: 60% of R 2 592 642.48 = R 1 555 585.49
 - 1.2 Stage 2: Procurement: 10% of R 2 592 642.48 = R 259 264.25
 - 1.3 Trips: 4 @ R 9 900.00 = R 39 600.00
 - 1.4 Site surveys: 3 @ R 5 880.00 = R 17 640.00
 - 1.5 Clerk of Works: R 98 500.00 x 25% = R 24 625.00
- Total (Excl. VAT)** **R 1 896 714.74**

	Unit cost	Units	Cost
Area preparation Works			2,466,240
TSL	324	5760	1,866,240
Strapping	600,000	1	600,000

Cubes		
8x8 squares (roof)	30	1920
Pillars	15	3840
		<u>5760</u>

Civil works	Unit cost	Units	Cost
Construction	38,029,979.00	1	38,029,979.00
<hr/>			<u>38,029,979.00</u>

Overhead cranes	Unit cost	Units	Cost
Crane price	703,308	3	2,109,924
Electrical	102,819	3	308,457
Delivery	74,375	3	223,125
Installation	11,850	10	118,500
Bridge	17,342	3	52,026
Remote	21,900	3	65,700
			2,877,732

SCHEDULE OF PRICE

EXCLUDING VAT

ITEM 1

- a) Three 10 ton Condra standard double girder electric overhead travelling cranes, class 2m complete ex factory Germiston as per our specification, general conditions of tender and standard conditions of contract. **R 703 308.00 each**
- b) Supply of downshop power supply for a length of 77.0 metres consisting of a 4 pole enclosed conductor system, including isolator and two hospital bays. **R 102 819.00**
- c) Delivery to site. (Hotazel) **R 74 375.00 each**
- d) Installation of an item (a) on an existing gantry with access for a mobile crane including commissioning.
(Supply of mobile and cherry picker excluded) See note **R 11 850.00 / day**

OPTIONAL EXTRAS

- a) Dual speed on hoist motion **Included**
- b) Dual speed on cross travel **Included**
- c) Dual speed on long travel **Included**
- d) Independent control **Included**
- e) Full length walkway on bridge **R 17 342.00 each**
- f) Supply and fit a load limiting device **Included**
- g) Condra standard paint specification **Included**
- h) Load cell with digital display **Included**
- i) Flashing light and siren **Included**
- j) Overload limit switch **Included**
- k) Long travel and cross travel limit switch **Included**
- l) Remote control combo system **R 21 900.00 each**

NOTE : The price quoted for installation and commissioning of item (a and b) excludes mobile crane, cherry picker scaffolding, induction, safety file, accommodation, SHEQ documentation, medicals and any standing time whatsoever. All standing time will be charged at our normal rate. Should site load testing be required after installation, the necessary test weights are to be supplied by your good selves.

Epiroc	Unit cost	Units	Cost
Charger	2,680,456.00	6.00	16,082,736.00
Post	346,300.54	6.00	2,077,803.24
Cable	107,748.29	6.00	646,489.74
Fire Supression	617,376.00	6.00	3,704,256.00
Auto Vent Doors	827,322.24	1.00	827,322.24
Vent door equip and fans	1,500,000.00	1.00	1,500,000.00
			<u><u>24,838,607.22</u></u>



Epiroc South Africa (Pty) Ltd

Co.Reg. Number 1911/003838/07
www.epiroc.com

H/Office: Innes Road, Jet Park, Boksburg, 1459. TEL:821-9000
Rustenburg: Mabe Business park,Kgwebo nr 7 Kgwebo Street, Waterval East, Ext 4. Tel: 011 821 9094
Kuruman: 11 Marietta Circle, Kuruman, 8460. TEL: 05371 22831/71
Steelpoort: No 16A Bergsering Street, Steelpoort, 1133. Tel: 013 230 9826/50

ADDRESS

ASSMANG LIMITED MANGANESE-MIASSMANG MANGANESE MINE

BLACK ROCK MINE (PSD ACCOUNT)

P.O. BOX 187
SANTOY
8491

Scan QR code to view our
standard terms and
conditions



QUOTATION

Page 1 of 1

QUOTATION NO.	406590
DATE	8/11/24
BRANCH NO.	

VAT REG. NO. 4530106204

MACHINE TYPE		CUSTOMER NO.	43200			CUSTOMER REF.			
LINE NO.	DESCRIPTION	PART NUMBER	QUANTITY	U/M	PRICE PER UNIT	DISCOUNT	NET AMOUNT	VAT	NET AMOUNT INCL.
1	POWER CABINET	9464900016	6	EA	2,680,456.00	.00	16,082,736.00	2,412,410.40	18,495,146.40
2	POST-CHARGING	6060027017	6	EA	346,300.58	.00	2,077,803.48	311,670.52	2,389,474.00
3	CABLE	6060017169	6	EA	107,748.29	.00	646,489.74	96,973.46	743,463.20
4	MODULE,POWER	6060017474	1	EA	.00	.00	.00	.00	.00
5	FAN,MOTORIZED	6060021178	10	EA	.00	.00	.00	.00	.00
6	CABLE	6060017169	2	EA	.00	.00	.00	.00	.00

ItemCode	Description	Quantity	Price	Disc %	Total ZAR
ASSMANG FIRE DOOR PROPOSAL					
0GCDB001	ARC C 600DC MOTOR & BACK-UP BATTERY	4,00	13 528,26	0.00	54 113,04
0GCDB001	ROLLER SHUTTER FIRE DOOR	4,00	137 427,30	0.00	549 709,20
0GCDB001	FIRE DOOR CONTROL PANEL	4,00	13 000,00	0.00	52 000,00
0GCDB001	TRANSPORT	1,00	12 500,00	0.00	12 500,00
OPTIONAL					
0GCDB001	TRAVELLING, ACCOMMODATION, COMMISSIONING & TRAINING	1,00	159 000,00	0.00	159 000,00

MEDICALS & INDUCTIONS NOT INCLUDED

Subtotal	827 322,24
Net Amount	827 322,24
VAT 15,0% (01) on 827 322,24	124 098,34
Total ZAR	951 420,58

	Unit cost	Units	Cost
Transformers			
Main Charging transformer	1,141,790.00	2	2,283,580.00
			2,283,580.00

Cooling - N/N/A

Vector Group - Dyn11

L.T. COMPARTMENT

: This compartment will contain the following main components:

- 1 x 1250 Amp main circuit breaker
- 400V - 800KVA**
- 3 x 250 Amp 4 pole circuit breakers
- 550V - 100KVA**
- 1 x 100 Amp 3 pole circuit breaker
- 3 x 32 Amp 3 pole circuit breakers
- 400V**
- 1 x 40 Amp 4 pole circuit breaker
- 6 x 20 Amp 2 pole circuit breakers

DIRECTORS: R.A. Wiggill; J.E. Farren-Handford, M.P. Wiggill; J.M Bagley (Mrs)

Q25340R1

- 2 -

- 1 x Dial thermometer
- 9 x Ammeters and current transformers
- 3 x Voltmeters
- 1 x Adit relay and neutral C.T.
- 4 x 31-ohm resistors
- 1 x Explosion vent
- The unit will be mounted on a base plate fitted with skids and will be finished in B26 orange.
- This unit will be filled with ESTER transformer oil.

PRICE

: R1,141,790-00 Nett, firm, delivered & offloaded, excluding VAT.

DELIVERY

: Delivery can be effected within 16-18 working weeks from date of receipt of your official order number.

Steelcor will be closing for the annual shutdown from the 13th of December 2024 to the 13th of January 2025.

Cabling	Supplier	Length m	Cost/unit	Cost
HT - 35mm XLPE	Aberdare	600	R 644.22	R 386,532.00
25mm Earth	Aberdare	600	R 52.39	R 31,434.00
1,5mm multicore	Aberdare	1500	R 72.85	R 109,275.00
35mm 4 core DC cable	Aberdare	1500	R 1,028.00	R 1,542,000.00
UTP	Interconnect Systems	1000	R 20.69	R 20,691.00
70mm 4 core	Stock	600	R 654.12	R 392,471.46
Cabling	Stock no	Unit cost	Units	Cost
Spot Lights	Voltex	19,950.00	29.00	578,550.00
LED Lights	84000000280079	4,850.00	30.00	145,500.00
				3,206,453.46

1 of 3

Quotation Details					
Item	Material Description		Quantity	Unit Price	Amount
000001	XCAL035C03KS04SD3 (PLANT:5800) CU35/3 XLP IS PVC SWA PVC BC SA11KV	Qty St Length Delivery Date Rev.Del.Date 00002 300.000 M 05.04.2024	600 M	644.22 per 1M	386,532.00
	<i>11-13 Weeks delivery from date of order received.</i>				
000002	RRTF035T04FF00PD5 (PLANT:5900) TCU 35/4 EPM CNB CM BB	Qty St Length Delivery Date Rev.Del.Date 00003 500.000 M 05.04.2024	1,500 M	1,028.00 per 1M	1,542,000.00
	<i>4-6 Weeks delivery from date of order received.</i>				
000003	CGWA025C01ZS00PLX (PLANT:5900) CU 25mm2 Circ Comp Conductor (7 Wires)	Qty St Length Delivery Date Rev.Del.Date 00001 600.000 M 05.04.2024	600 M	52.39 per 1M	31,434.00
	<i>2-4 Weeks delivery from date of order received.</i>				
000004	BMAL1.5C07ESBCPD5 (PLANT:5900) CU 1.5/7 PVC PVC SWA PVC BC LOHAL	Qty St Length Delivery Date Rev.Del.Date 00003 500.000 M 05.04.2024	1,500 M	72.85 per 1M	109,275.00
	<i>5-7 Weeks delivery from date of order received.</i>				
	<i>All prices are subject to metal, material and copper price adjustments.</i>				
			VAT @ 15%	----- 310,386.15	
			Total Amount	----- R 2,379,627.15	

Item Code	Description	Qty	Unit Price	Line Discount	Line Total
HB17-600W - HiFar LED LIGHT 600W 160LM/W 5 YEAR WARRANTY		29.00	19 950.00	0.00	578 550.00
5FT-LED-WP-2T - 5FT WATERPROOF FITTING 2X24W WIRED FOR LED		4.00	285.00	0.00	1 140.00

Banking Details:
Bank Name: STANDARD BANK
Account No: 242590977
Account Type: CURRENT
Branch Code: 051001
Reference : <u>QT3021007519</u>

Number of Items
33

Subtotal (Exclusive)	579 690.00
Document Discount	0.00
Vat	86 953.50
Total	666 643.50

BRANCH/PLANT	CREDITOR NAME	ORD TP	ORD NO	ITEM CODE	PURCHASE	UNIT COST
MAIN STORE	VOLTEX (PTY) LTD	#03	23000782	84000000280079	Light Strip LE	4,850.00

Tools	Unit cost	Units	Cost
Special tools	500,000.00	1	500,000.00

Black Rock Project team cost

Project team(7,5%)	R 3,144,937
--------------------	-------------

Budget	Current Budget
1 Construction	
1 Construction Cost	R 38,029,979
1 Consulting Fees-Construction	R 3,902,519
1 Owners team cost (7,5%)	R 3,144,937

Lubrication system	Unit cost	Units	Cost
Complete unit	840,000		3,850,000

BLACKROCK

NCHWANING III

CHARGING BAY II

LIST OF DRAWINGS

NO.	TITLE
SK4050/1	LIST OF DRAWINGS, DRAWING CONVENTIONS, DESIGN DATA AND GENERAL NOTES.
-/2	GENERAL ARRANGEMENT AND SETTING OUT
-/3	SECTIONS A - C
-/4	SECTIONS D - E
-/5	SECTIONS F - H
	CIVILS: FLOOR SLAB
-/10	FLOOR LAYOUT: SHEET 1
-/11	FLOOR LAYOUT: SHEET 2, FOOTING, ROCK ANCHOR DETAIL & JOINT DETAILS
-/12	SECTIONS C1 - C4
-/13	BARRIER DETAILS
-/14	WASHBAY SUMP AREA LAYOUT
-/15	SECTIONS C5 - C9
-/16	OIL STORAGE AREA LAYOUT
-/17	SECTIONS 4 AND 5
	TYPICAL MINISUB AREA
-/20	LAYOUT
-/21	ELEVATIONS E1 TO E5
-/22	SECTIONS 1 AND 2
-/23	SECTION 3 & JOINT DETAIL
-/24	STEEL PLACING
-/25	BENDING SCHEDULE
	OFFICE & STORE AREA
-/30	GROUND FLOOR LAYOUT
-/31	FIRST FLOOR LAYOUT
-/32	ELECTRICAL LAYOUTS
-/33	SECTION 1
-/34	SECTION 2
-/35	SECTION 3
-/36	OFFICE & STORE AREA SECTION 4, WINDOW AND DOOR SCHEDULE
-/37	FIRST FLOOR SLAB LAYOUT AND SECTIONS
-/38	FIRST FLOOR SLAB LAYOUT STEEL PLACING AND BENDING SCHEDULE
	TEAROOM & STORE AREA
-/40	GROUND FLOOR LAYOUT
-/41	FIRST FLOOR LAYOUT
-/42	ELECTRICAL LAYOUTS
-/43	SECTION 1
-/44	SECTION 2
-/45	SECTION 3, WINDOW & DOOR SCHEDULE
-/46	FIRST FLOOR SLAB LAYOUT AND SECTIONS
-/47	FIRST FLOOR SLAB LAYOUT STEEL PLACING AND BENDING SCHEDULE
	SERVICE TIP
-/50	LAYOUT
-/51	SECTION 1
-/52	SECTIONS 2 & 3
-/53	DETAILS 4, S1 & S2
-/54	STEEL PLACING: LAYOUT & SECTION 1
-/55	STEEL PLACING: SECTIONS 2 & 3
-/56	BENDING SCHEDULE

LIST OF DRAWINGS

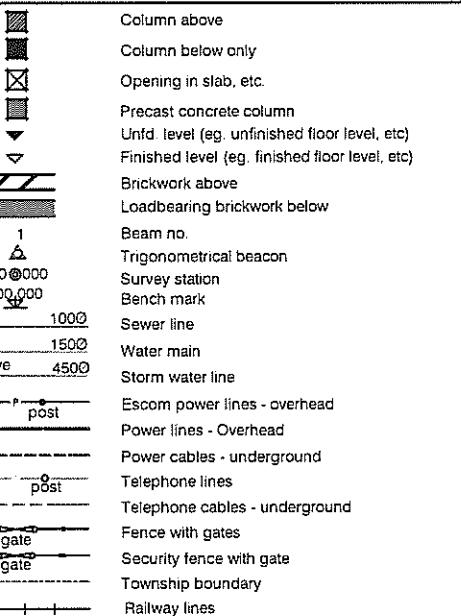
NO.	TITLE
-/60	CRANE STRUCTURE
-/61	GENERAL ARRANGEMENT
-/62	SECTION S2 (TRESTLE DETAILS)
-/63	DETAIL S3 - S5
-/64	CRANE BEAM CB1
-/65	CRANE BEAM CB2
-/66	CRANE BEAM CB3
-/67	CRANE BEAM CB4
-/68	CRANE BEAM CB5
-/69	CRANE BEAM CB6
-/70	VERTICAL BRACING DETAILS
-/71	SPlice DETAILS AND SECTIONS S6, S7
-/72	STOPPER BLOCK B1, B2 DETAILS
-/80	TYPICAL STAIR AT STORE AREAS
-/90	ELECTRICAL & COMPRESSED AIR
-/91	GENERAL ARRANGEMENT
-/92	SECTIONS E1 - E3
-/93	ENLARGED AIRLINE CONNECTION POINT LAYOUT, SECTIONS E4 - E5
-/100	CIVILS: FLOOR SLAB: STEELPLACING & BENDING SCHEDULES
-/101	BARRIER: STEEL PLACING
-/102	WASHBAY SUMP AREA: STEEL PLACING: LAYOUT & SECTION C5
-/103	WASHBAY SUMP AREA: STEEL PLACING: SECTIONS C6 - C8
-/104	BENDING SCHEDULE: CRANE STRUCTURE BASES, BARRIER AND FLOOR SLAB
-/105	WASHBAY SUMP AREA LAYOUT

GENERAL NOTES

GENERAL

- Read this set of drawings in conjunction with architectural, civil, structural, mechanical and electrical drawings (where applicable) and with the general specifications issued by the Engineer.
- Downspouts in columns are shown, but these must be checked against Architects drawings before commencing to cast concrete.
- Figured dimensions are to be used exclusively.
- All dimensions, levels and setting out pegs must be checked on site and any discrepancy, variation or ambiguity reported to the Engineer before commencing work or ordering relevant materials.
- No alterations may be made to drawings or specifications without written approval of Engineer.
- All materials to comply with specifications and/or requirement as shown in document or on drawings.
- Internal control tests as required by specifications are to be performed as laid down and submitted to the Engineer.
- Standard specifications as applicable for each activity will be latest edition of SANS - 1200 series unless otherwise specified in documents or on drawings.

DRAWING CONVENTION



DESIGN DATA

STRUCTURES

150 kPa	FOUNDATION BEARING PRESSURE not exceeding
	SURCHARGE PRESSURE TO RETAINING WALLS generally
	adjacent roadways
18 kN/m ²	SOIL DENSITY for active pressure
16 kN/m ²	for passive pressure
0.7 kN/m ²	WIND LOADS stability
0.9 kN/m ²	fixings
	CONCRETE GRADES NOMINAL MAX.
CLASS C	MIX 1:3:6 AGGREGATE SIZE 19 STRENGTH 15 MPa binding
E	1:2:4 19 25 MPa general
F	1:1.5:3 19 30 MPa columns u.o.s. on foundation drawings
	STRUCTURAL STEEL grade
	CONSTRUCTION TIMBER
SABS 563	merchantable S.A. pine
	LAMINATED TIMBER according to S.A.B.S. 876
	type of timber
	grade
	density
	exposure category
	expected average equilibrium moisture content
	appearance class
7 MPa	LOADBEARING BRICKWORK bricks
B	mortar class inner and outer leaves of cavity walls are to be tied together to Engineers satisfaction
	LIVE LOADS

STRUCTURAL STEEL

STEELWORK

- All steelwork to be Painted to Mine Spec's
- All steelwork to be in accordance with SANS 1431 - grade S355JR
- Fabrication, workmanship, etc. to be in accordance with SANS 1200 H.
- Where HSFG bolts are used they must be tightened as specified on page 6.23 of the South African Steel Construction handbook, using the "Turn of Nut Method".
- Once tightened an HSFG bolt cannot be re-used and must be discarded. All holes to be 22 dia. for M20 bolts U.O.S.
- Hardened washers are to be used with high tensile and HSFG bolts.
- Tapered washers are to be used where required.
- Fabricator is to supply all nuts, bolts and washers suitably bagged and labelled.
- Welding to be carried out in accordance with SANS 10044 (All welds 6 mm cont. fillet, unless otherwise noted)
- All end plates, gussets and stiffeners to be 10mm thick U.O.S
- Shop Detailer to allow sufficient clearances for erection purposes.
- Standard back marks and cross centres to be used where possible.
- No deviation from member sizes, dimensions or setting out points unless permission has been obtained from the designer in writing.
- All loose items, packs and brackets, etc. to be wired on for delivery.
- All items to be clearly marked with their respective item and drawing number (prior to sand blasting), by means of welding or hard stamping.
- All steelwork must be colour coded, after Galvanising, if specified on arrangement drawing and the No. must be indicated in white paint.
- Fabricator to supply temporary bracing as required for safe erection.
- After painting or galvanising, as noted, all crawl beams to be clearly marked with SWL

HANDRAILING

- All handrailing and stanchions to be painted to mine spec.
- Ex-15x215x23 UC Tee-pieces (U.O.S.) to be welded into beam web for handrailing stanchion side mounting.
- No fixing to kick-flat allowed U.O.S
- Handrailing stanchions for stairs stringers to be top mounted, type MTA 40 or equivalent.
- Handrailing to be standard tubular, MENTIS or similar, max. spacing of stanchions to be 1,5 m.

FLOORING

- Flooring to be hot dipped GALVANISED in accordance with SANS 121
- Flooring to be open grid type with 30x4.5 bearer bars and 38x38 nominal openings, unless otherwise specified.
- Direction of span of bearer bars are indicated thus ↗.
- Provide 130x8 kick-flat along outer edges and openings in flooring. Flooring edges without kick flats to be banded.
- Sharp corners of kick flats to be ground round and smooth.
- All flooring to be hard stamped with panel mark number and drawing number.

ANCHORS

- All chemical bolts to be HILTI HVA adhesive anchors or similar and approved by the engineer.
- Size as specified on drawings.

PLATEWORK for MATERIALS HANDLING (eg. Chutes and Underpans)

- Platework to be 6 thk. M.S. (u.o.s.) to SANS 1431 - grade S355JR.
- All welds to be 6 cont. f.w. watertight (to comply with SANS 10044).
- Fabricator to supply all nuts, bolts washers, etc. (suitably bagged and labeled) including those in bolt list. (Shop bolting of flanges prior to delivery is preferred.)
- All packs to be laminated and wired to platework for delivery.
- Flanges to be flat 65x8. All "wet" flanges to be sealed with clear silicone sealant U.O.S.
- Hole spacing in FLGS: pitch max. for wet chutes. 200 max. for dry chutes. u.o.s.
- All dims given on drg. are inside chute pits, where applicable.
- Stiffeners to be flat 65x8 welded on int.f.w. 50 hit 100 miss alternate. u.o.s.
- All items to be hard stamped with item number (min. size: 15 mm high), unless otherwise indicate.
- All steel liner plates to be VRN 500, thickness as specified on, drg. bolted on with min. 4 M16 CSK nib head bolts U.O.S.
- All liners to be of standard size and shape where possible, and limited to 25 kg.
- Gaps between steel liner plates to be 5 mm maximum - gaps to be offset in the material flow direction.
- All burrs etc. to be ground smooth prior to painting and lining.
- Paint as per specification.
- Fabricator to provide suitable lifting lugs where required, for lifting purposes.
- All ceramic liners to be fitted to a suitable backing plate and bolted onto chute u.o.s.
- Fabricators must provide "SHOP DETAILS" drawings of the liners.

STRUCTURAL CONCRETE

STEEL

- Any breaks in the concrete are to be made in accordance with the Engineers instruction.
- Kicker (starter nibs) to columns, retaining walls, etc. are not to exceed 100 mm.

CONCRETE COVER

- | | |
|-------|-----------------|
| 75 mm | footings |
| 40 mm | columns |
| 25 mm | beams |
| 19 mm | rafts |
| 25 mm | retaining walls |
- or diameter of the main reinforcing, whichever is the greater.
- Cast a 50 mm thick blinding layer of 10 MPa concrete under the full extent of all footings unless otherwise specified by engineer.
 - No concrete shall be poured until the reinforcement has been inspected by the Engineer.
 - The Contractor is to maintain the steel in position after placing and during concreting.

FOUNDATIONS

- Founding levels and conditions must be inspected and approved by Engineer before blinding is cast.

CIVIL WORK

- Cover on all water pipes, sewer pipes, storm water pipes, sleeves and electrical cables to comply with the drawings or specifications.
- No underground work, for example pipe lines, may be covered without prior approval of Engineer.
- Successive layers on roads and streets may not be placed before the previous layer has been approved by the Engineer in writing
- Prior written approval must be obtained from the Engineer before utilization of any quarry or spoil area.
- Exact position of culverts and pipes crossing roads and streets to be checked on site, and the final position to be approved by the Engineer in writing.

CIVIL WORK

ROADS AND STREETS

Layer thickness (mm)	Density %	Material (describe)
		selected layers
		In situ layer
		subbase
		base course
		wearing course

SEGMENTED PAVING

- SANS 1200 MJ 3.3 - SAND FOR BEDDING AND JOINTING. Sand for bedding and jointing shall be free from substances that may be deleterious to blocks. In addition, the grading of sand shall conform to that given in (a) or (b)

a) Bedding sand

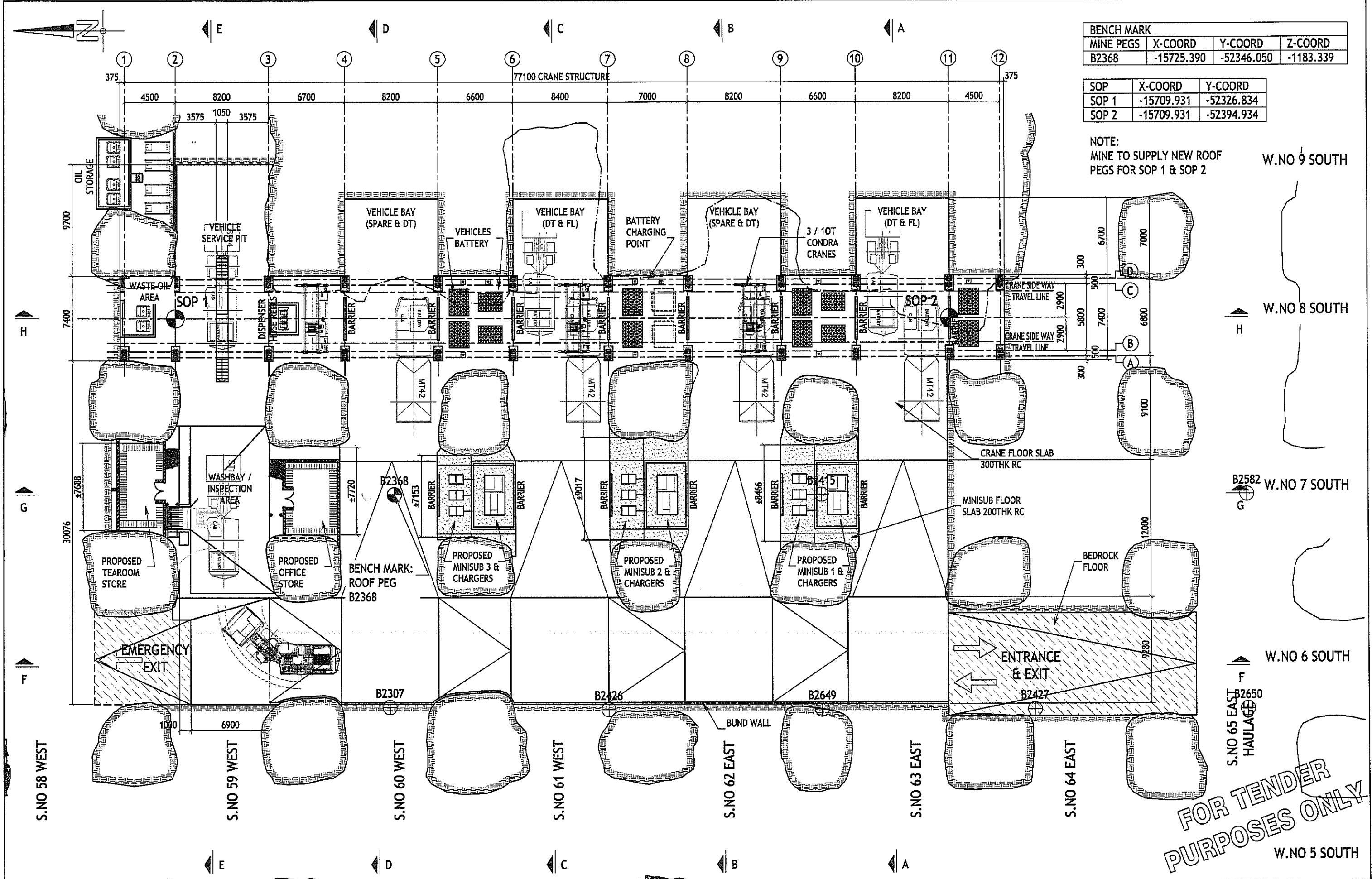
Nominal sieve size (mm)	passing %
9,52	100
4,75	95-100
2,36	80-100
1,18	50-65
0,600	25-60
0,300	10-30
0,150	5-15
0,075	0-10

- b) Jointing sand shall pass a 1,18mm sieve and shall contain 10-50 % (m/m) of material that passes a 0,075mm sieve.

FOR TENDER PURPOSES ONLY

NOTES
1. FOR GENERAL NOTES SEE DRAWING -/1

|
<th
| |



NOTES



The logo for Asmang Mining features a stylized 'A' shape composed of three downward-pointing triangles. Below the 'A' is the word 'ASMANG' in a bold, sans-serif font, with 'MANGANESE' written in a smaller font underneath. At the bottom, it says 'BLACK ROCK MINE OPERATIONS'.

P.O. Box 187
SANTO DOMINGO
DOMINICAN REPUBLIC
TEL. (053) 751 5353
FAX. (053) 751 5251

APPROVAL
PROJECT MANAGER
PROJECT ENGINEER

DATE	DRAWN BY
	DATE
	SCALE
	DESIGN BY
	PROF. ENGI.

	CHRIS
	DEC. 2022
1 : 150	41
1 : 300	43

PROJE
BLACKROCK:
CHARGE

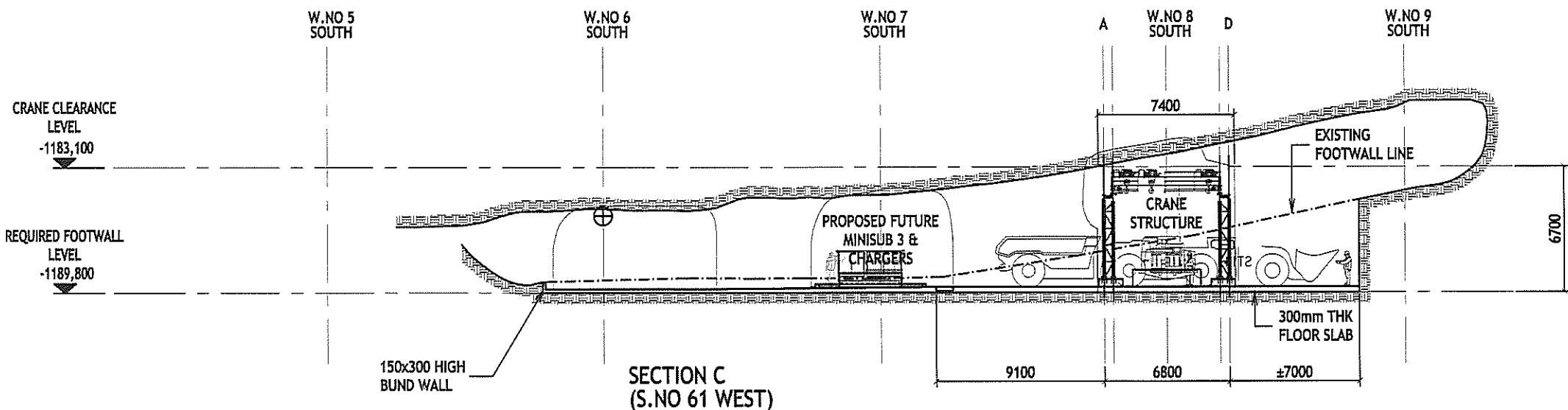
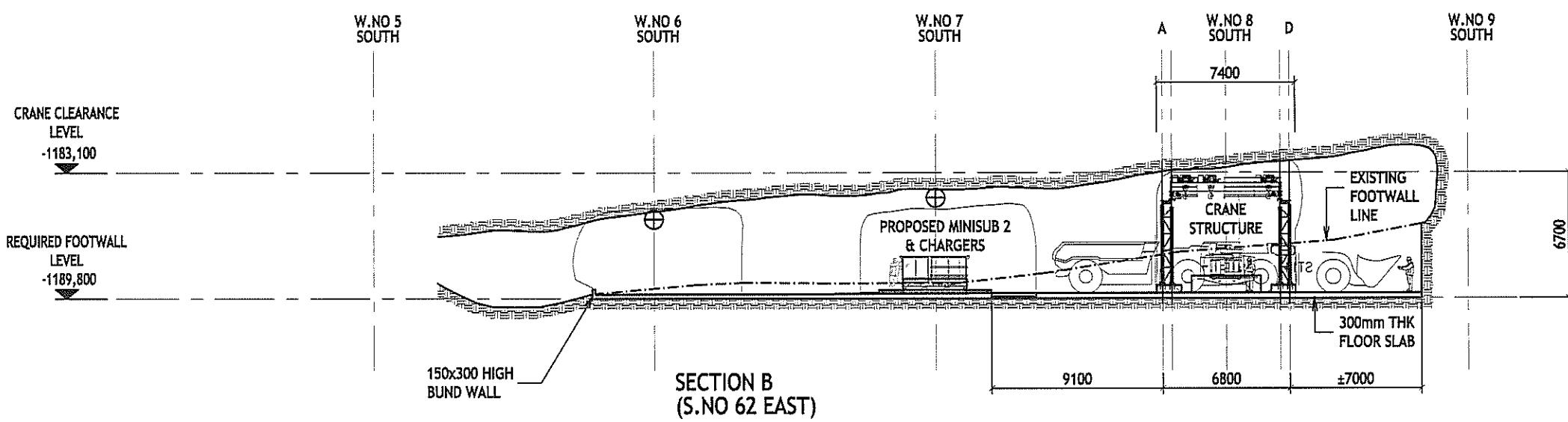
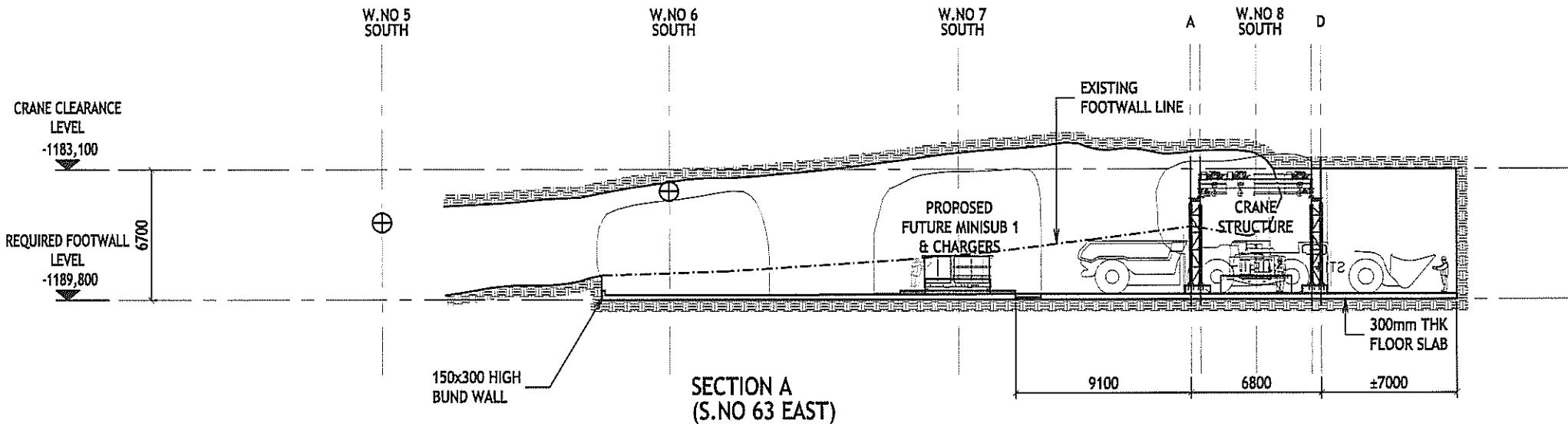
DRAW
GENERAL A

**ECT TITLE
NCHWANING II
ING BAY II
ING TITLE
ARRANGEMNET**

**PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II**

**DRAWING TITLE
GENERAL ARRANGEMNET**

STABILIS
Development(Pty)Ltd
3 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za



NOTES
1. FOR GENERAL NOTES SEE DRAWING -/1

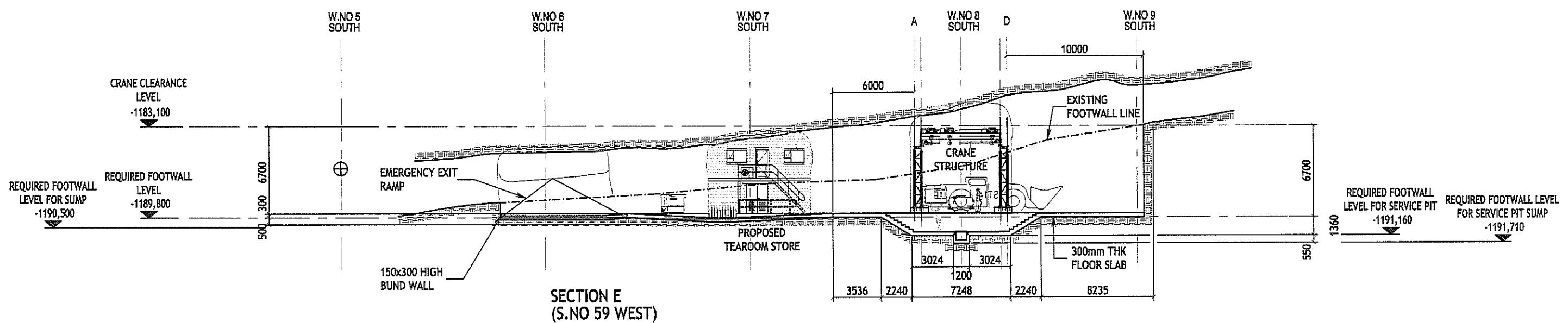
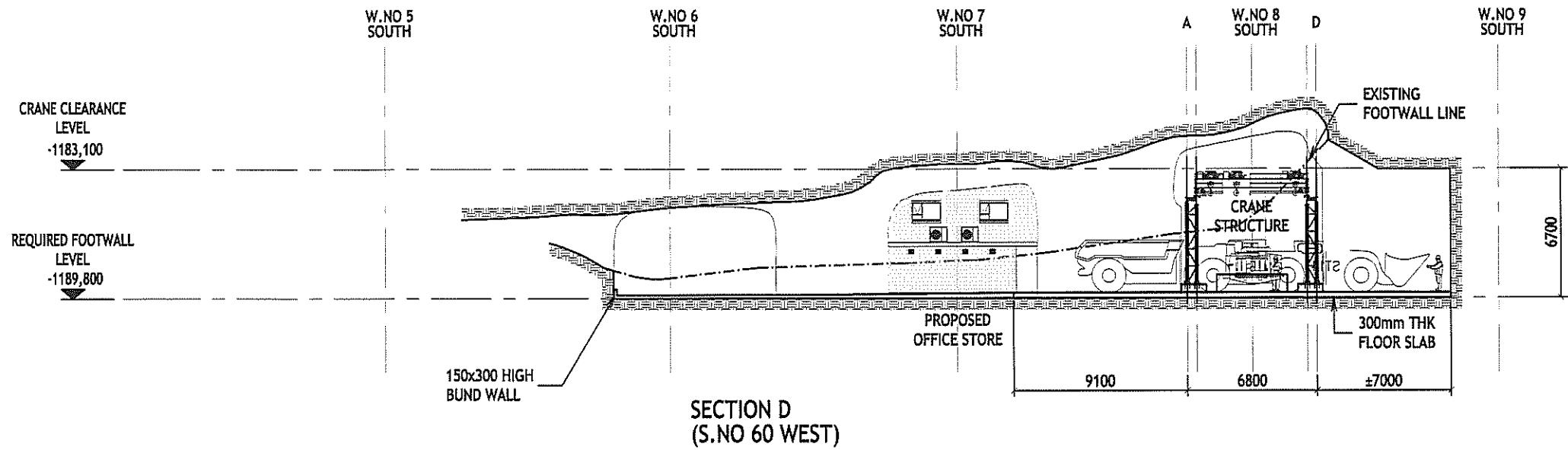
DRG NO.	REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN	CLIENT	P.O. Box 117 SAFETY OFFICER TEL: (053) 751 5555 FAX: (053) 751 0251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE	
A	FOR DESIGN REVIEW			13/12/2022	C.J			PROJECT MANAGER			DEC 2022		BLACKROCK: NCHWANING III
B	FOR INFORMATION ONLY			18/01/2023	C.J								CHARGING BAY II
C	FOR DESIGN REVIEW			22/02/2023	C.J			SCALE			1:150 [A1]		
D	FOR TENDER PURPOSES ONLY			09/03/2023	C.J						1:300 [A3]		
								PROJECT ENGINEER			DESIGN BY	/ / /	DRAWING TITLE
											PROF ENGINEER	/ / /	SECTIONS A - C

FOR TENDER
PURPOSES ONLY

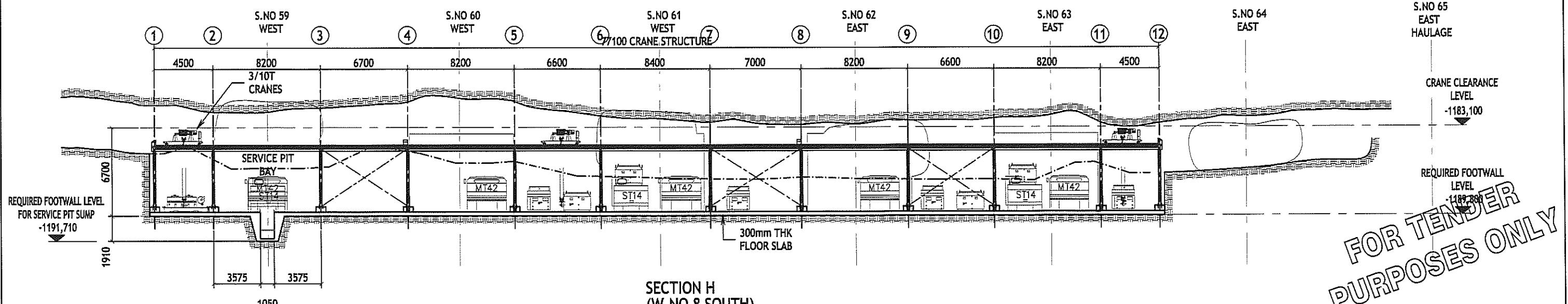
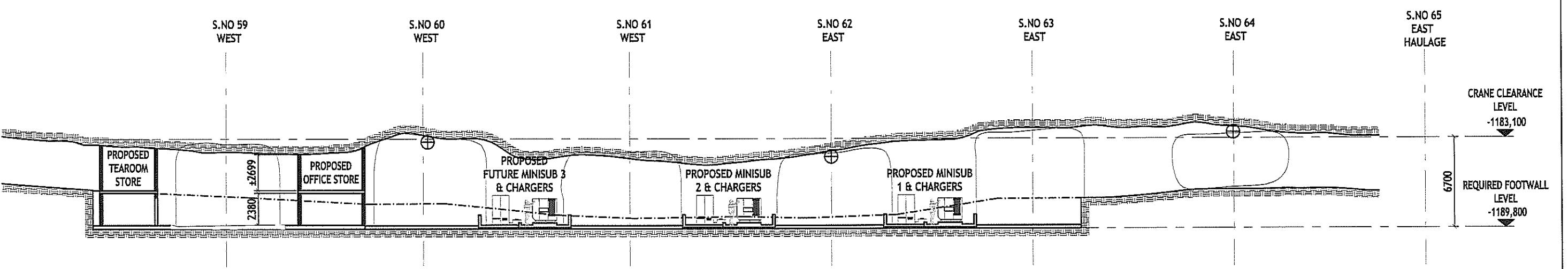
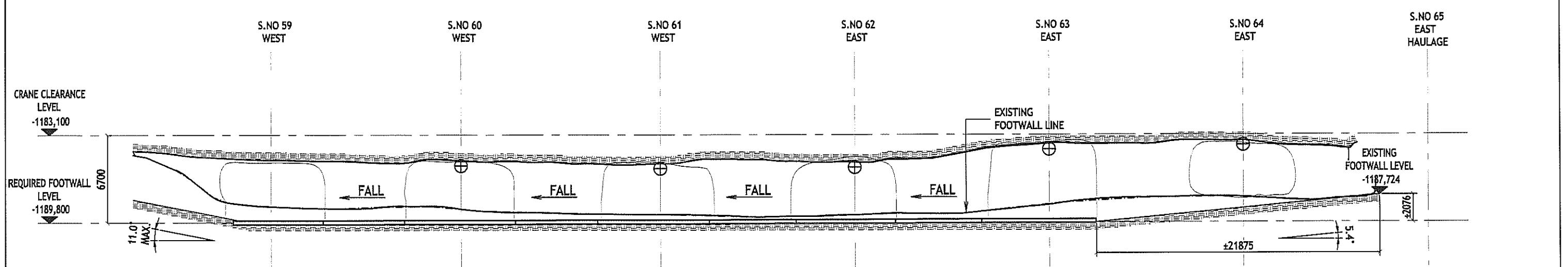


STABILIS
Development(Pty) Ltd
13 Bishops Ave,
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING NO. SK4050/3 REV. D



**FOR TENDER
PURPOSES ONLY**



NOTES
1. FOR GENERAL NOTES SEE DRAWING -/1

REFERENCE DRAWINGS

DRG NO.	TITLE
A	FOR DESIGN REVIEW
B	FOR INFORMATION ONLY
C	FOR DESIGN REVIEW
D	FOR TENDER PURPOSES ONLY

NO. REVISION

NO.	REVISION	DATE	DRAWN
A	FOR DESIGN REVIEW	13/12/2022	CJJ
B	FOR INFORMATION ONLY	18/01/2023	CJJ
C	FOR DESIGN REVIEW	22/02/2023	CJJ
D	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ

CLIENT



SK 1050

EX-107

TEL: (053) 751 5555
FAX: (053) 751 5551

APPROVAL

DATE

DRAWN BY

CHRIS

PROJECT MANAGER

DATE

DEC 2022

SCALE

1:150

A1

1:300

A3

PROJECT ENGINEER

DESIGN BY

J/J

PROF. ENGINEER

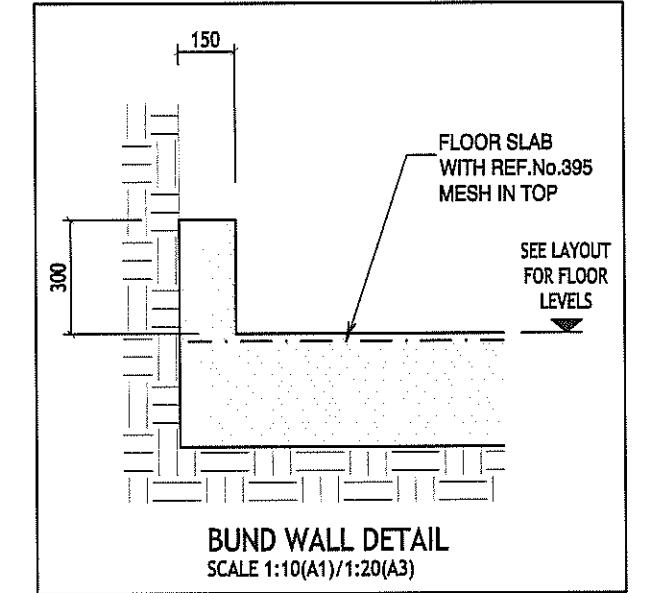
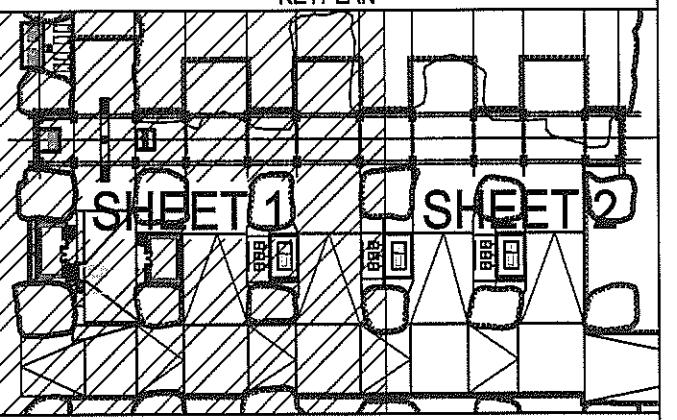
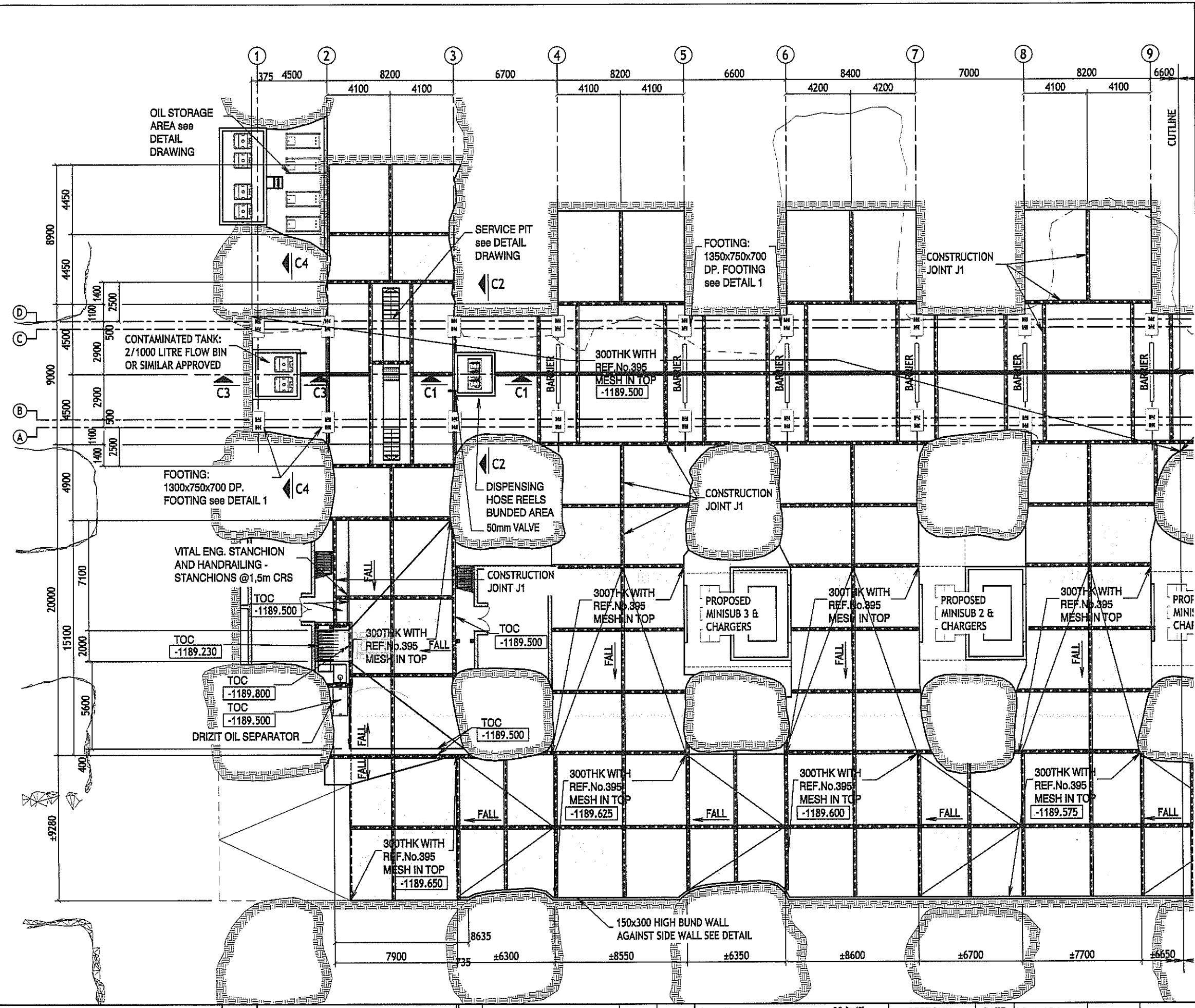
PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

DRAWING TITLE
SECTIONS F - H

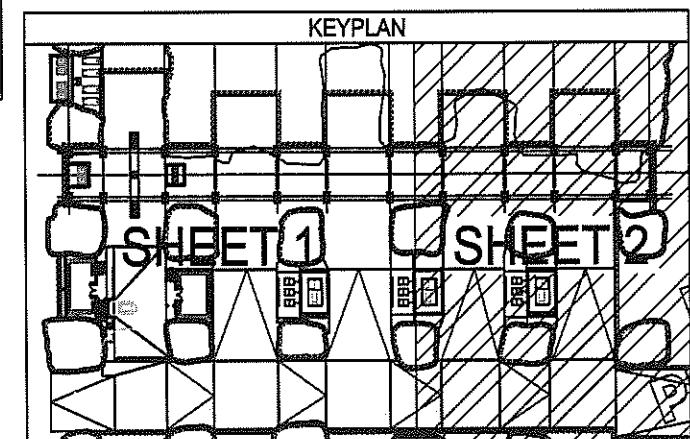
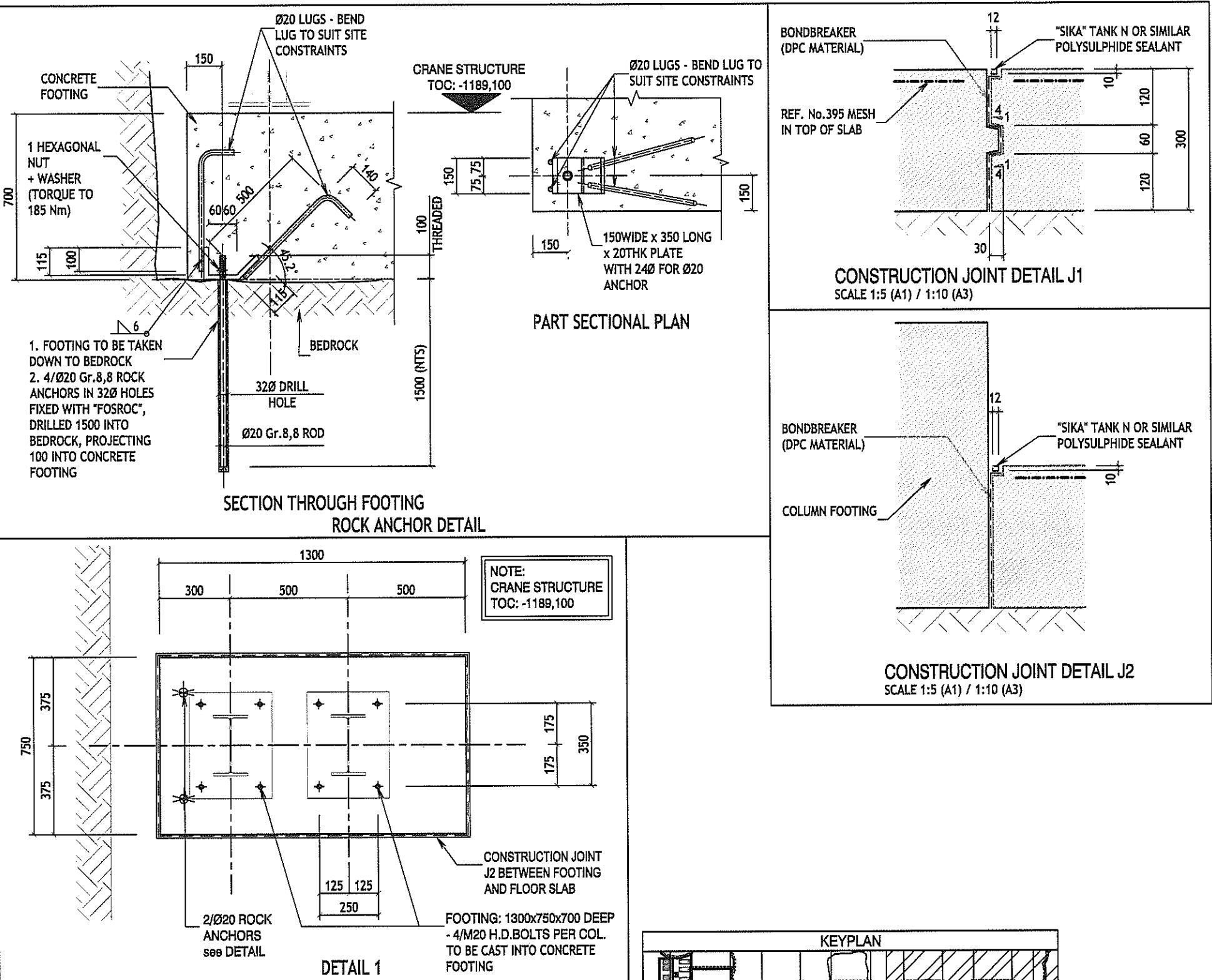
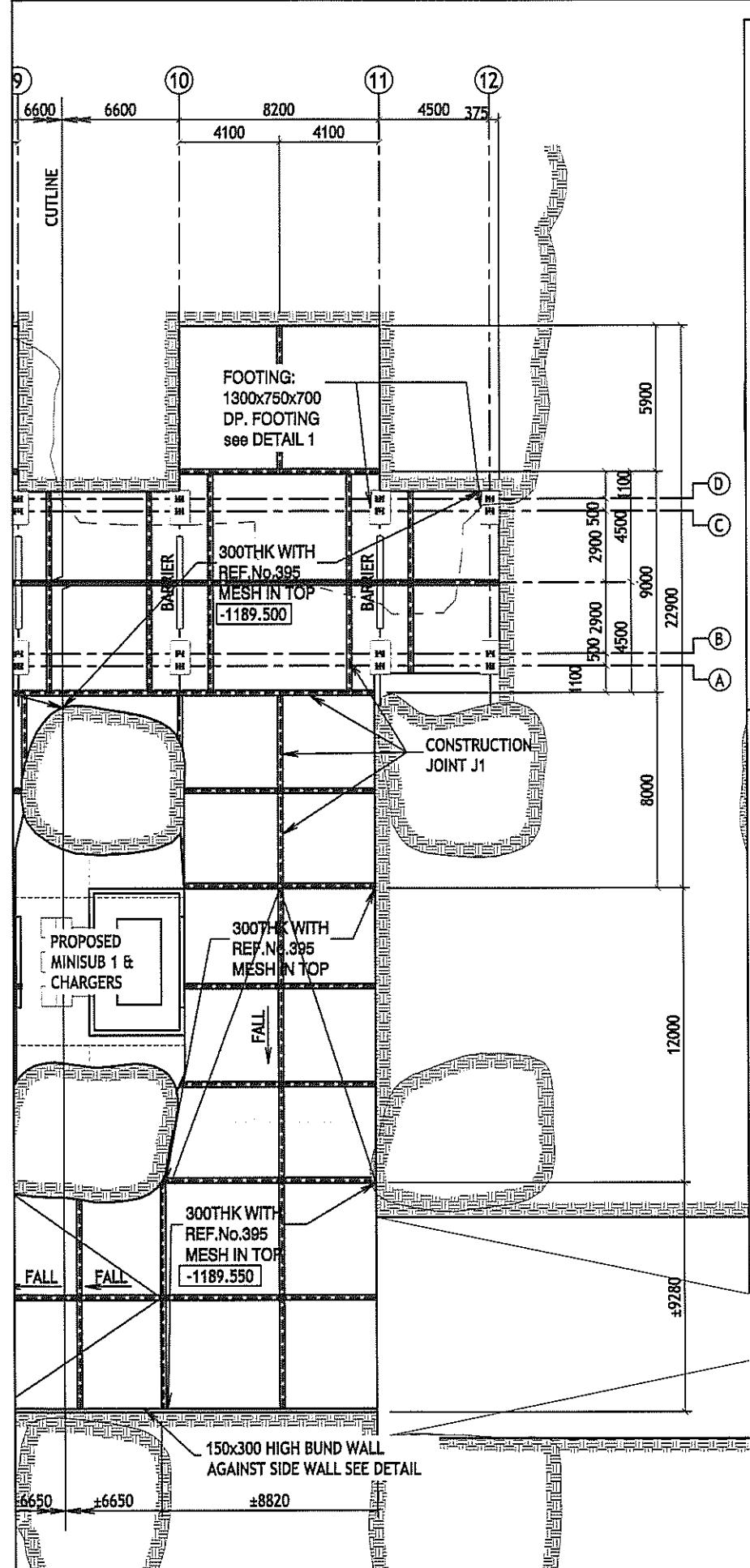
STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za

FOR TENDER
PURPOSES ONLY

DRAWING NO. SK4050/5 REV. D



**FOR TENDER
PURPOSES ONLY**



NOTES
 1. FOR GENERAL NOTES SEE DRAWING -1
 2. CONCRETE STRENGTH TO BE 30Mpa AT 28 DAYS
 3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER
 4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
 5. TOC = TOP OF CONCRETE -1189.500

REFERENCE DRAWINGS	
DRG NO.	TITLE
A	FOR DESIGN REVIEW
B	FOR TENDER PURPOSES ONLY
	09/03/2023
	CJJ

No.	REVISION	DATE	DRAWN
A	FOR DESIGN REVIEW	20/02/2023	CJJ
B	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ



P.O. Box 187
TEL: (053) 751 5353
FAX: (053) 751 5251

APPROVAL
PROJECT MANAGER

DATE
JAN. 2023

DRAWN BY
CHRIS

SCALE
1:125 A1
1:250 A3

PROJECT ENGINEER

DESIGN BY
///

PROF. ENGINEER
CJW

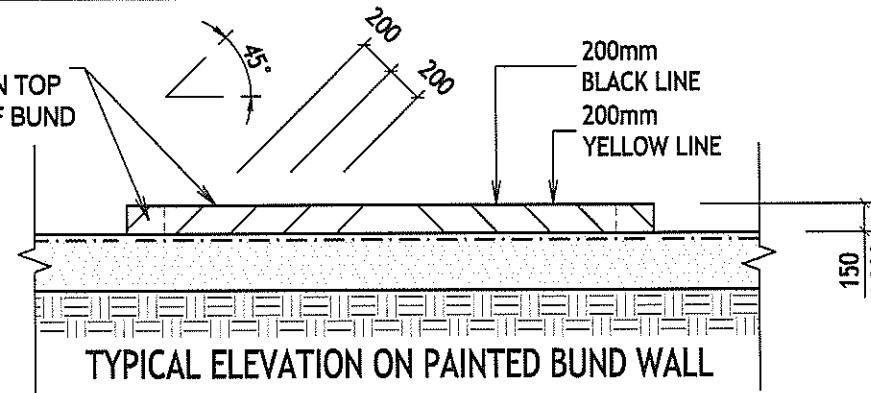
PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

DRAWING TITLE
FLOOR LAYOUT: SHEET 2, FOOTING, ROCK
ANCHOR DETAIL & JOINT DETAILS

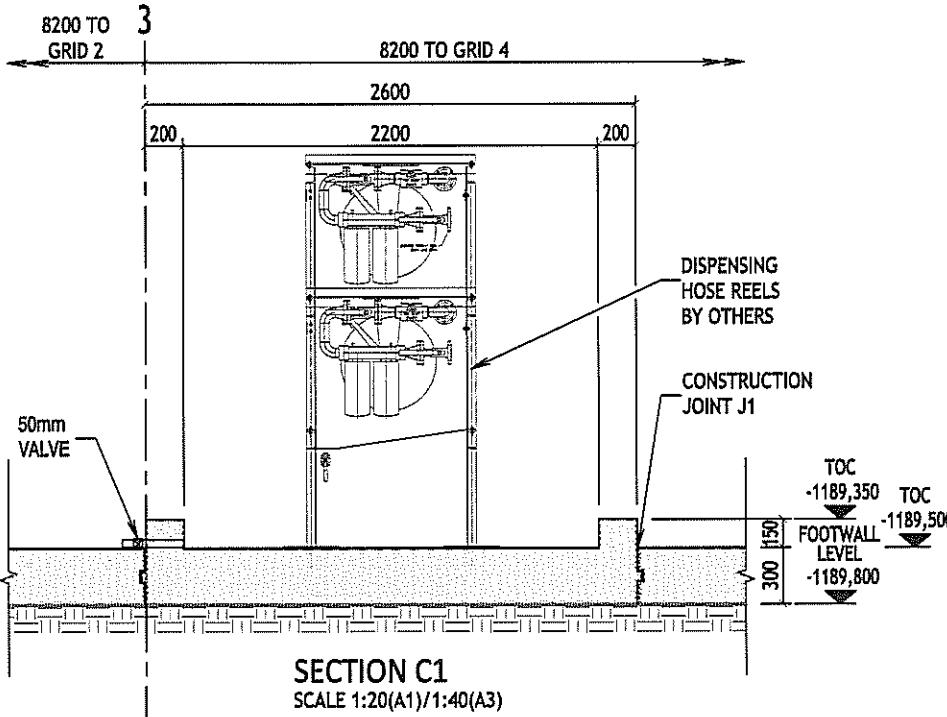
STABILIS
Development(Pty)Ltd
13 Bishops Ave
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING NO. SK4050/11 REV. B

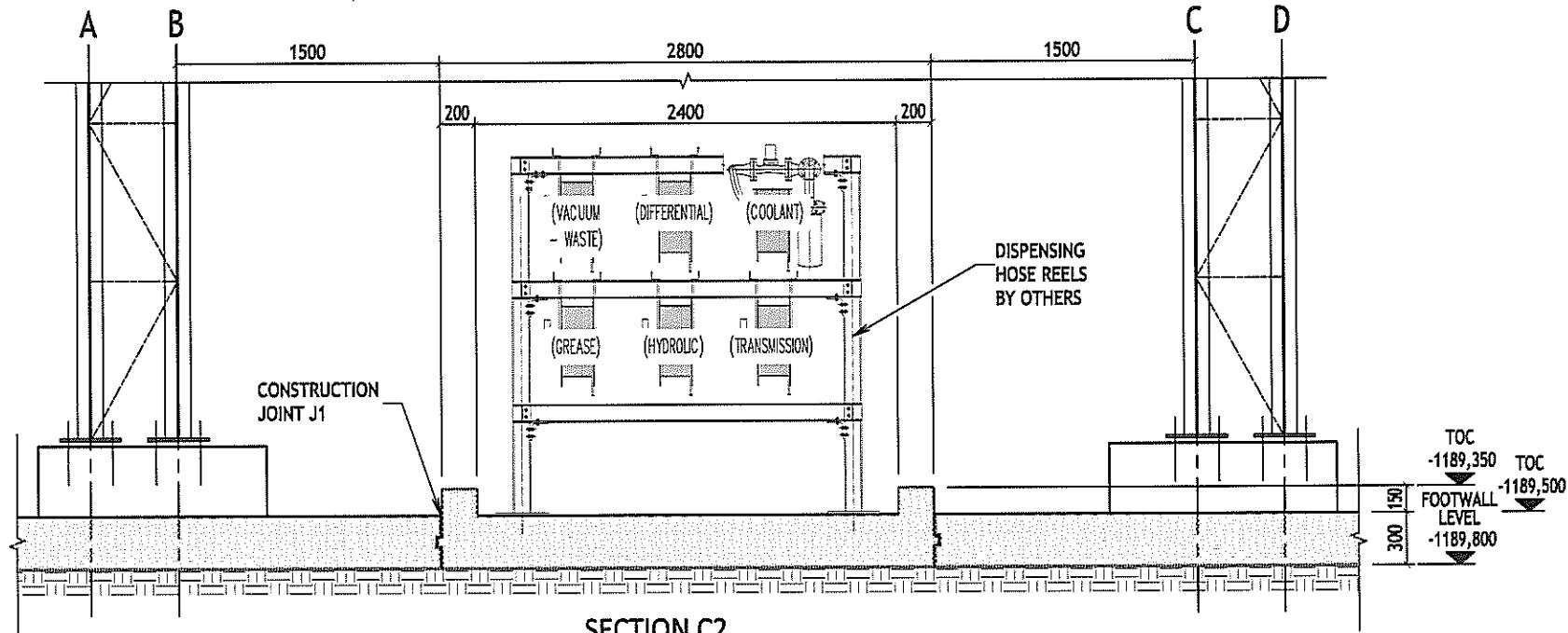
FOR TENDER
PURPOSES ONLY



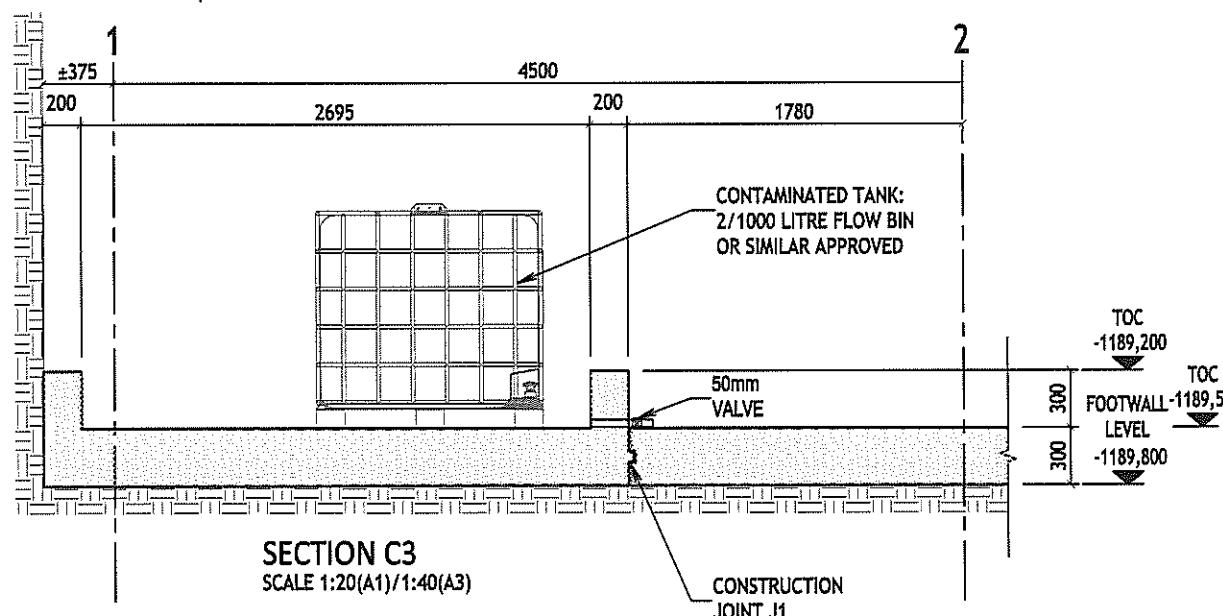
TYPICAL ELEVATION ON PAINTED BUND WALL



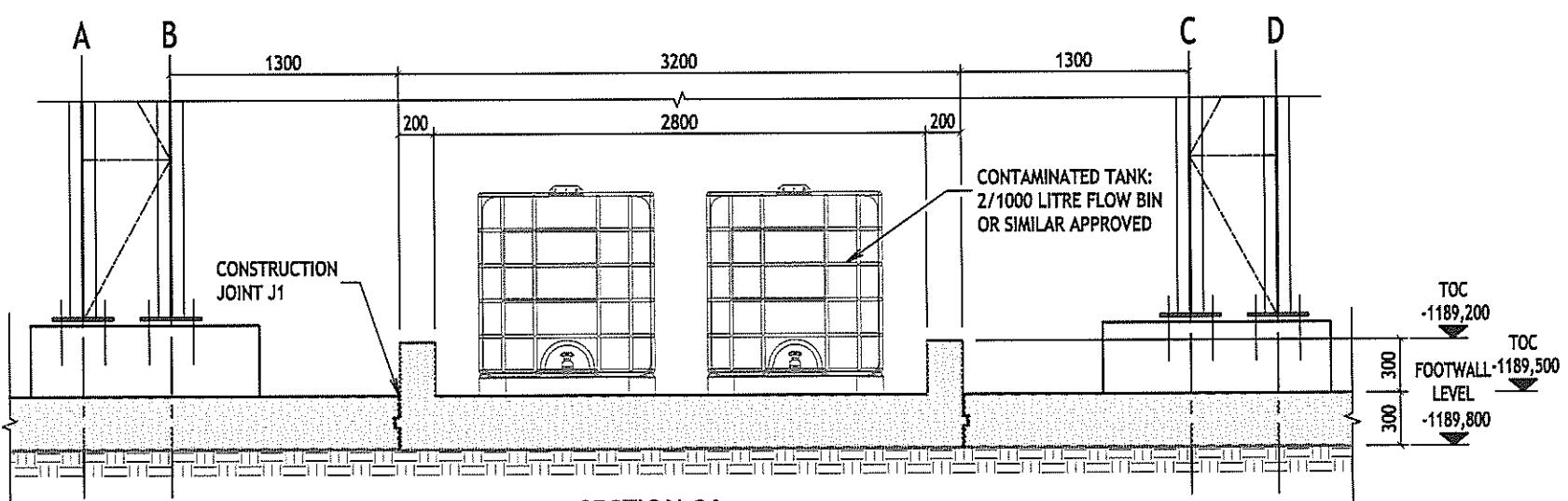
SECTION C1
SCALE 1:20(A1)/1:40(A3)



SECTION C2
SCALE 1:20(A1)/1:40(A3)



SECTION C3
SCALE 1:20(A1)/1:40(A3)



SECTION C4
SCALE 1:20(A1)/1:40(A3)

**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
5. TOC = TOP OF CONCRETE




ASMANG
 MANUFACTURERS OF
 STAINLESS STEEL

The logo for Assmang Mining Services. It features the word "CLIENT" in a bold, sans-serif font at the top left. To its right is a stylized, three-dimensional "A" shape composed of several parallel lines. Below this graphic, the word "ASSMANG" is written in a bold, sans-serif font, with a horizontal line extending from the top of the "A" through the letters. Underneath "ASSMANG", the words "MINING SERVICES" are written in a smaller, bold, sans-serif font.

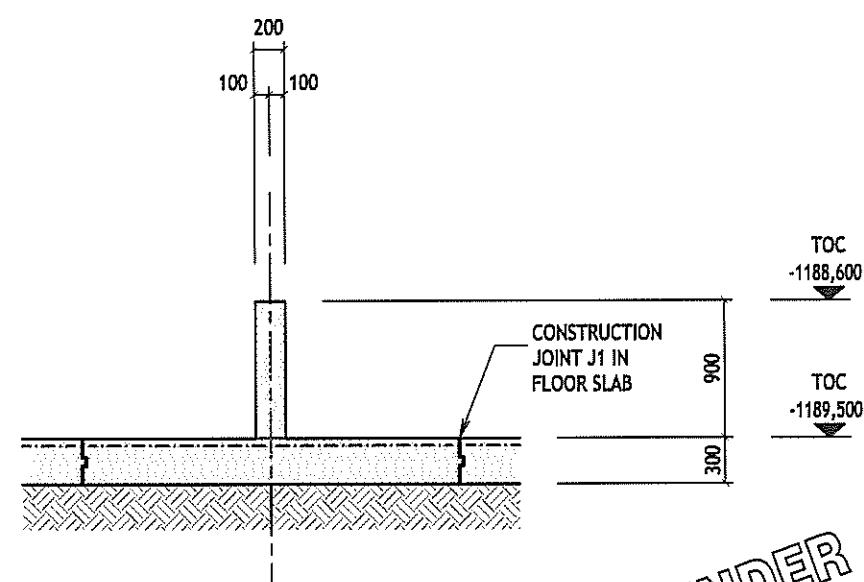
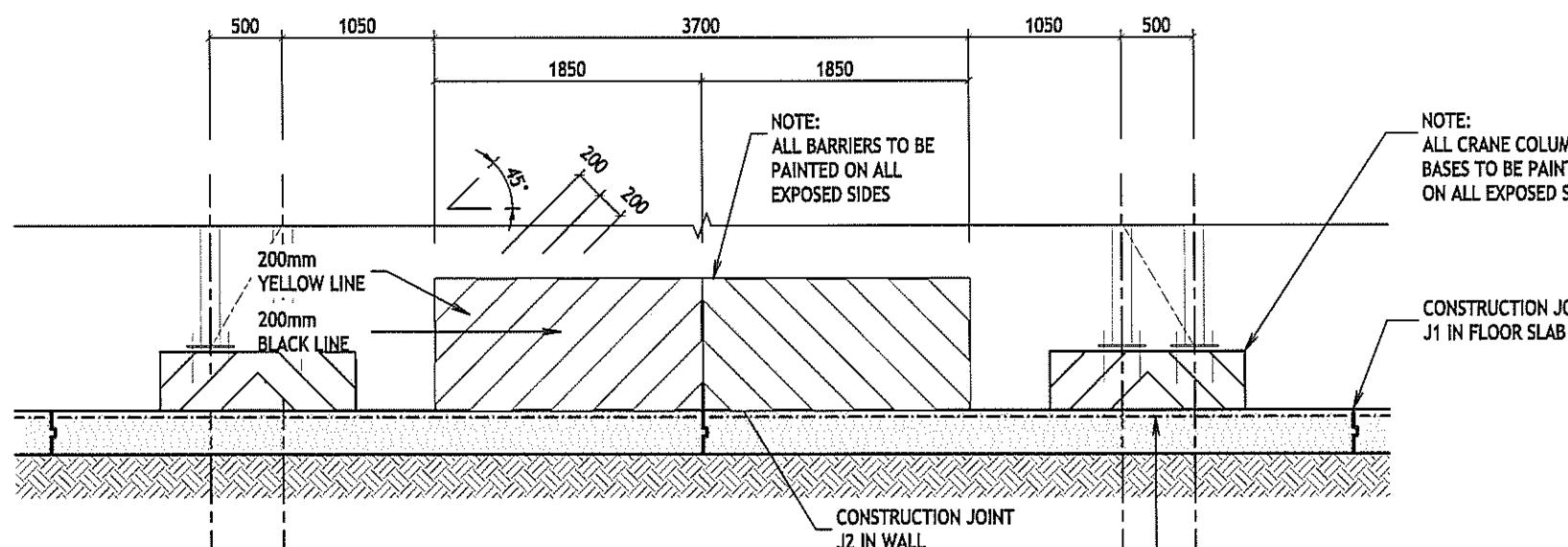
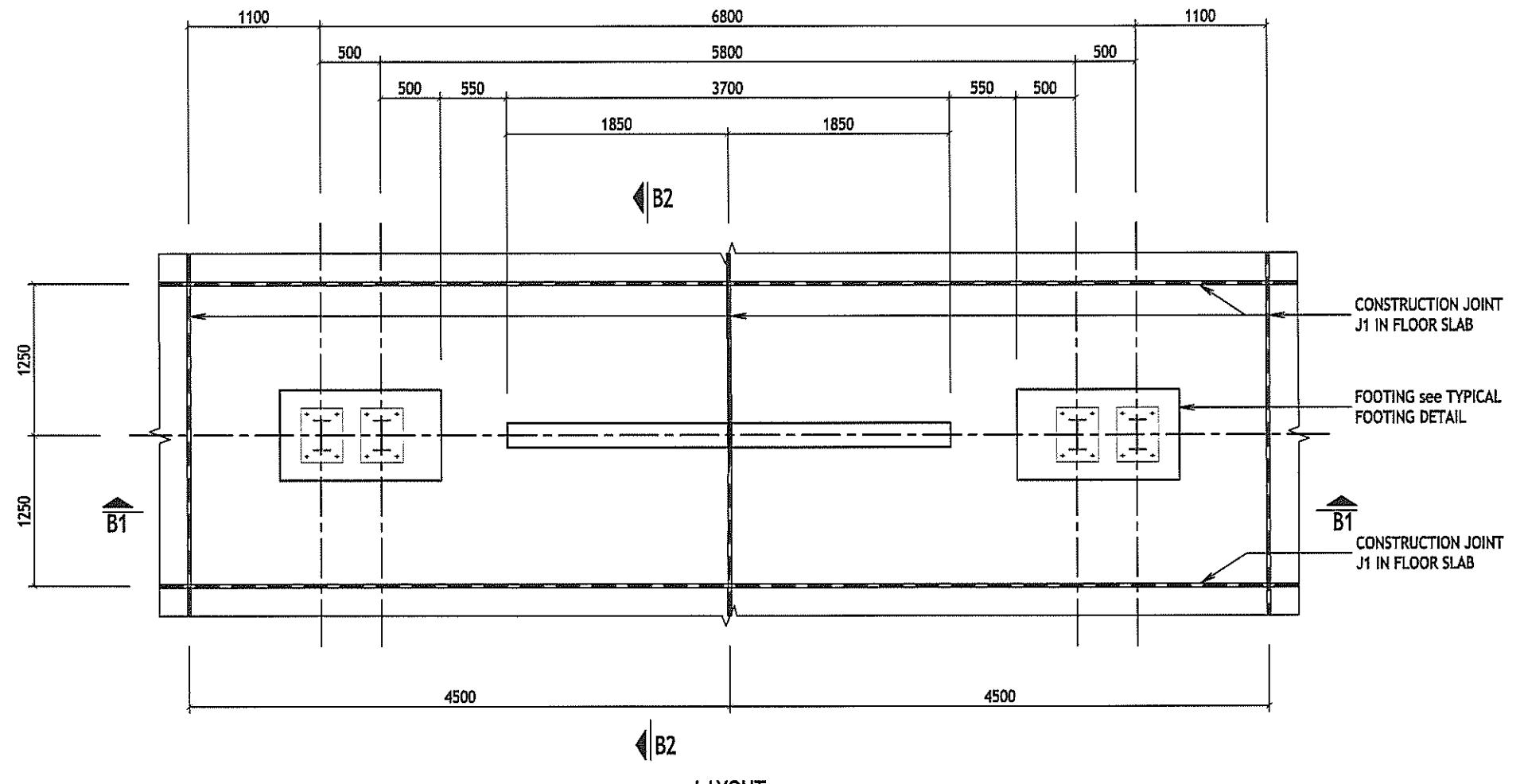
Box 187
OF
(953) 751 5555
(953) 751 5251

APPROVAL	DATE
MANAGER	
ENGINEER	

DRAWN BY
DATE
SCALE
DESIGN BY

PROJECT TITLE
**BLACKROCK: NCHWANING III
CHARGING BAY II**

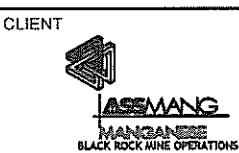
6 STABILIS
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY Tel. (053) 833 1654
Development(Pty) Ltd
E-mail: reception@stabilis.co.za



**FOR TENDER
PURPOSES ONLY**

NOTES
 1. FOR GENERAL NOTES SEE DRAWING /1
 2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
 3. NO CONCRETE SHALL BE POURED UNTIL THE
 REINFORCEMENT HAS BEEN INSPECTED AND
 APPROVED BY THE ENGINEER.
 4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND
 APPROVED ON SITE.
 5. TOC = TOP OF CONCRETE

DRG NO.	REFERENCE DRAWINGS		NO.	REVISION	DATE	DRAWN
	TITLE	REF.				
SK----	A FOR DESIGN REVIEW	20/02/2023	CJ			
	B FOR TENDER PURPOSES ONLY	09/03/2023	CJ			

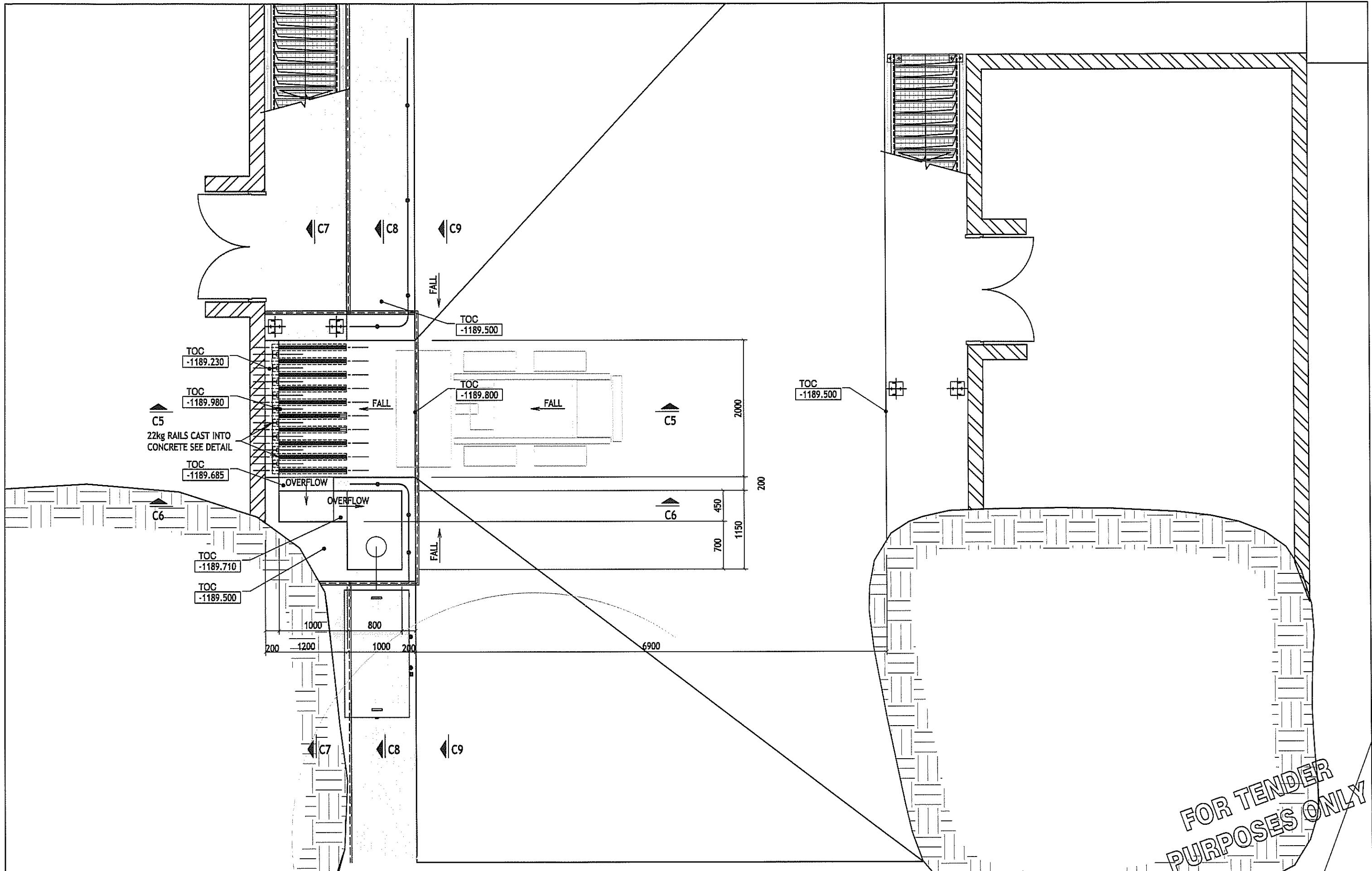


P.O. Box 147
SAFETY
TEL: (053) 751 5555
FAX: (053) 751 5251

PROJECT MANAGER	DATE	DRAWN BY	CHRIS	PROJECT TITLE	
				DESIGN BY	PROF. ENGINEER

BLACKROCK: NCHWANING III
CHARGING BAY II
DRAWING TITLE
BARRIER DETAILS
DRAWING NO. SK4050/13 REV. B

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za



NOTES
 1. FOR GENERAL NOTES SEE DRAWING -1
 2. CONCRETE STRENGTH TO BE 30Mpa AT 28 DAYS
 3. NO CONCRETE SHALL BE POURED UNTIL THE
 REINFORCEMENT HAS BEEN INSPECTED AND
 APPROVED BY THE ENGINEER
 4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND
 APPROVED ON SITE
 5. TOC = TOP OF CONCRETE

DRG NO.	REFERENCE DRAWINGS	
	TITLE	
SK---/---	A FOR DESIGN REVIEW	20/02/2023 CJU
	B FOR TENDER PURPOSES ONLY	09/03/2023 CJU

NO.	REVISION	DATE	DRAWN
	A FOR DESIGN REVIEW	20/02/2023	CJU
	B FOR TENDER PURPOSES ONLY	09/03/2023	CJU



P.O. BOX 187
 200
 TEL: (031) 751 5555
 FAX: (031) 751 5251

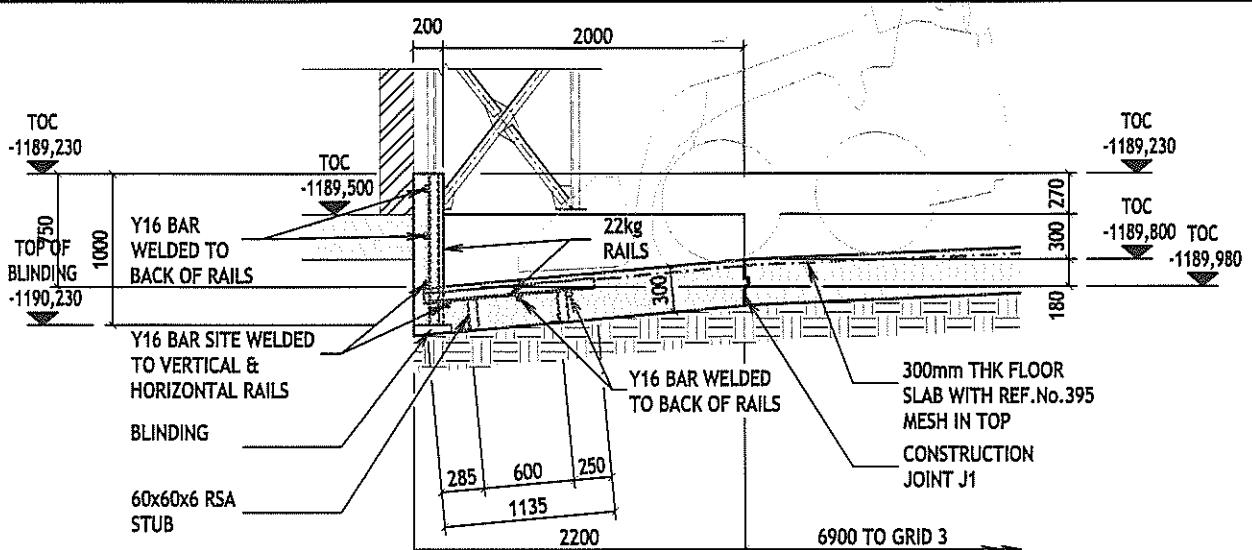
CLIENT	PROJECT MANAGER	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE	
						DESIGN BY	DRAWING TITLE
			JAN 2023				BLACKROCK: NCHWANING III CHARGING BAY II
							WASHBAY SUMP AREA LAYOUT

PROF. ENGINEER

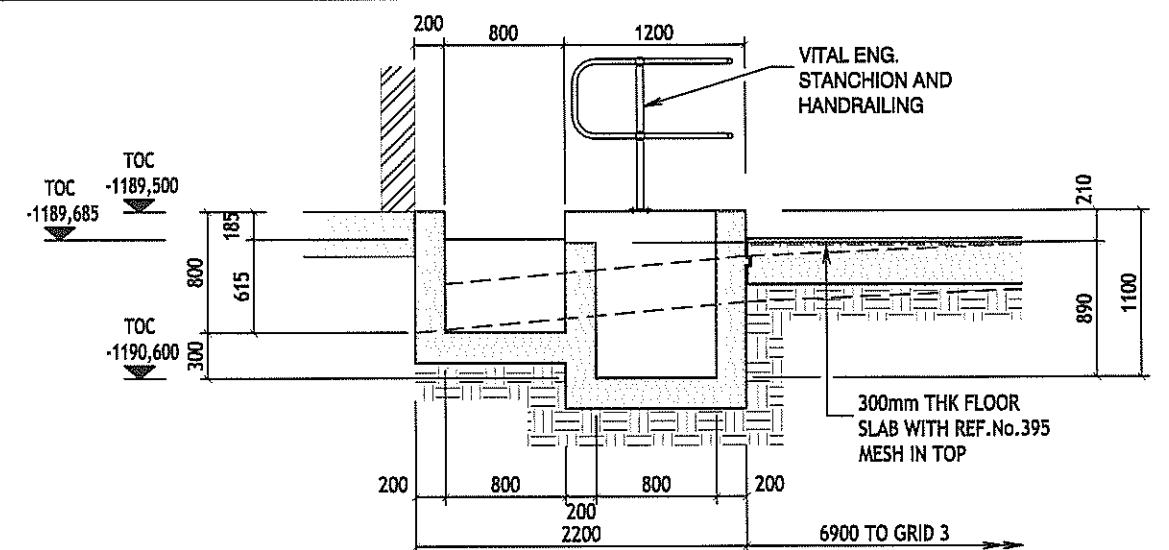
STABILIS
 Development(Pty) Ltd
 13 Bishops Ave.
 Sanlam Complex
 Building D
 KIMBERLEY
 Tel. (053) 833 1654
 E-mail: reception@stabilis.co.za

FOR TENDER
 PURPOSES ONLY

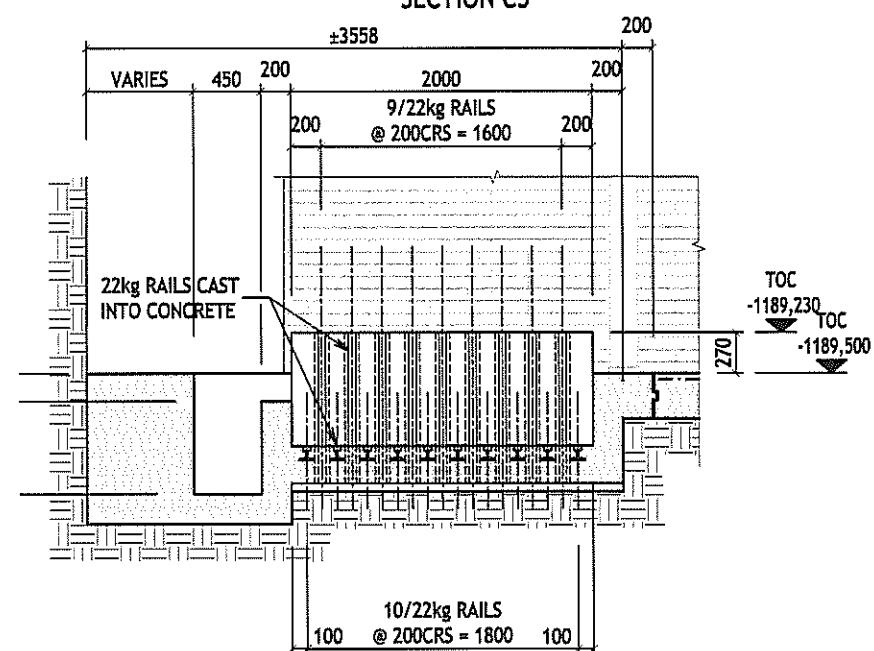
DRAWING NO. SK4050/14 REV. B



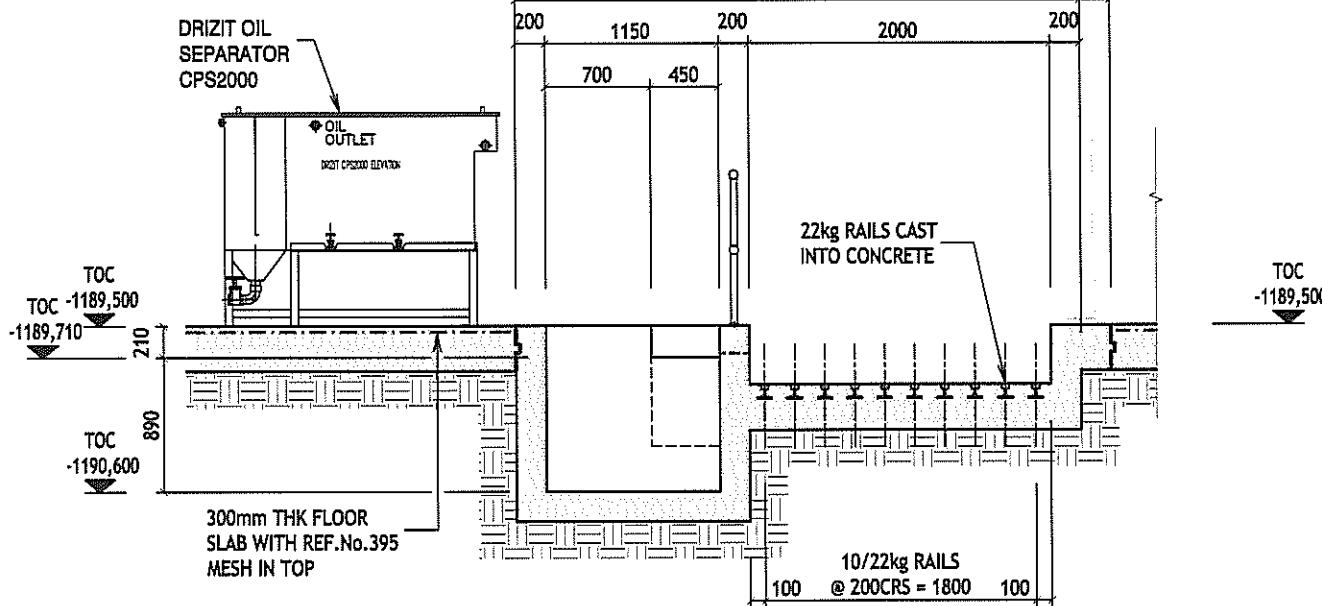
SECTION C



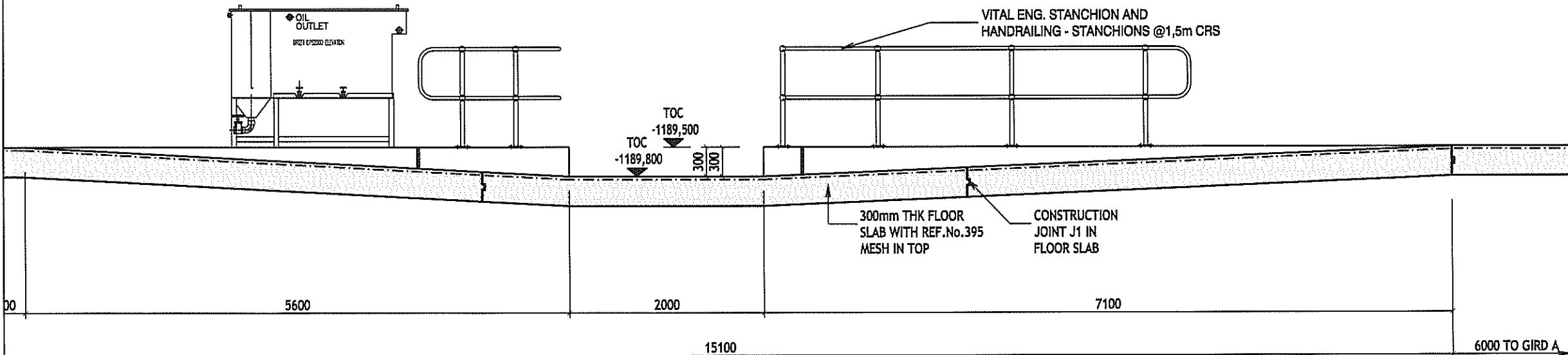
SECTION C6



SECTION C



SECTION C8



**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
5. TOC = TOP OF CONCRETE



P.O. Box 187
SAVANNAH,
GA 31401
TEL. (912) 751-5555
FAX. (912) 751-5221

VAL	DATE	DRA
MANAGER		DATI
ENGINEER		SCA DES PRO

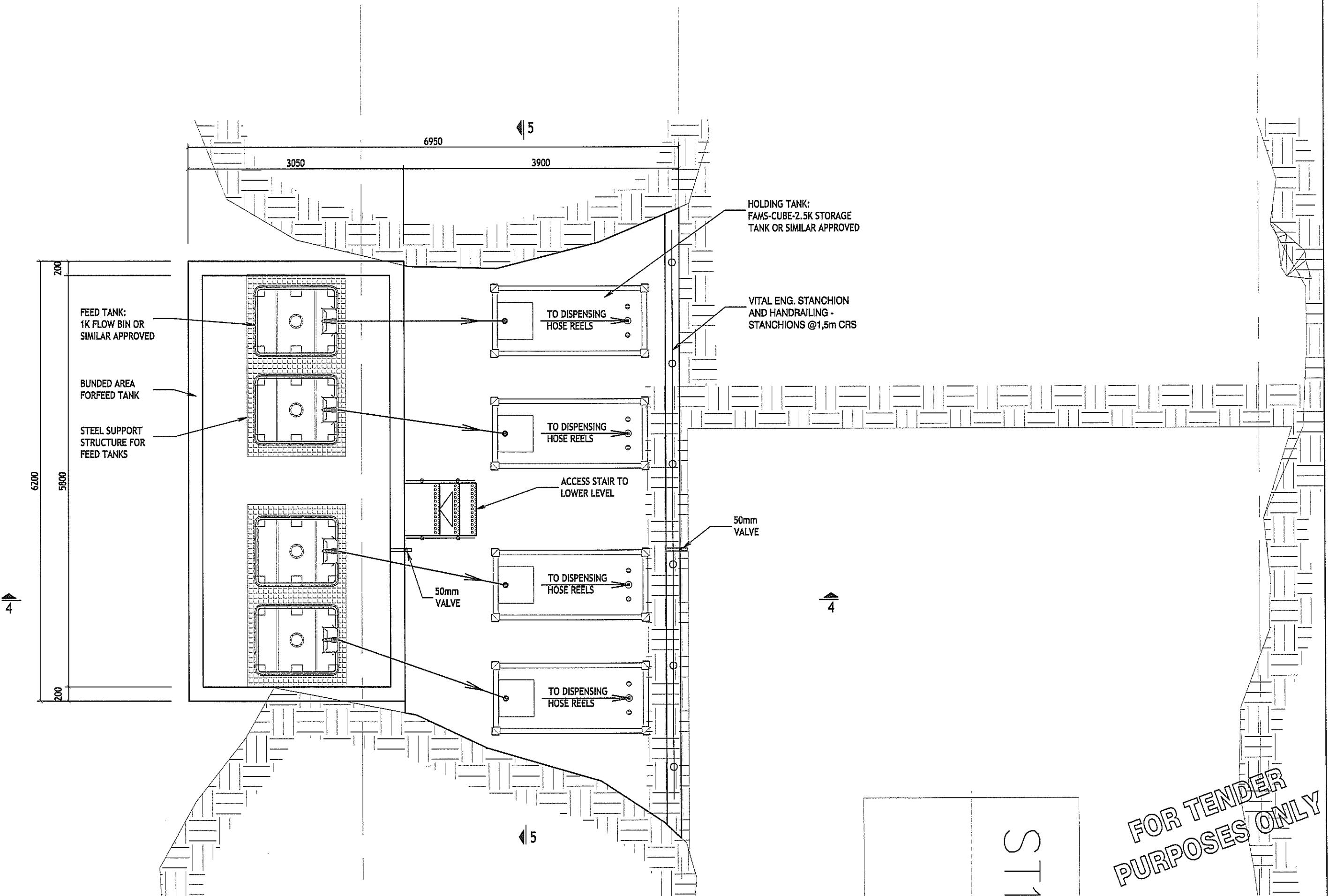
N BY	CHRIS	
	JAN. 2023	
E	1:25	A1
	1:50	A3
N BY	<i>M</i>	
ENGINEER	<i>John</i>	

PROJECT TITLE
**BLACKROCK: NCHWANING III
CHARGING BAY II**

DRAWING TITLE
SECTIONS C5 - C9

6 STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING NO.	SK4050/15	REV.	B
-------------	-----------	------	---



NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE
5. TOC = TOP OF CONCRETE

REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN
DRG NO	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJU
SK-1		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJU

CLIENT	20-BY-187 SUIT 107 TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS
ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS	PROJECT MANAGER		JAN. 2023		
		SCALE		1:25 A1 1:50 A3	

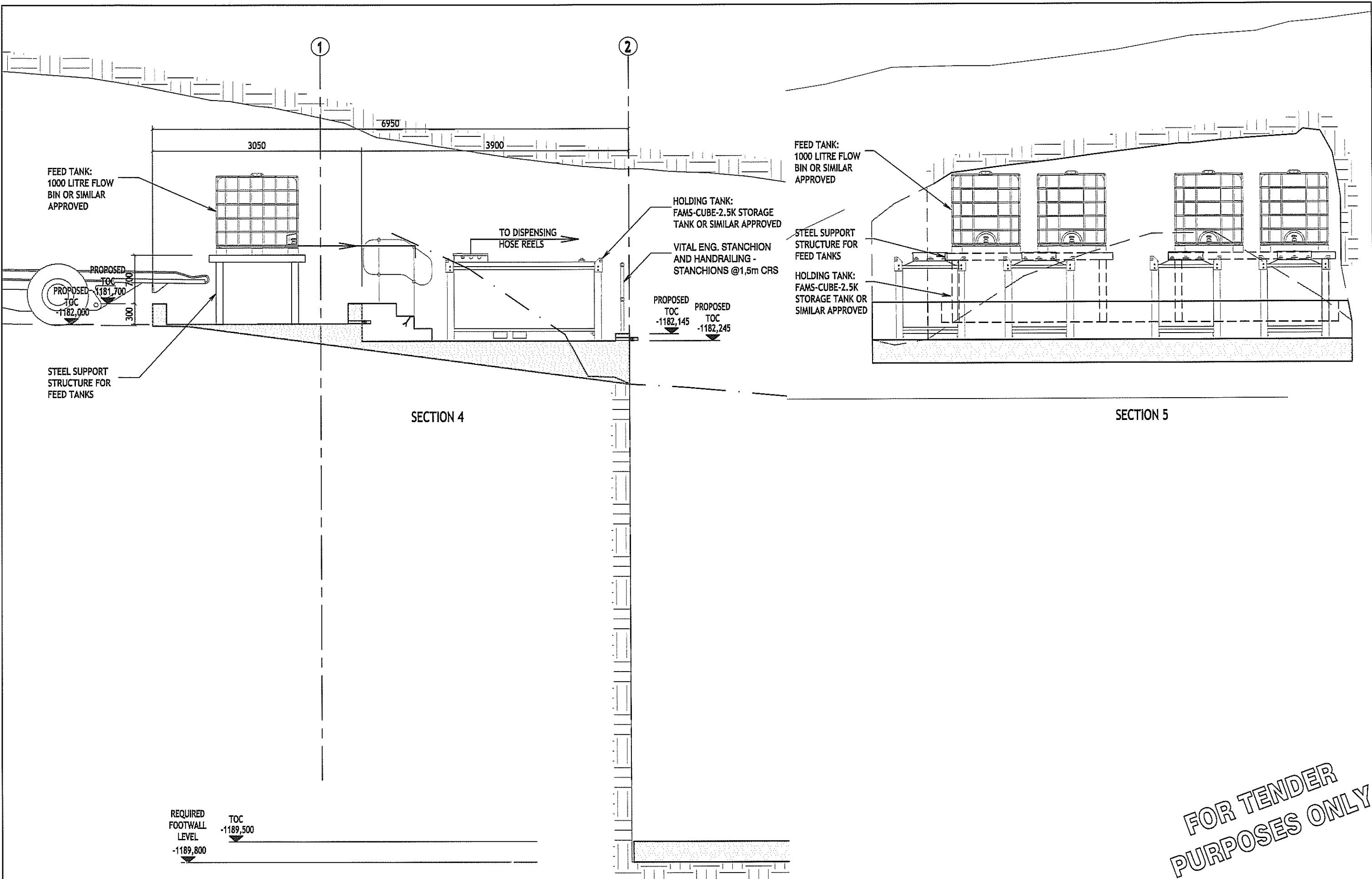
PROJECT ENGINEER	DESIGN BY	PROF. ENGINEER

PROJECT TITLE
**BLACKROCK: NCHWANING III
CHARGING BAY II**

DRAWING TITLE
OIL STORAGE AREA LAYOUT

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING NO. SK4050/16 REV. B



**FOR TENDER
PURPOSES ONLY**

NOTES	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN BY
	DRG NO.	TITLE				
1. FOR GENERAL NOTES SEE DRAWING -1			A	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS						
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.						
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.						
5. TOC = TOP OF CONCRETE						

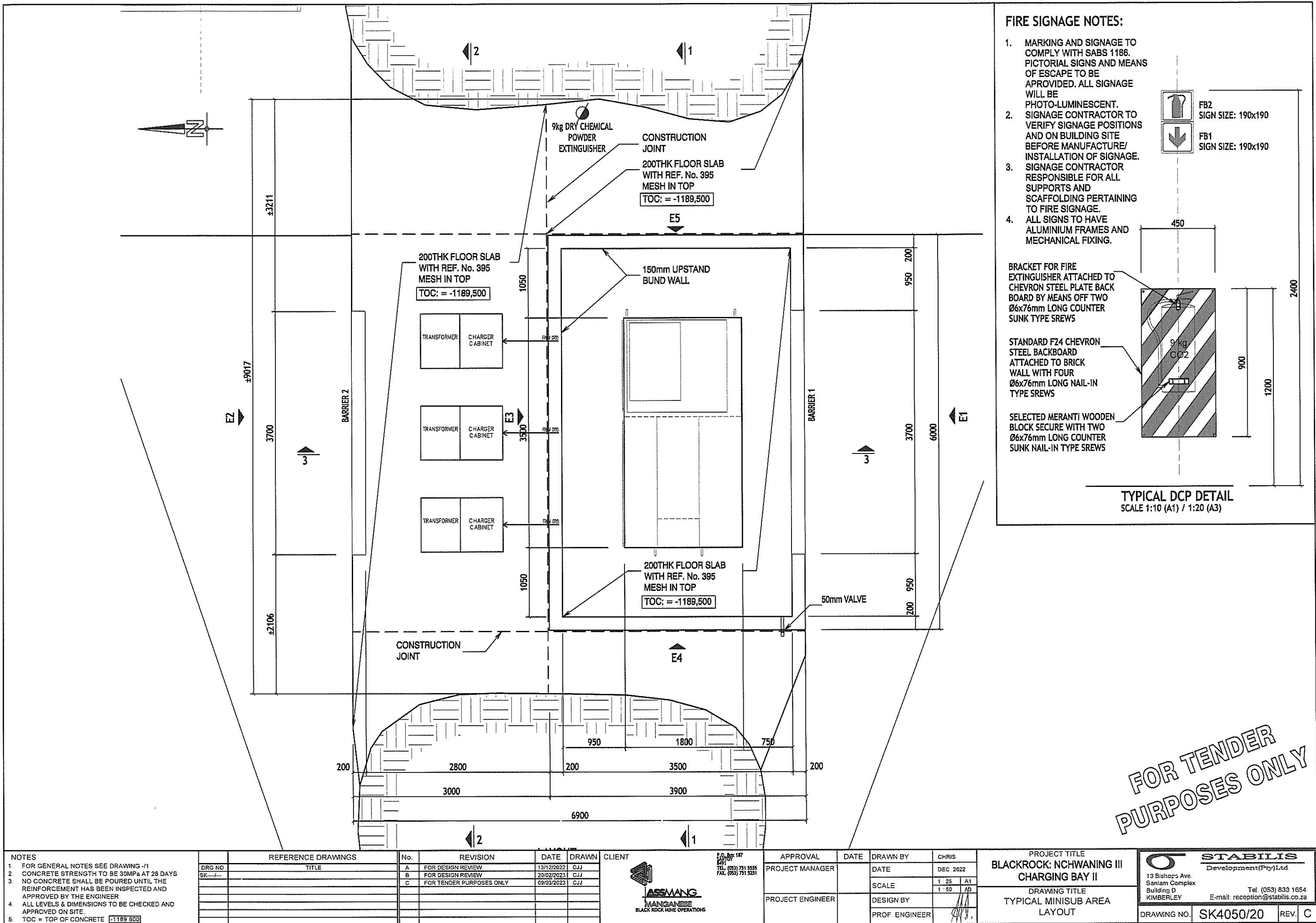


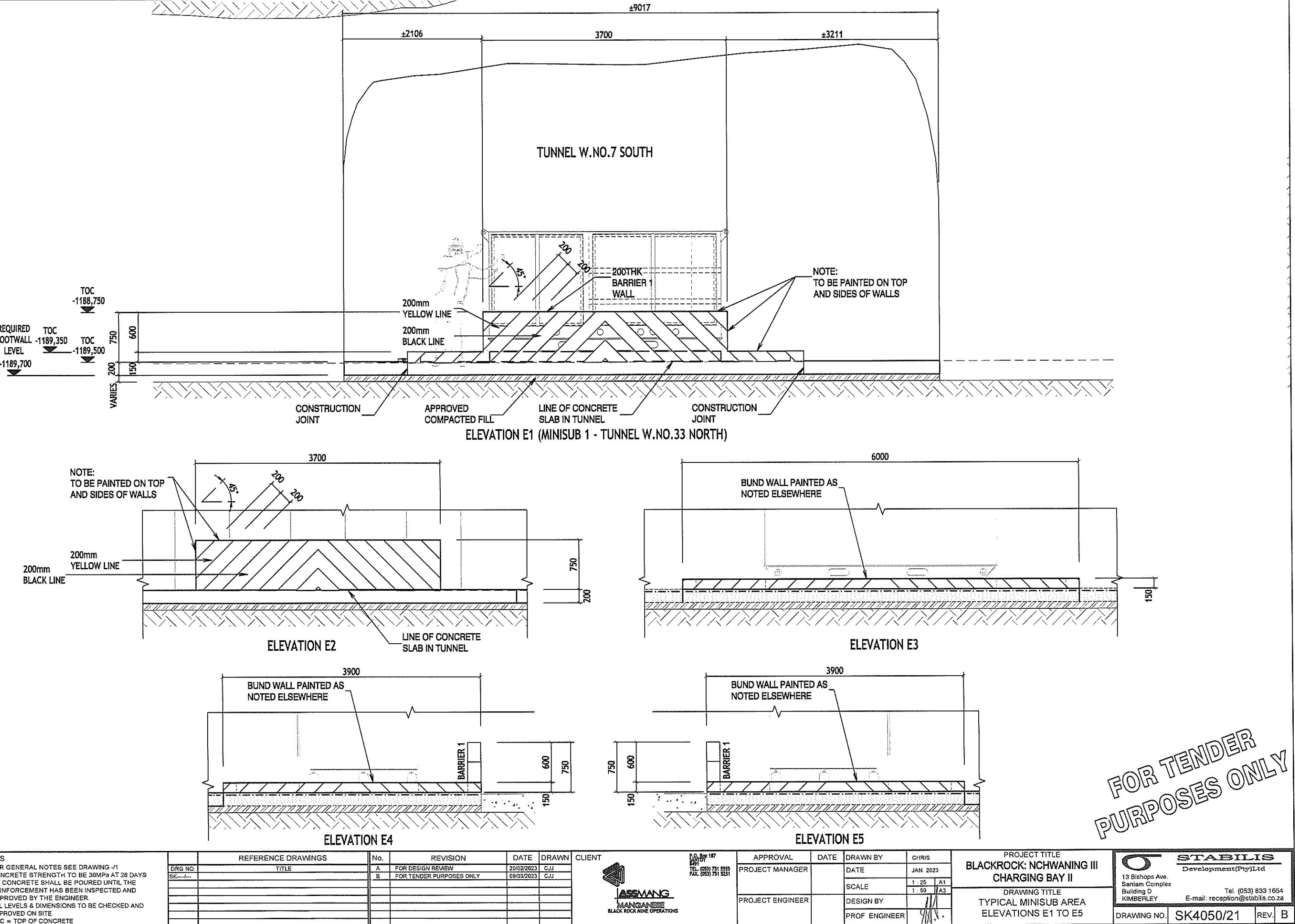
	APPROVAL	DATE	DRAWN BY	C
5555 \$251	PROJECT MANAGER		DATE	J
			SCALE	1 1
PROJECT ENGINEER			DESIGN BY	
			PROF. ENGINEER	

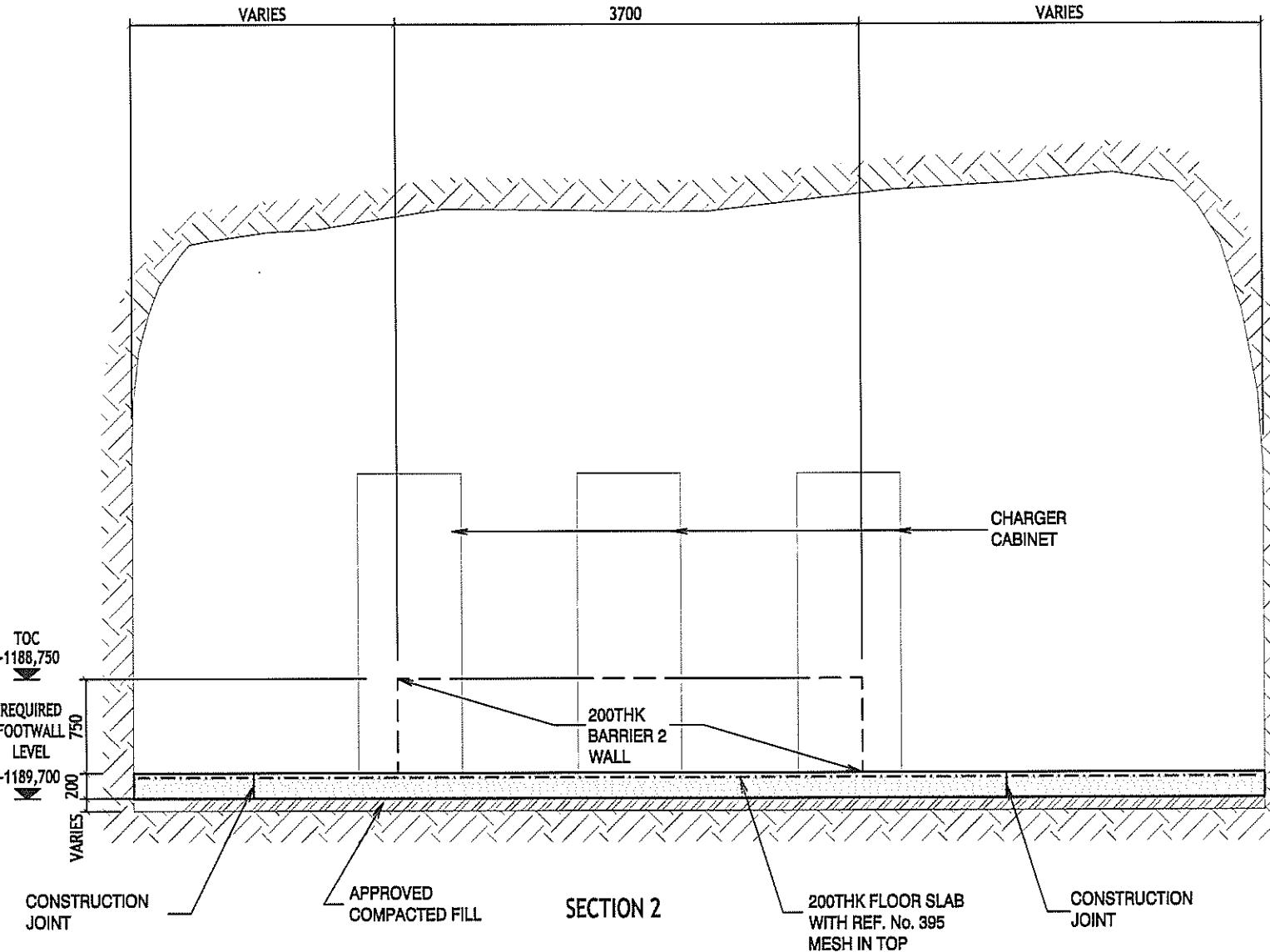
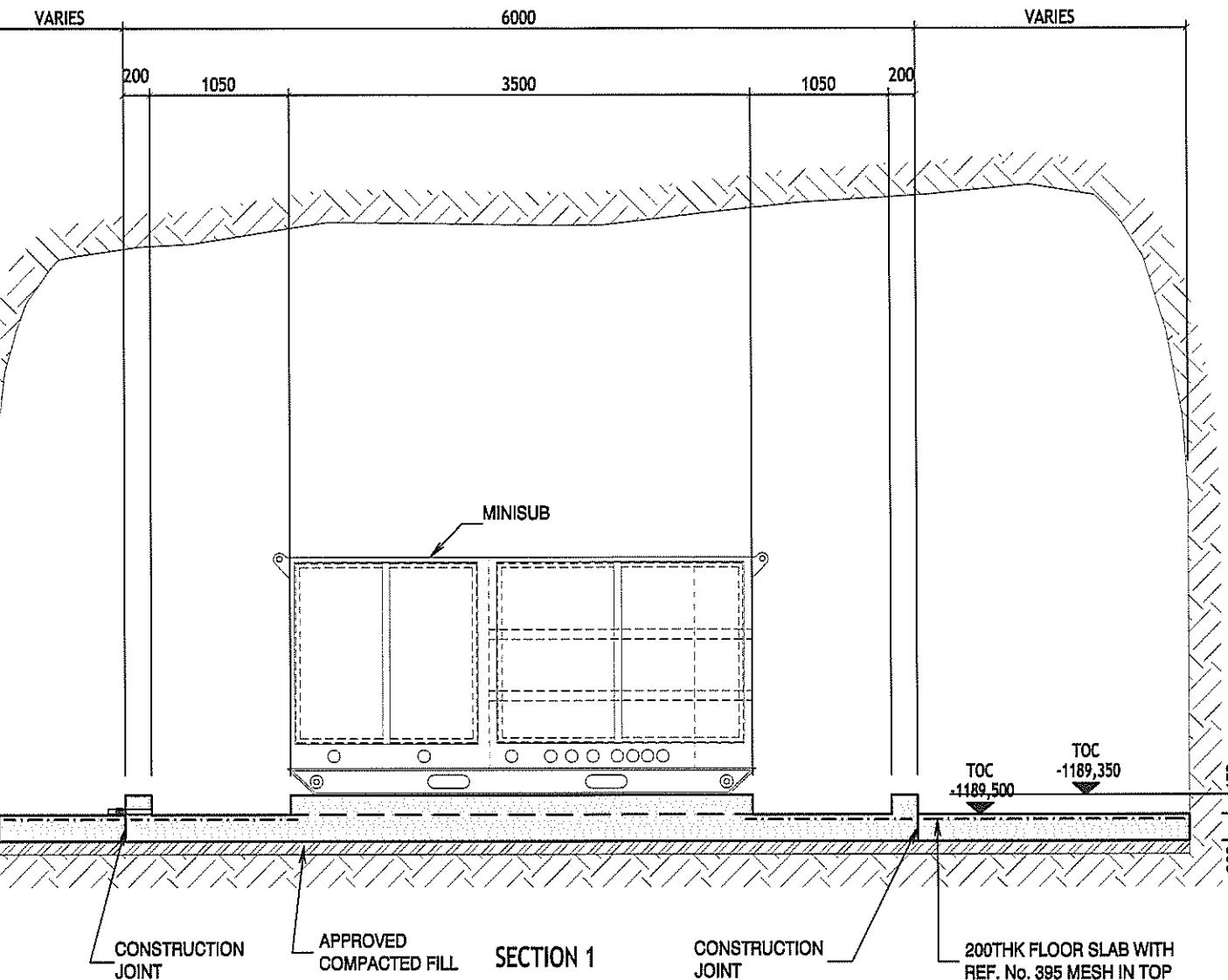
PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

**DRAWING TITLE
SECTIONS 4 AND 5**









FOR TENDER
PURPOSES ONLY

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE
5. TOC = TOP OF CONCRETE

DRG NO.	REFERENCE DRAWINGS	NO.	REVISION	DATE	DRAWN
SK-----	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJU
		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJU



P.O. Box 117
DURBAN
TEL: (031) 751 5555
FAX: (031) 751 5231

PROJECT MANAGER	APPROVAL	DATE	DRAWN BY	CHRIS
	DATE	JAN. 2023		
	SCALE	1:25 / 41 1:50 / 43		

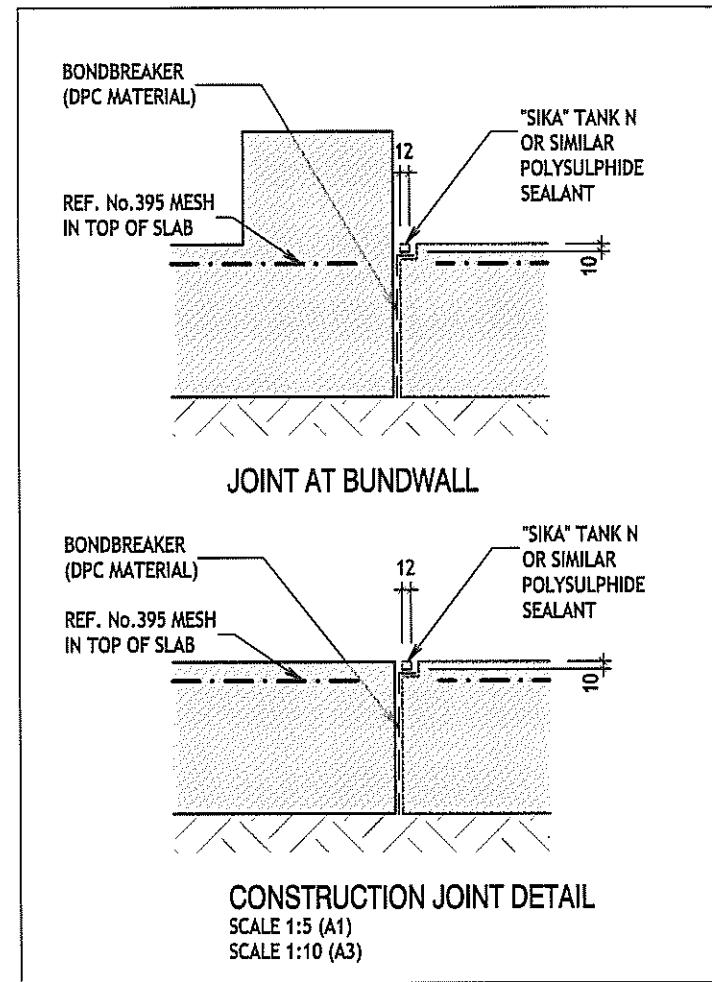
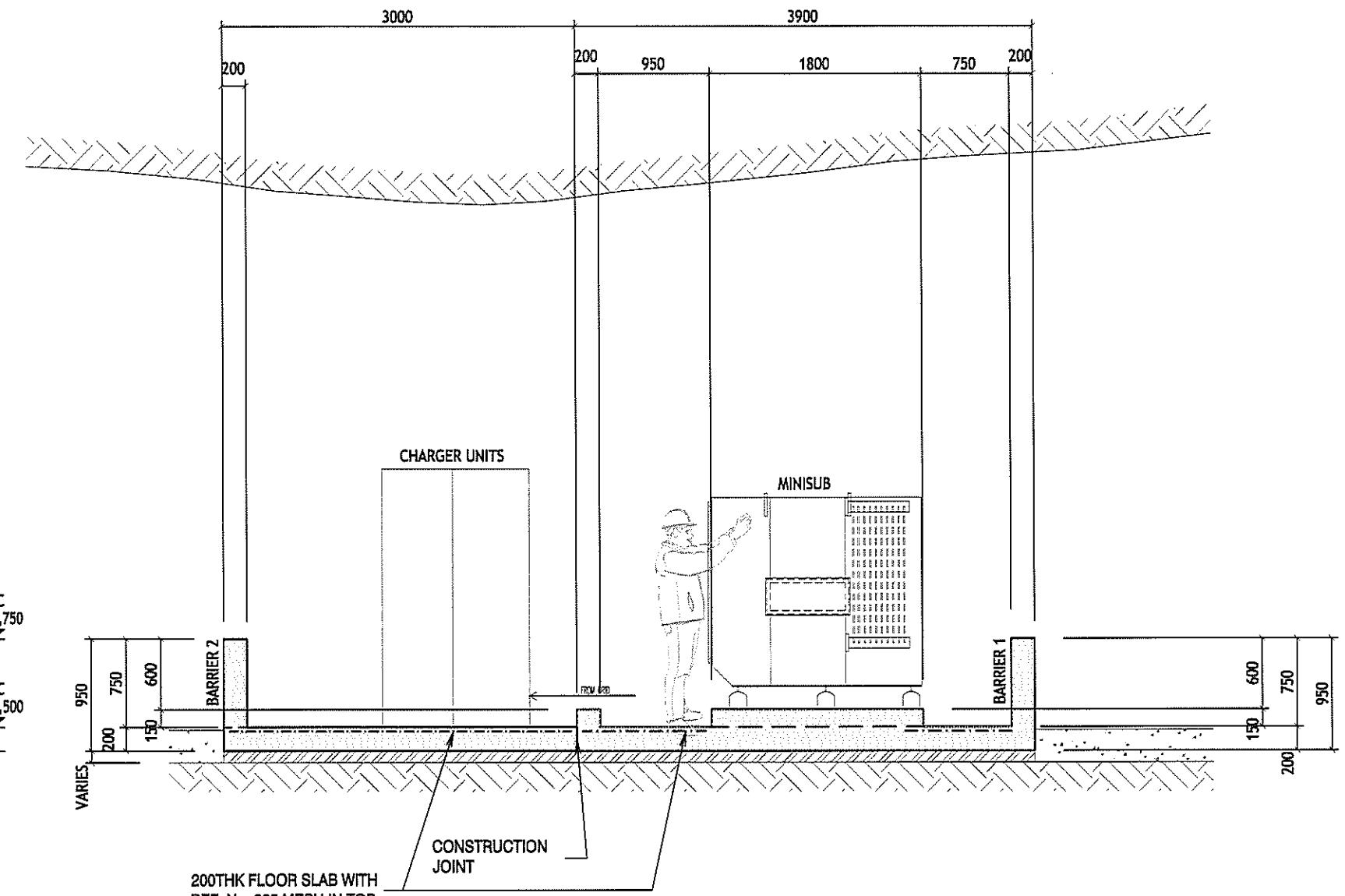
PROJECT ENGINEER	DESIGN BY	PROF. ENGINEER	DRAWN BY

PROJECT TITLE
**BLACKROCK: NCHWANING III
CHARGING BAY II**

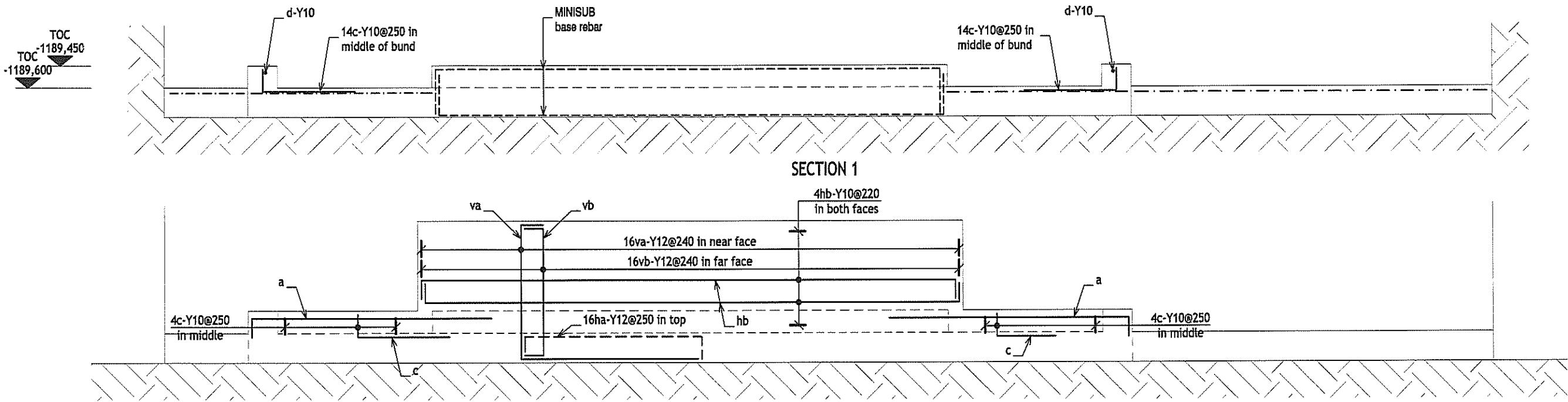
DRAWING TITLE
**TYPICAL MINISUB AREA
SECTIONS 1 AND 2**

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za

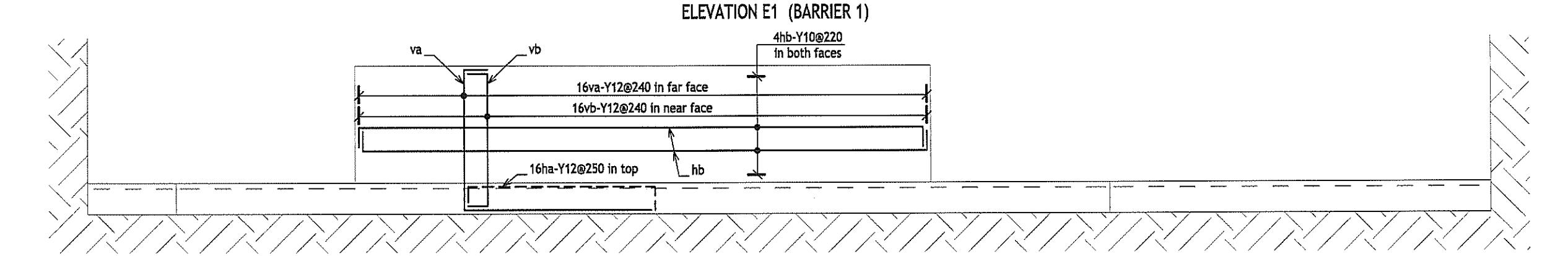
DRAWING NO. **SK4050/22** REV. **B**



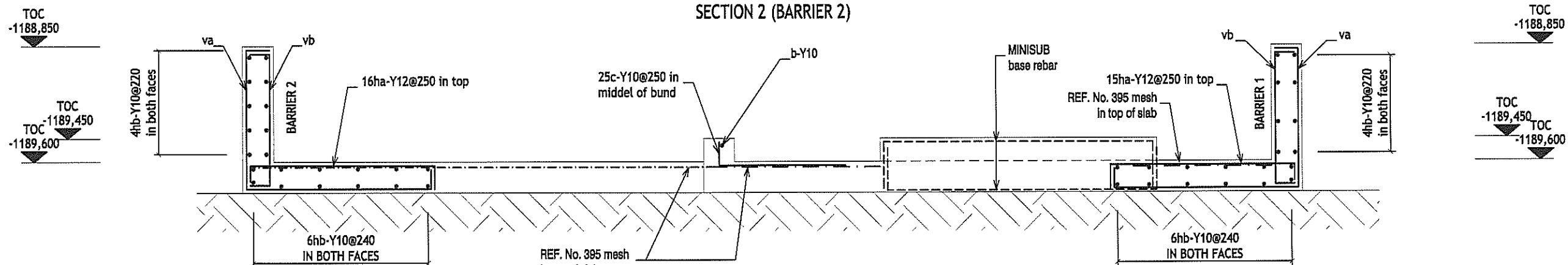
**FOR TENDER
PURPOSES ONLY**



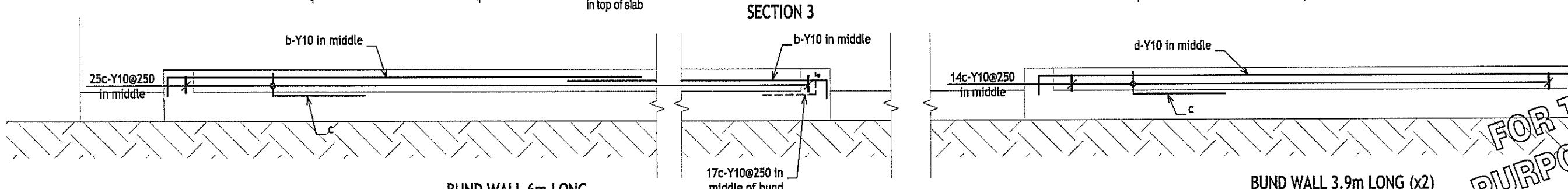
SECTION 1



ELEVATION E1 (BARRIER 1)



SECTION 2 (BARRIER 2)



BUND WALL 6m LONG

BUND WALL 3.9m LONG (x2)

NOTES
 1. FOR GENERAL NOTES SEE DRAWING -1
 2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
 3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
 4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
 5. TOC = TOP OF CONCRETE

REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN
DRG NO.	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJU
SK	/—	B	FOR TENDER PURPOSES ONLY	09/03/2023	CJU



P.O. Box 157
SAF
TEL: (031) 751 5355
FAX: (031) 751 5221

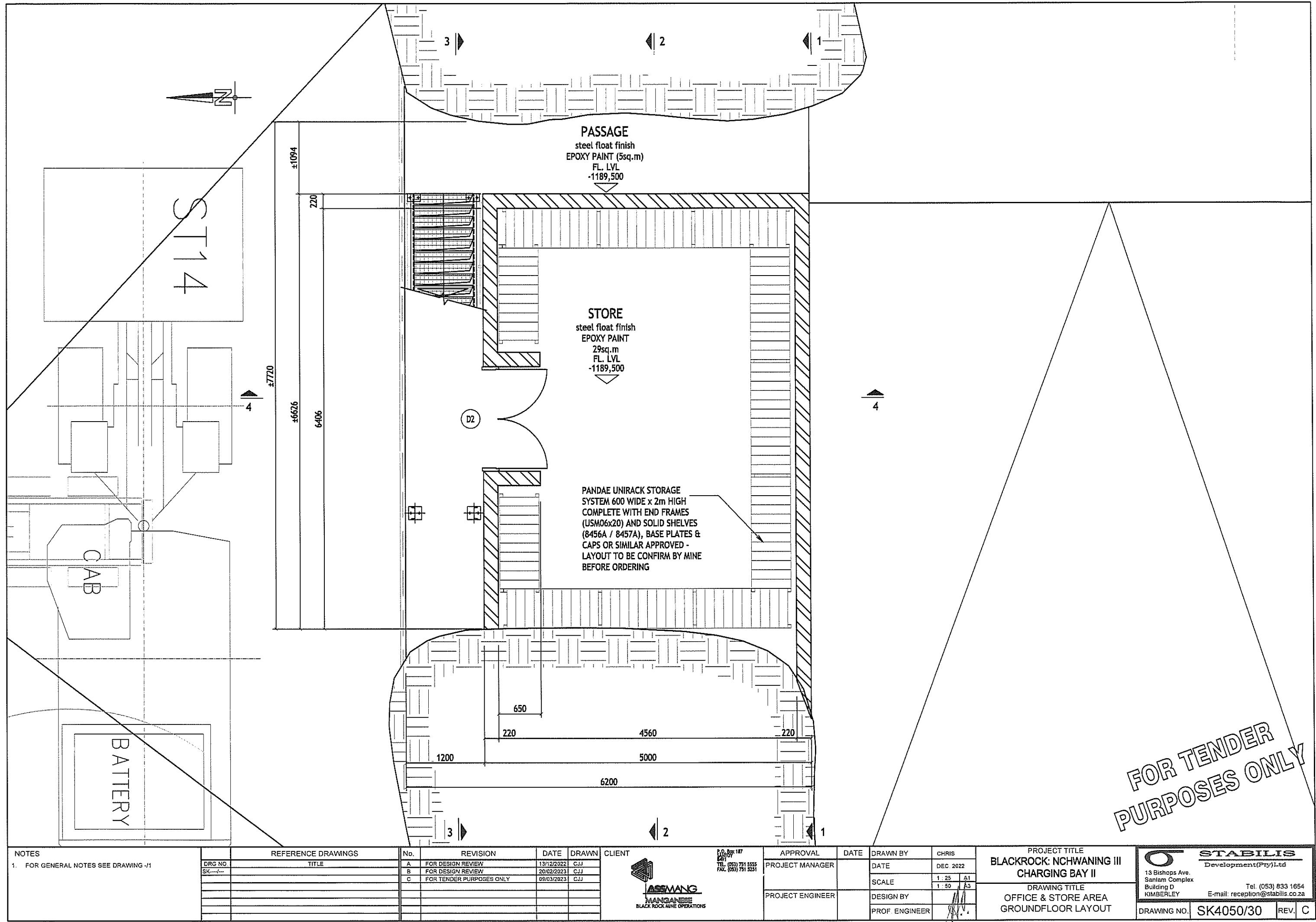
PROJECT MANAGER	APPROVAL	DATE	DRAWN BY	CHRIS
	DATE	JAN. 2023		
	SCALE	1 : 15 A1 1 : 30 A3		

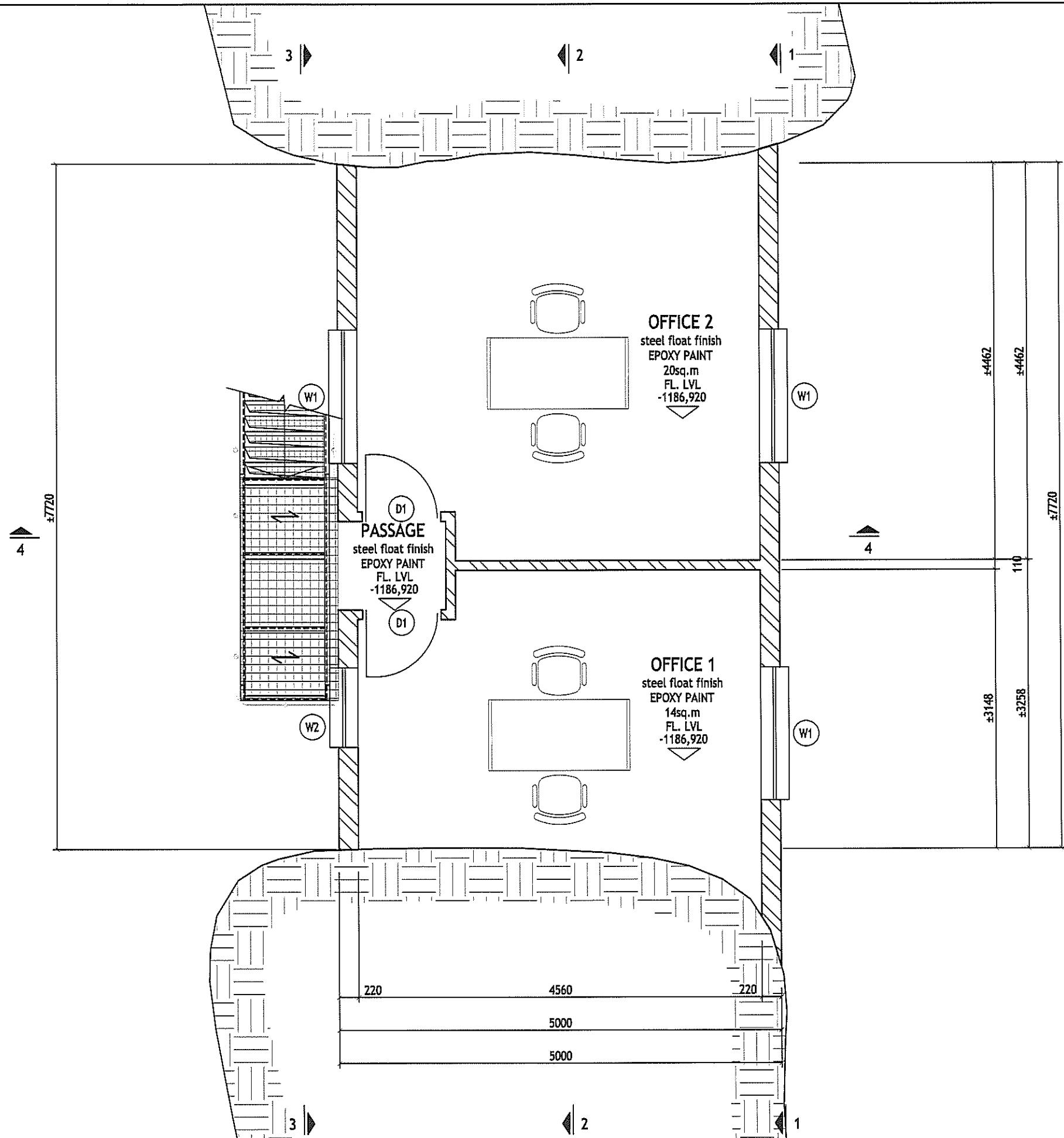
PROJECT ENGINEER	DESIGN BY	DATE	DRAWN BY	CHRIS
	PROF. ENGINEER			

PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II
DRAWING TITLE
TYPICAL MINISUB AREA
STEEL PLACING

STABILIS
Development(Pty) Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za
DRAWING NO. SK4050/24 REV. B

FOR TENDER
PURPOSES ONLY



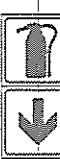


**FOR TENDER
PURPOSES ONLY**

NOTES	1. FOR GENERAL NOTES SEE DRAWING -/1	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN	CLIENT  ASSMANG MANCANESSE BLACK ROCK MINE OPERATIONS	P.O. Box 187 SK4050 TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE	 STABILIS Development(Pty)Ltd 13 Bishops Ave. Sanlam Complex Building D KIMBERLEY Tel. (053) 833 1654 E-mail: reception@stabilis.co.za			
		DRG NO.	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJJ		PROJECT MANAGER		DATE	JAN. 2023	BLACKROCK: NCHWANING III CHARGING BAY II					
		SK-/-		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ		SCALE	1 : 25	A1	1 : 50	A3	DRAWING TITLE	OFFICE & STORE AREA FIRST FLOOR LAYOUT			
								PROJECT ENGINEER	DESIGN BY				PROF. ENGINEER					
															DRAWING NO.	SK4050/31	REV.	B

FIRE SIGNAGE NOTES:

1. MARKING AND SIGNAGE TO COMPLY WITH SABS 1186. PICTORIAL SIGNS AND MEANS OF ESCAPE TO BE PROVIDED. ALL SIGNAGE WILL BE PHOTO-LUMINESCENT.
2. SIGNAGE CONTRACTOR TO VERIFY SIGNAGE POSITIONS AND ON BUILDING SITE BEFORE MANUFACTURE/ INSTALLATION OF SIGNAGE.
3. SIGNAGE CONTRACTOR RESPONSIBLE FOR ALL SUPPORTS AND SCAFFOLDING PERTAINING TO FIRE SIGNAGE.
4. ALL SIGNS TO HAVE ALUMINUM FRAMES AND MECHANICAL FIXING.



FB2
SIGN SIZE: 190x190
FB1
SIGN SIZE: 190x190

450

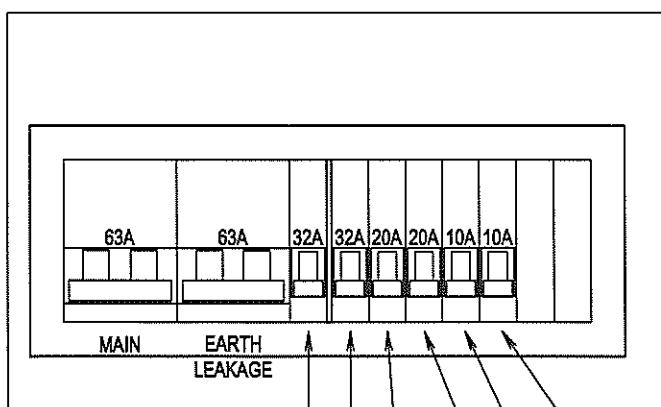
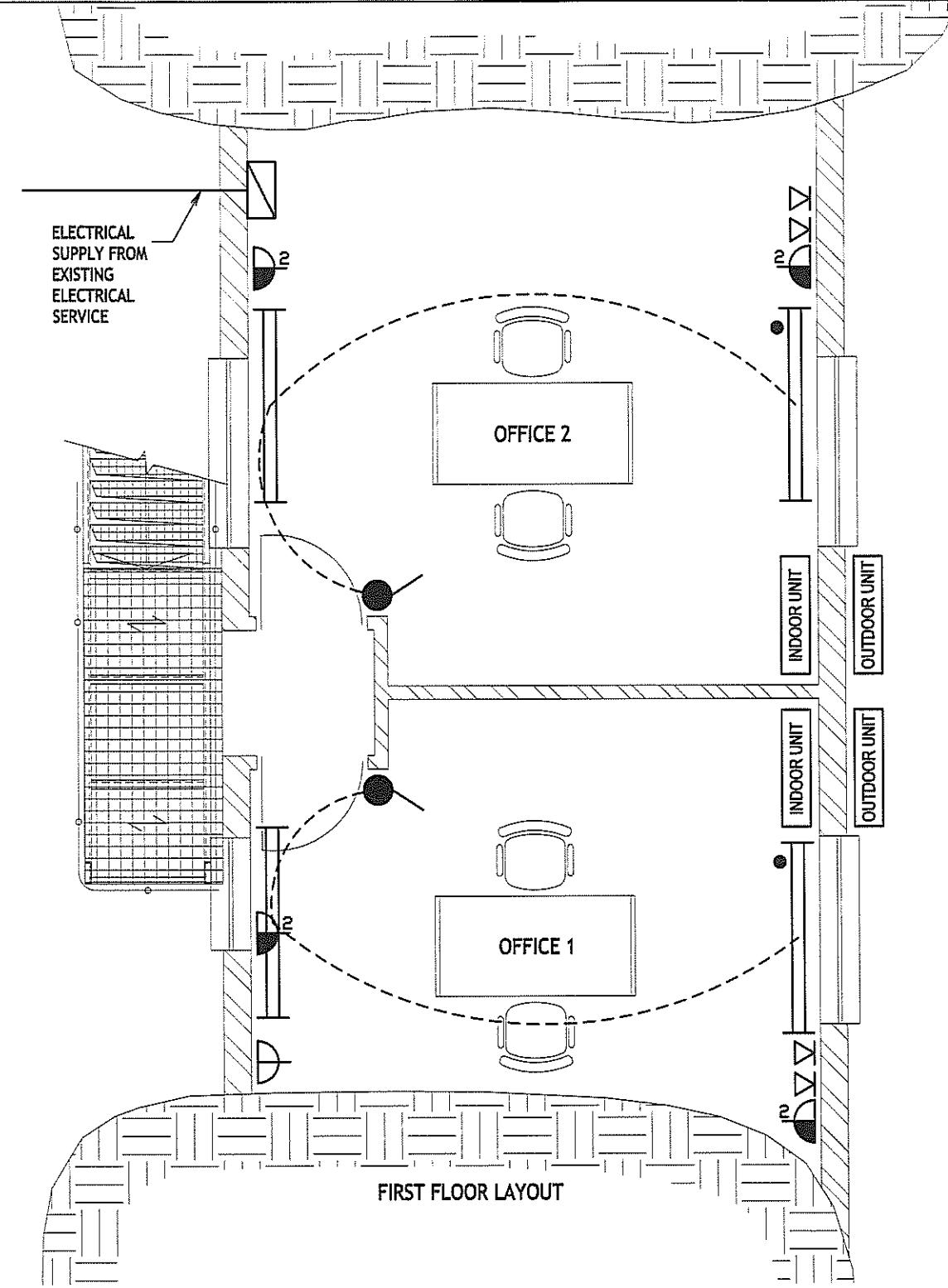
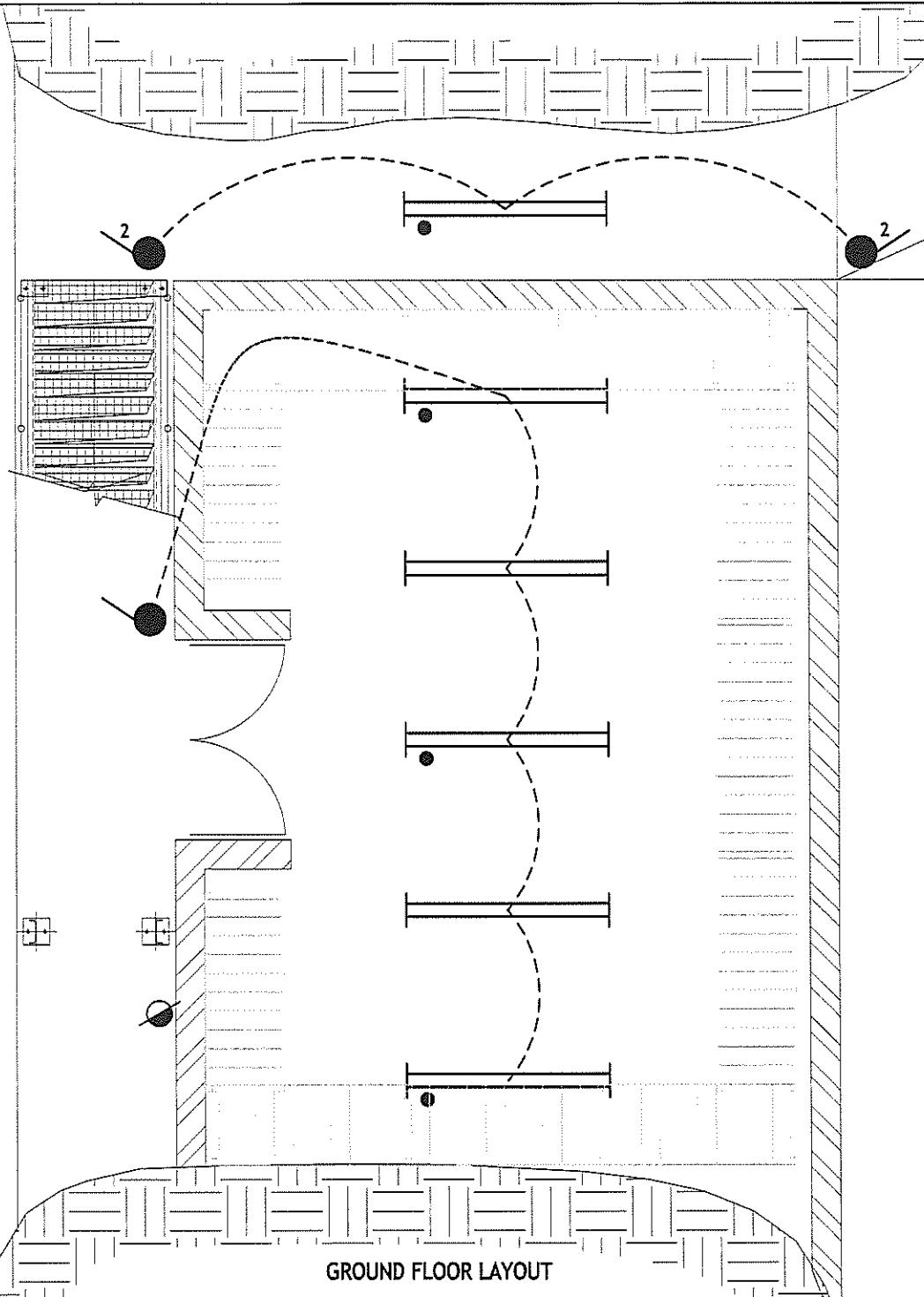
2400

BRACKET FOR FIRE EXTINGUISHER ATTACHED TO CHEVRON STEEL PLATE BACK BOARD BY MEANS OF TWO Ø6x76mm LONG COUNTER SUNK TYPE SCREWS

STANDARD F24 CHEVRON STEEL BACKBOARD ATTACHED TO BRICK WALL WITH FOUR Ø6x76mm LONG NAIL-IN TYPE SCREWS

SELECTED MERANTI WOODEN BLOCK SECURE WITH TWO Ø6x76mm LONG COUNTER SUNK NAIL-IN TYPE SCREWS

TYPICAL DCP DETAIL
SCALE 1:10 (A1) / 1:20 (A3)



BB-DB **-OFFICES/STORE
DISTRIBUTION BOARD ELEVATION
(N.T.S.)

ELECTRICAL LEGEND	
●	LIGHT SWITCH - 1,2m HIGH
●	2 WAY LIGHT SWITCH - 1,2m HIGH
	2x5ft NORDLUND VAPOR PROOF LED LIGHTS (JBLT 2x5ft LED G13) WITH CLEAR T8 TUBES
	2x5ft NORDLUND VAPOR PROOF LED LIGHTS (JBLT 2x5ft LED G13) WITH EMERGENCY SUPPLY - CLEAR T8 TUBES
□	DOUBLE WALL PLUG - 1,2m HIGH FOR FLOOR LEVEL

ELECTRICAL LEGEND	
●	DOUBLE WALL PLUG - 0,3m HIGH FOR FLOOR LEVEL
□	DEDICATED PLUG FOR CASS
□	DISTRIBUTION BOARD
OUTDOOR UNIT	AIR CONDITIONER - SPLIT UNIT TYPE 18000 BTU
INDOOR UNIT	
△	NETWORK POINT

FIREFIGHTING LEGEND	
9kg DCP	9kg DRY CHEMICAL POWDER EXTINGUISHER

ELECTRICAL WIRE NOTES	
•	LIGHT SWITCH WIRE - 1.5mm ² THK
•	DOUBLE WALL PLUGS - 2.5mm ² THK
•	AIR CONDITIONING - 4mm ² THK

NOTES
1. FOR GENERAL NOTES SEE DRAWING -/1

REFERENCE DRAWINGS
DRG NO. TITLE

No. REVISION DATE DRAWN

CLIENT
 ASSMANG
MANGANESE
BLACK ROCK MINE OPERATIONS

P.D. Ref. 147
DIA 07
TEL: (053) 751 5555
FAX: (053) 751 5251

APPROVAL
PROJECT MANAGER

DATE

DRAWN BY

CHRIS

JAN 2023

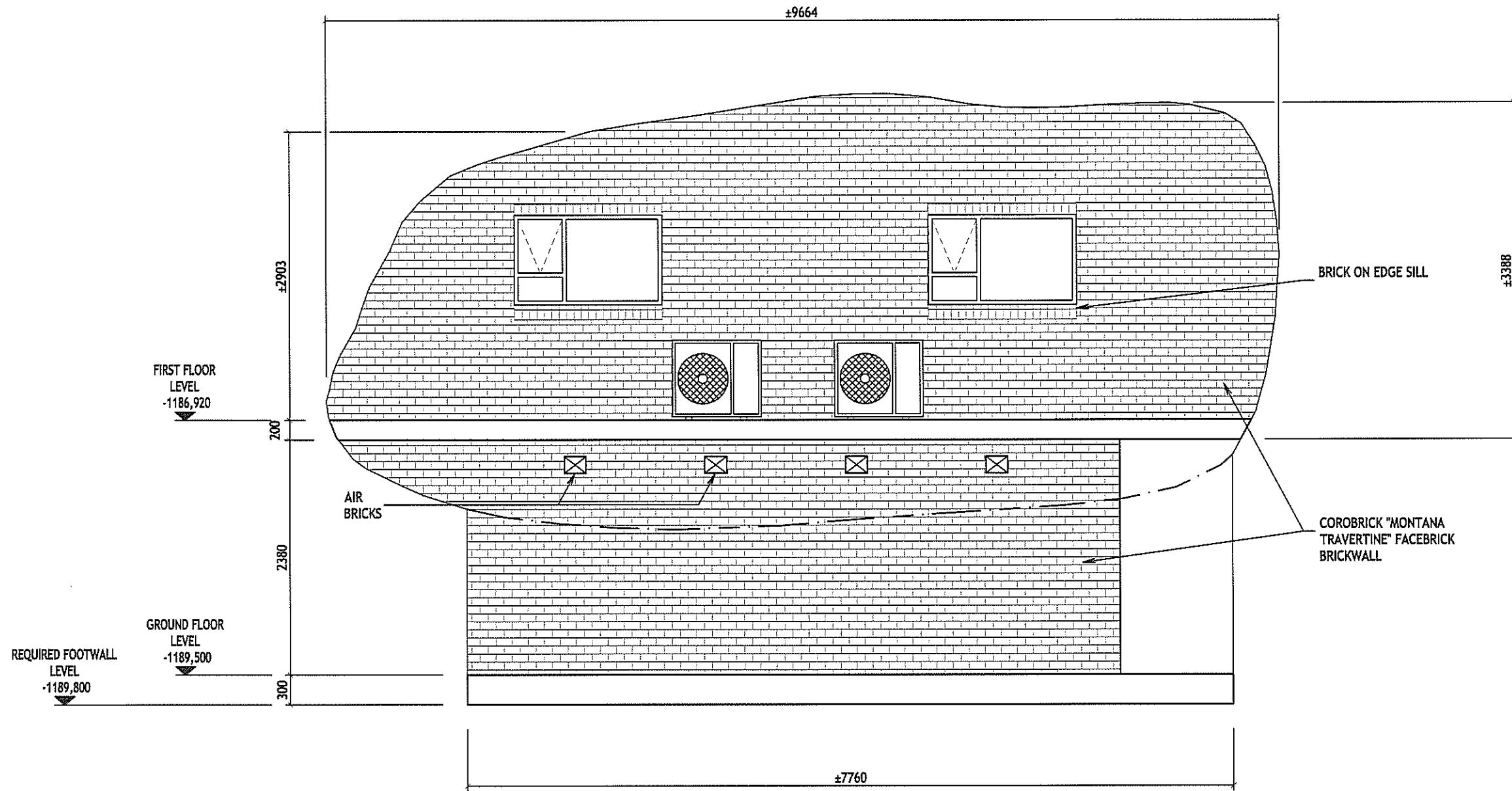
PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

DRAWING TITLE
OFFICE & STORE AREA
ELECTRICAL LAYOUTS

STABILIS
Development(Pty) Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za

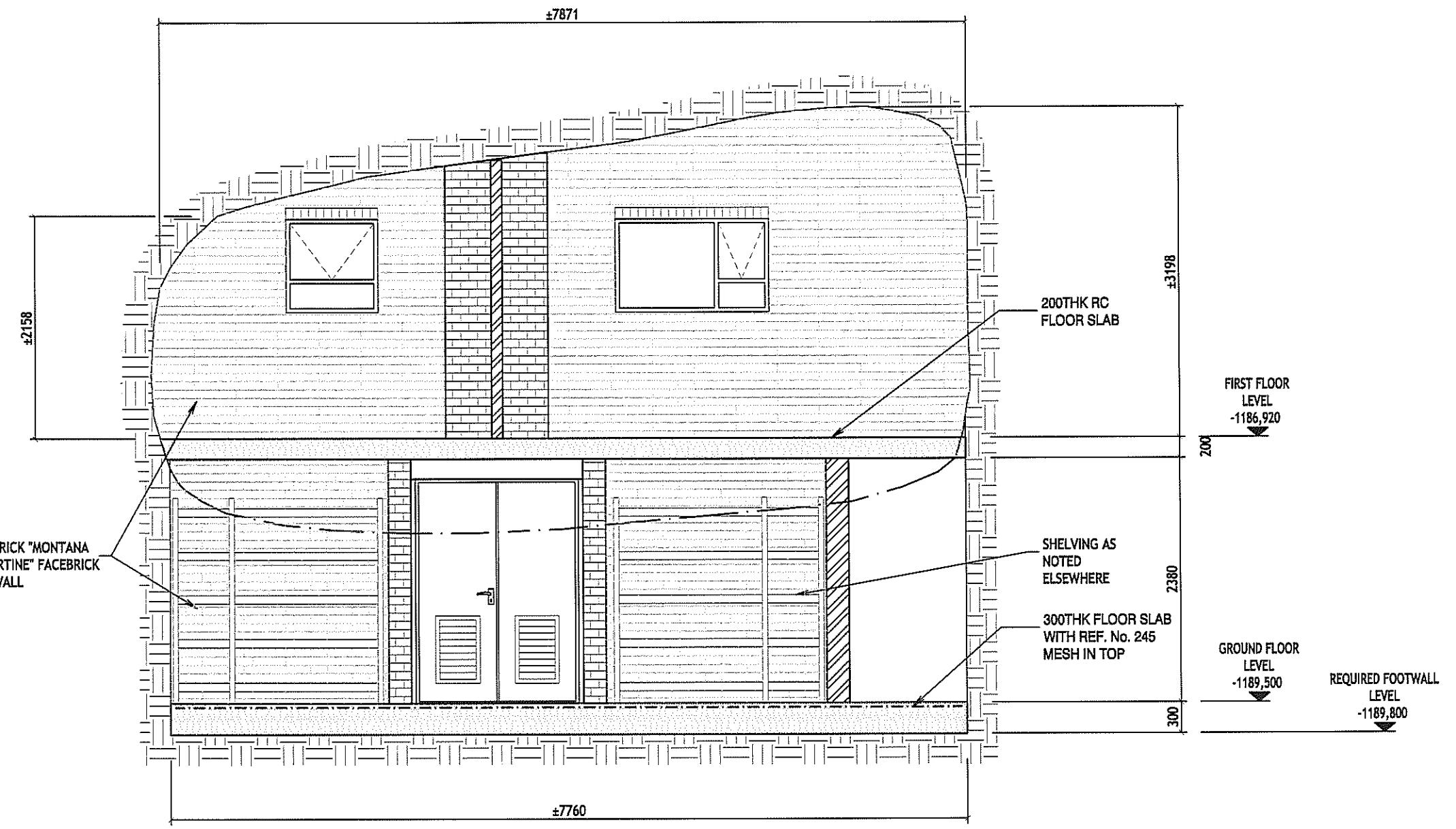
FOR TENDER
PURPOSES ONLY

DRAWING NO. SK4050/32 REV. B

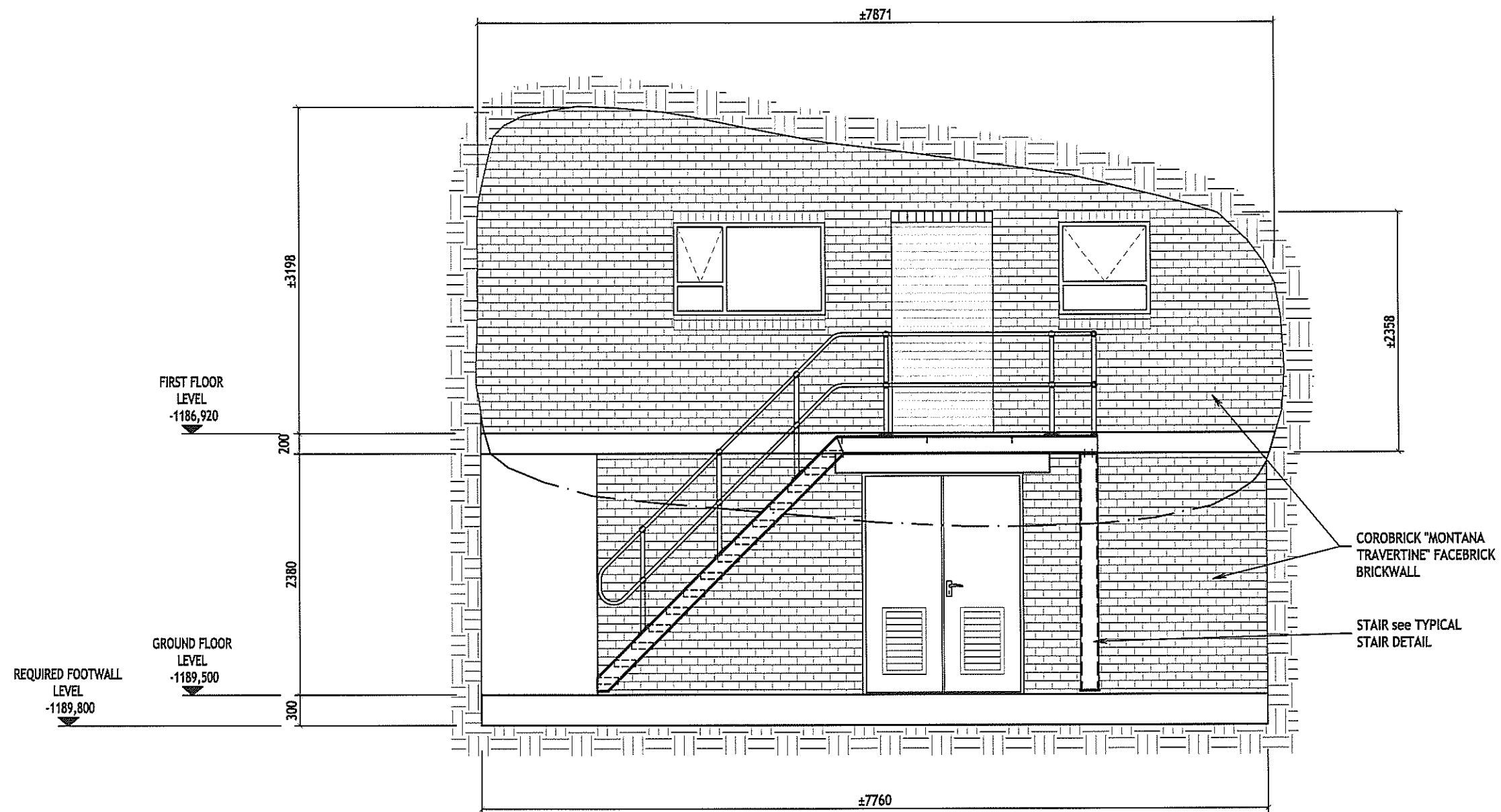


**FOR TENDER
PURPOSES ONLY**

NOTES 1. FOR GENERAL NOTES SEE DRAWING -1	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN	CLIENT  JASSMANN MANGANESE BLACK ROCK MINE OPERATIONS	P.O. BOX 117 SK 13 TEL (053) 751 5555 FAX (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II	DRAWING NO. SK4050/33	REV. B					
	DRG NO.	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJ			PROJECT MANAGER		DATE	JAN 2023	SCALE	1 : 25 A1 1 : 50 A3	PROJECT ENGINEER		DESIGN BY			
			B	FOR TENDER PURPOSES ONLY	09/03/2023	CJ												DRAWING TITLE OFFICE & STORE AREA SECTION 1		
																		DRAWING NO. SK4050/33	REV. B	

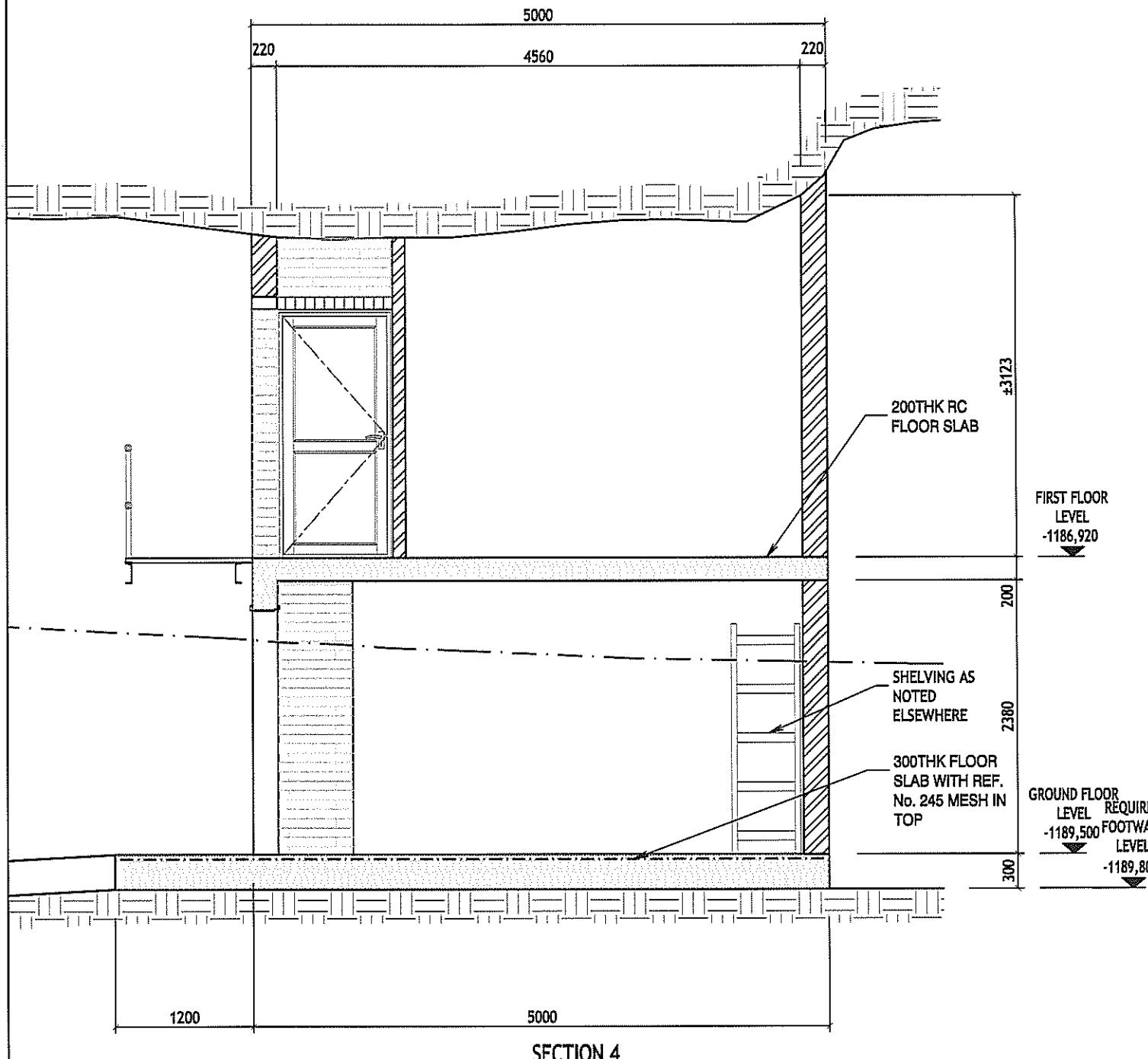


**FOR TENDER
PURPOSES ONLY**



**FOR TENDER
PURPOSES ONLY**

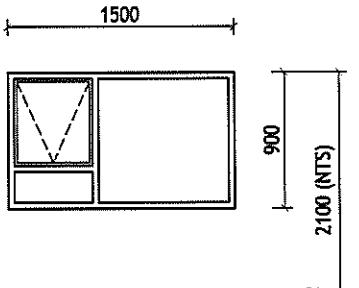
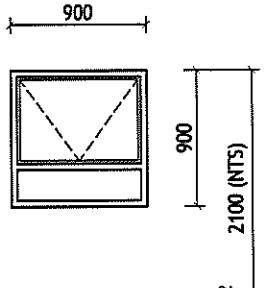
NOTES 1. FOR GENERAL NOTES SEE DRAWING -1	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN	CLIENT  ASSMANG MANCANESE BLACK ROCK MINE OPERATIONS	P.O. BOX 187 SK 107 TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS		PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II	STABILIS Development(Pty)Ltd 13 Bishops Ave. Sanlam Complex Building D KIMBERLEY Tel. (053) 833 1654 E-mail: reception@stabilis.co.za
	DRG NO.	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJJ			PROJECT MANAGER		DATE	JAN. 2023	1 : 25	A1	
	SK-—		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ			SCALE		1 : 50	A3	DRAWING TITLE OFFICE & STORE AREA SECTION 3		
									PROJECT ENGINEER		DESIGN BY				
									PROF. ENGINEER		REV. B				
									DRAWING NO.	SK4050/35					



SECTION 4

NOTE:
ALL ALUMINIUM DIMENSION
TO BE CONTROLLED ON SITE

DOORS	N0: D1	N0: D2
	<p>ELEVATION</p>	<p>PLAN</p>
DESCRIPTION	ALUMINIUM SINGLE DOOR WITH GLAZED PANELS COMPLETE WITH FRAME, DOOR HANDLES, 2 HINGES TOP & 1 HINGE BOTTOM NECESSARY RUBBER SEALS AS PER MANUFACTURER'S SPECIFICATIONS (COLOUR: STANDARD BRONZE) NOTE: ALL ALUMINUM SECTIONS TO CONFORM TO AAMSA & SYSTEM SUPPLIER STANDARDS	<p>CONSTRUCTION</p> <p>JAMB</p> <p>LOCK</p> <p>FINISHING: JAMB</p> <p>FINISHING: DOOR</p>
GLAZING	6.38 LAMINATED CLEAR SAFETY GLASS ALL GLAZING MUST COMPLY WITH AAAMSA, SAGGA AND SANS 10400-N.	<p>TRANSFORMER DOOR, TYPE MV, DOOR OPENING TO INSIDE</p> <p>STANDARD PRERESSED STEEL; 1 FOR 230 WALL</p> <p>SUPPLIED LOCKSET WITH HANDLES INSIDE & OUTSIDE</p> <p>COLD GALVANIZED</p> <p>COLD GALVANIZED</p>
NO OFF REQUIRED	1 LH; 1 RH	NO OFF REQUIRED

WINDOWS	NO: W1	NO: W2
	 <p>1500</p> <p>900</p> <p>2100 (NTS)</p> <p>ufl</p>	 <p>900</p> <p>900</p> <p>2100 (NTS)</p> <p>ufl</p>
FRAME	TOP HUNG OPEN OUT; ALUMINIUM WINDOW COMPLETE WITH ALL NECESSARY BEADING, RUBBER SEALS AND DRIP SECTIONS AS PER MANUFACTURER'S SPECIFICATIONS (COLOUR: STANDARD BRONZE)	TOP HUNG OPEN OUT; ALUMINIUM WINDOW COMPLETE WITH ALL NECESSARY BEADING, RUBBER SEALS AND DRIP SECTIONS AS PER MANUFACTURER'S SPECIFICATIONS (COLOUR: STANDARD BRONZE)
GLAZING	6.38 LAMINATED CLEAR SAFETY GLASS ALL GLAZING MUST COMPLY WITH AAAMSA, SAGGA AND SANS 10400-N.	6.38 LAMINATED CLEAR SAFETY GLASS ALL GLAZING MUST COMPLY WITH AAAMSA, SAGGA AND SANS 10400-N.
IRONMONGERY	CASEMENT HANDLE AND COVER PLATES WEDGELESS INWARDS STAINLESS STEEL SCREWS	CASEMENT HANDLE AND COVER PLATES WEDGELESS INWARDS STAINLESS STEEL SCREWS
NO OFF REQUIRED	3 OFF	1 OFF

H AAAMSA, SAGGA

PLATES
S STEEL SCREWS

**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1

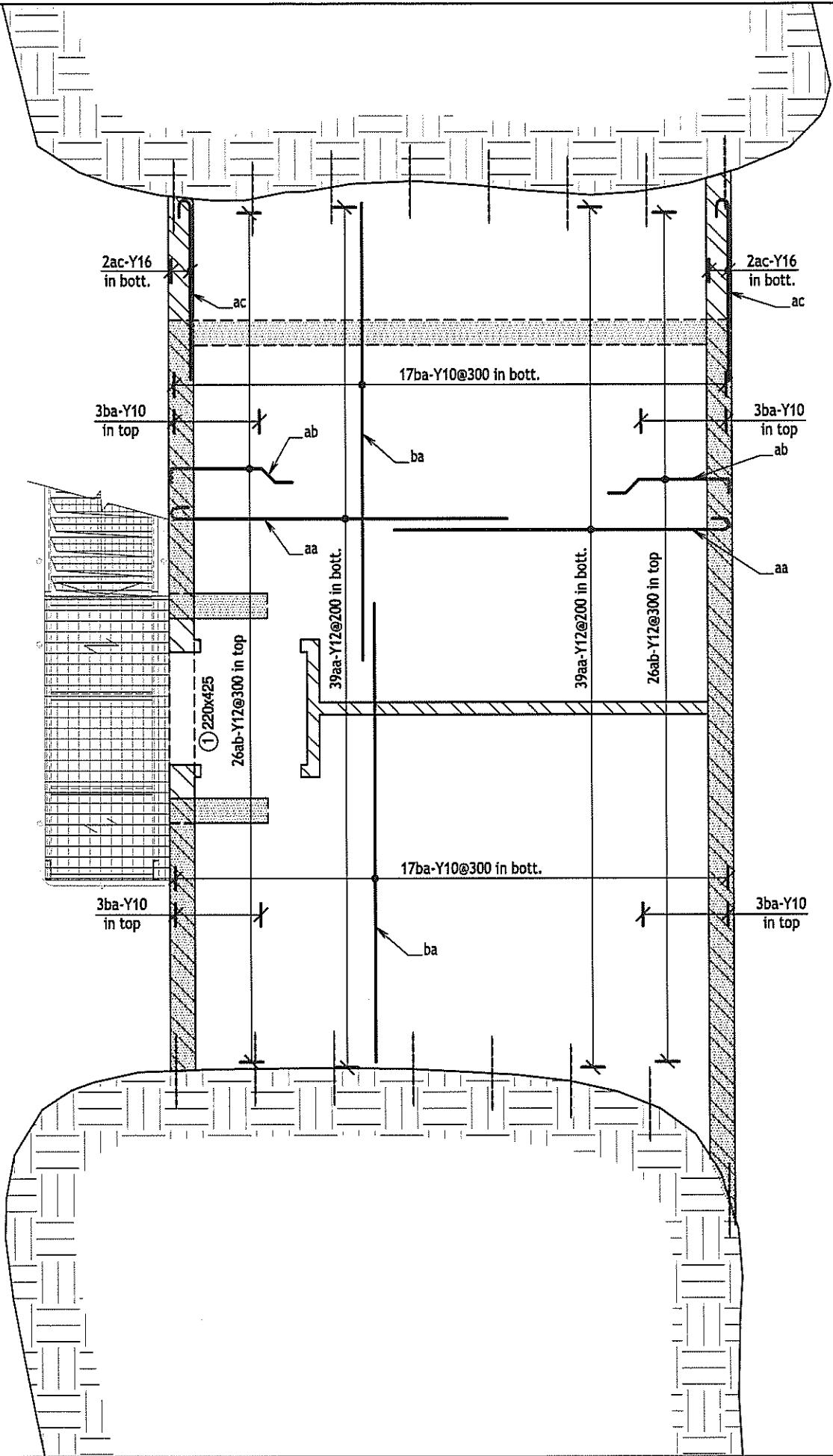


P.O. Box 117
MAY 10
TEL: (03) 731 5555
FAX: (03) 731 5251

APPENDIX
PROJECT
PROJECT

ROVAL T MANAGER	DATE	DRAWN BY	CHRIS		PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II	
			DATE			
			JAN. 2023			
F ENGINEER		SCALE	1 : 25	A1	DRAWING TITLE OFFICE & STORE AREA SECTION 4, WINDOW AND DOOR SCHEDULE	
			1 : 50	A3		
		DESIGN BY	<u>J. J.</u>			
		PROF. ENGINEER	<u>J. J.</u>			

STABILIS
Development(Pty) Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY Tel. (053) 833 1654
E-mail: reception@stabilis.co.za
DRAWING NO. SK4050/36 REV. B



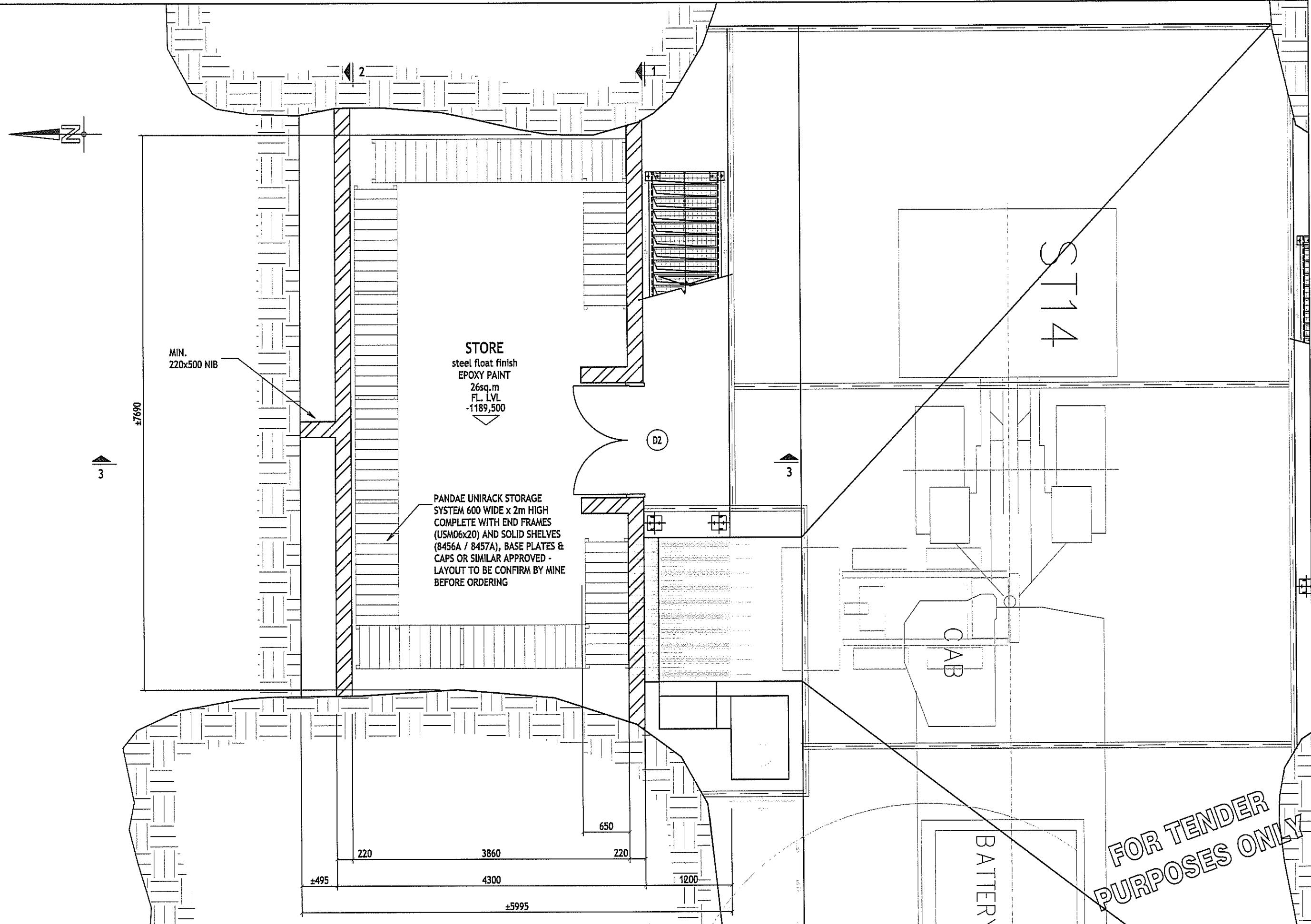
**FOR TENDER
PURPOSES ONLY**

NOTES

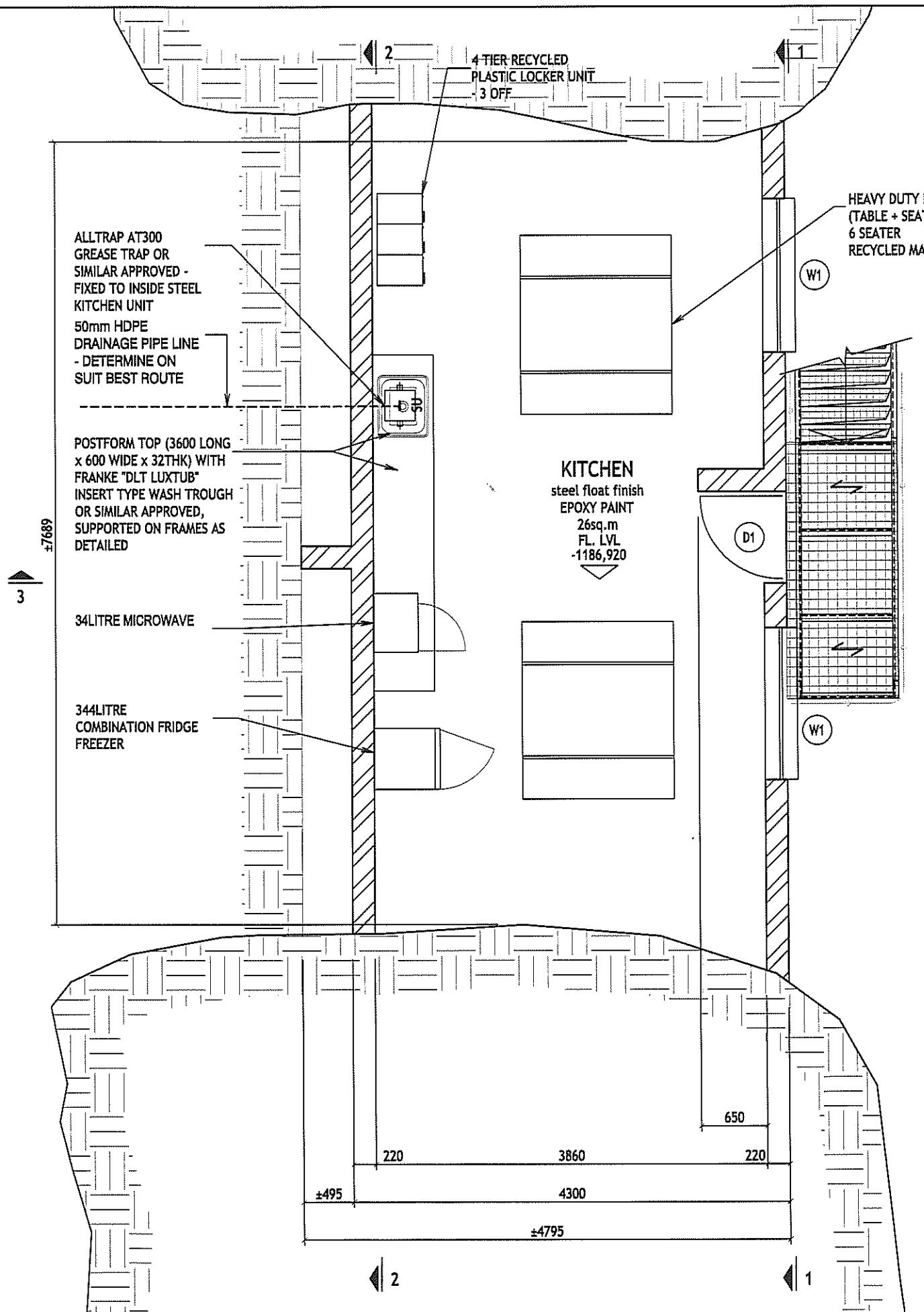
1. FOR GENERAL NOTES SEE DRAWING -1



P.O. Box 157 MANTON TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II	DRAWING TITLE OFFICE & STORE AREA FIRST FLOOR SLAB LAYOUT: STEEL PLACING AND BENDING SCHEDULE	DRAFTSMAN 13 Bishops Ave. Sanlam Complex Building D KIMBERLEY	STABILIS Development(Pty)Ltd
	PROJECT MANAGER		DATE	JAN 2023				
			SCALE	1 : 25 A4 1 : 50 A3				
			DESIGN BY					
PROJECT ENGINEER		PROF. ENGINEER		DRAWING NO.	SK4050/38	REV.	A	



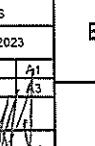
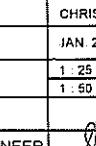
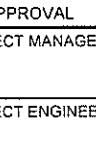
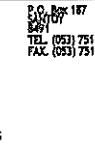
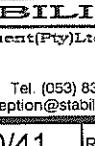
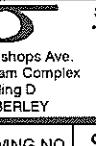
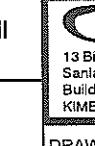
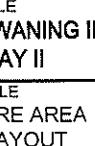
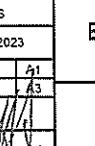
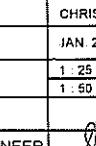
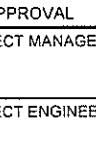
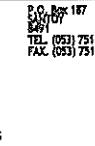
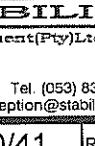
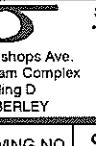
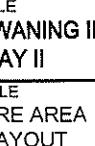
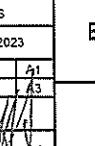
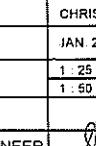
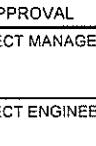
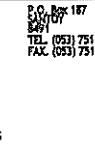
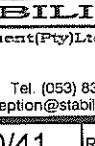
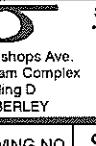
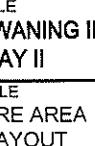
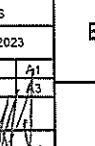
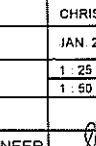
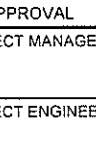
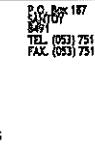
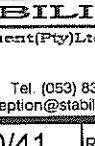
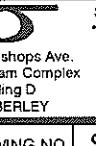
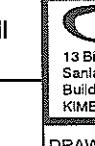
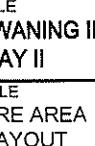
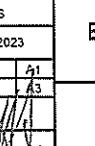
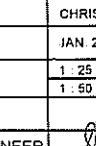
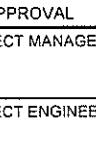
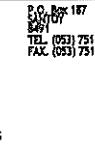
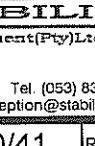
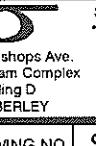
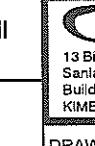
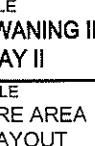
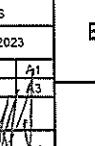
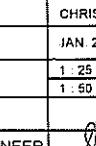
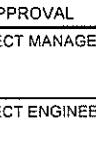
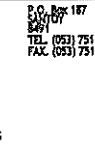
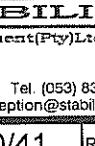
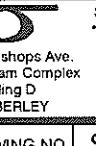
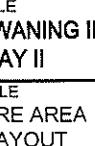
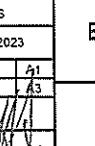
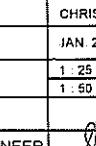
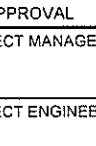
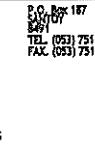
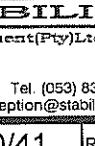
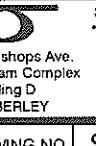
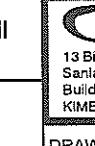
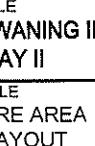
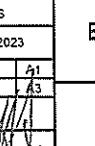
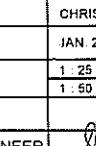
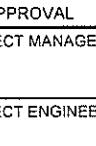
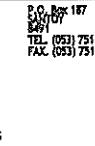
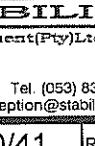
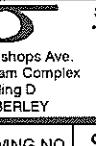
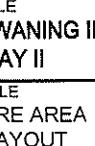
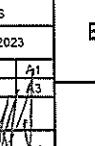
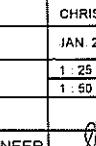
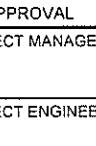
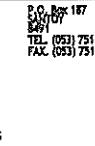
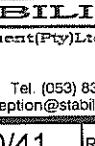
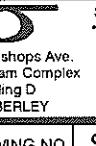
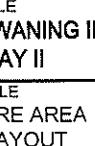
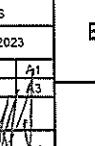
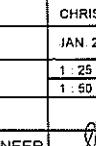
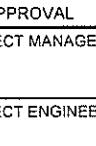
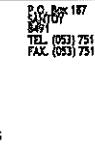
**FOR TENDER
PURPOSES ONLY**

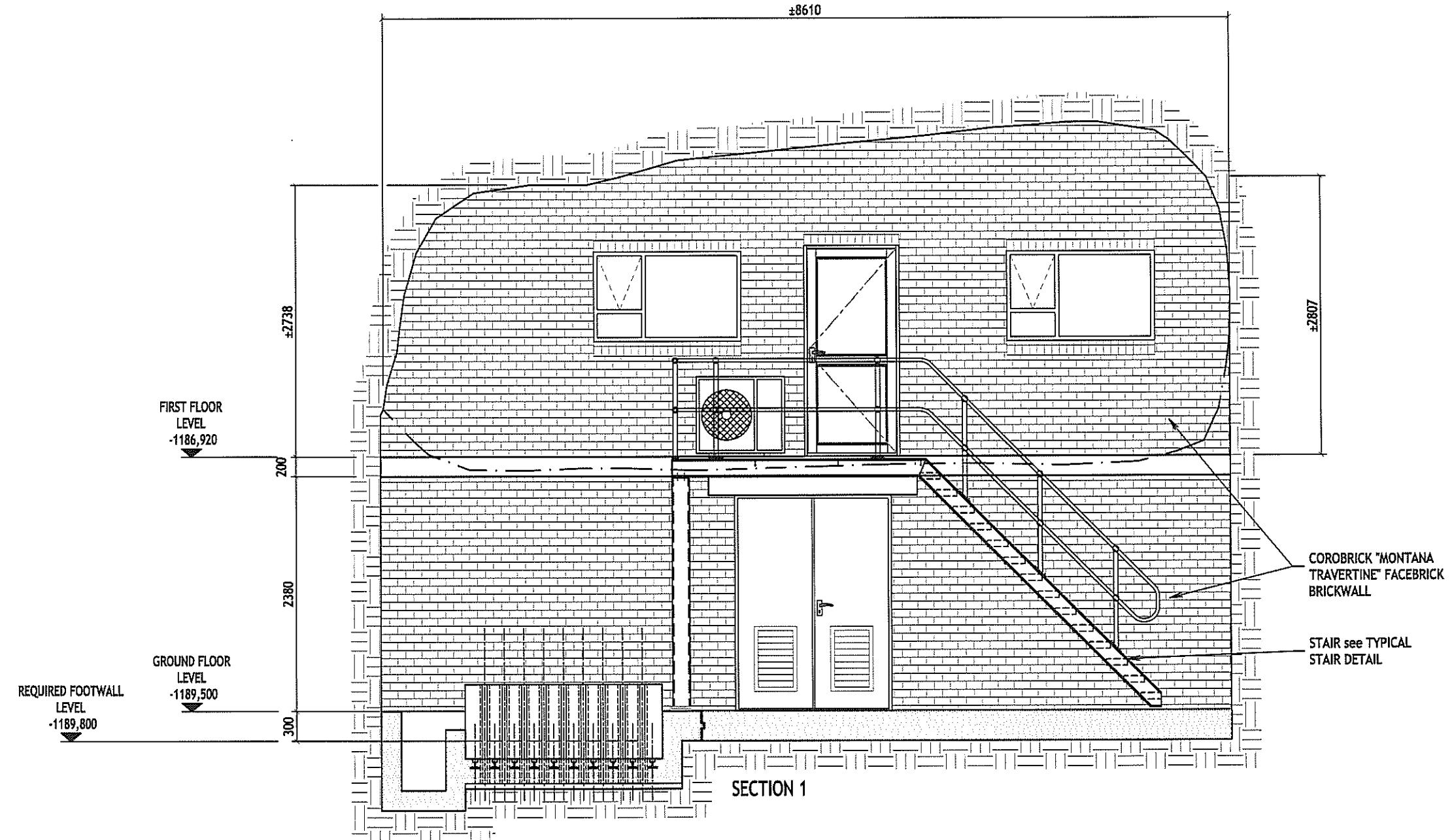


FOR TENDER
PURPOSES ONLY

NOTES
1. FOR GENERAL NOTES SEE DRAWING -1

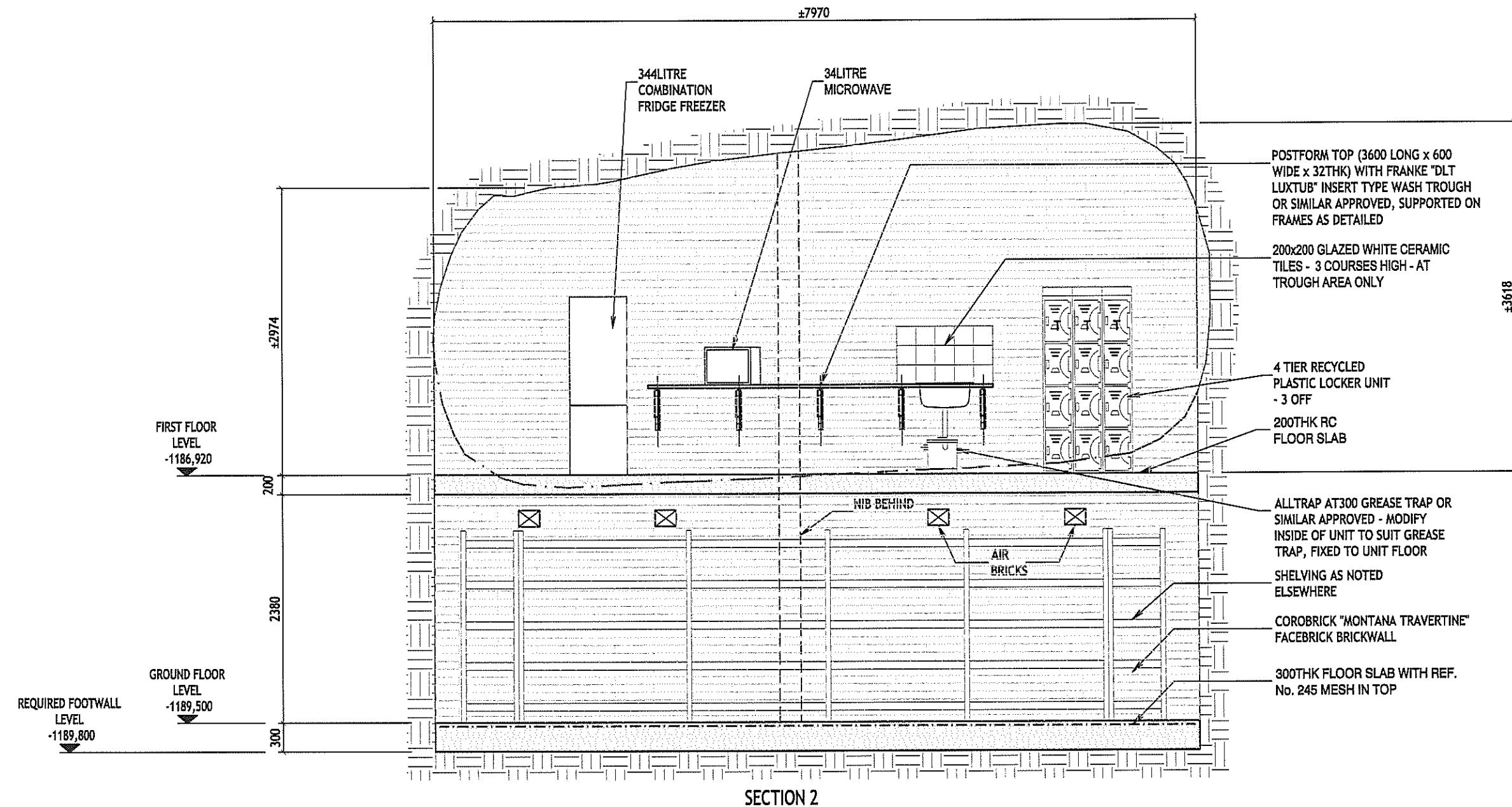
DRG NO.	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN
	TITLE					
SK-----	A FOR DESIGN REVIEW			20/02/2023	CJU	
	B FOR TENDER PURPOSES ONLY			09/03/2023	CJU	





**FOR TENDER
PURPOSES ONLY**

NOTES 1. FOR GENERAL NOTES SEE DRAWING -/1	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN	CLIENT	DRAWN BY	APPROVAL	DATE	CHRIS	PROJECT TITLE
	DRG NO.	TITLE							PROJECT MANAGER	DATE	TEL (053) 731 5255	BLACKROCK: NCHWANING III CHARGING BAY II
	SK-/-			B	09/03/2023	CJ				JAN 2023	FAX (03) 731 5251	
									SCALE	1 : 25	A1	
									1 : 50	A3		
								PROJECT ENGINEER	DESIGN BY			DRAWING TITLE
									PROF. ENGINEER			TEAROOM & STORE AREA SECTION 1
												DRAWING NO. SK4050/43 REV. B
												13 Bishops Ave. Sanlam Complex Building D KIMBERLEY
												Tel. (053) 833 1654 E-mail: reception@stabilis.co.za



FOR TENDER PURPOSES ONLY

NOTES
1 FOR GENERAL NOTES SEE DRAWING -1

DRG NO.	REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN
SK—/—	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJU
		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJU



CLIENT

P.O. Box 187
SAFETY
TEL: (053) 751 5555
FAX: (053) 751 5251

PROJECT MANAGER	DATE	DRAWN BY	CHRIS
	DATE	JAN. 2023	
	SCALE	1:25 A1	

PROJECT ENGINEER	DESIGN BY	PROF. ENGINEER	

PROJECT TITLE
BLACKROCK: NCHWANING III CHARGING BAY II
DRAWING TITLE
TEAROOM & STORE AREA SECTION 2

STABILIS
Development(Pty) Ltd
13 Bishops Ave
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za



Development(Pty) Ltd

13 Bishops Ave

Sanlam Complex

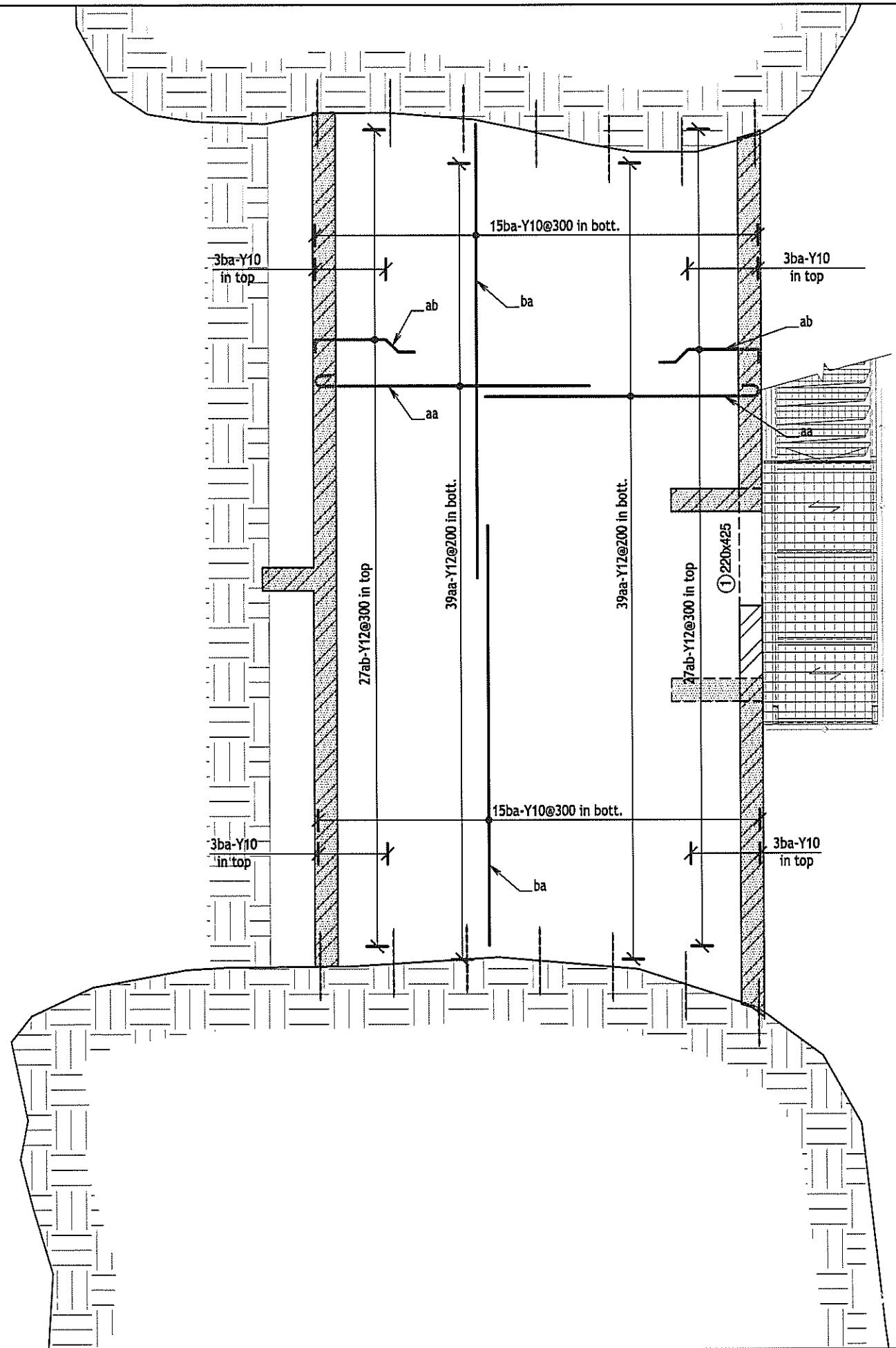
Building D

KIMBERLEY

Tel: (053) 833 1654

E-mail: reception@stabilis.co.za

DRAWING NO. SK4050/44 REV. B



POSITION PLASING	BAR - STAAF			NO. OFF AANTAL		SKETS MET AFMETINGS DIMENSIONED SKETCH	MASSA MASS		
	MARK MERK	DIA LENGTE	IN EA IN ELK	TOTAL TOTAAL					
TEAROOM & STORE AREA									
GROUND FLOOR SLAB									
1 OFF				-	51m ²	REF. No. 245 MESH			
	st	R10	850	-	48				
FIRST FLOOR SLAB									
200 THK	aa	Y12	2800	-	78				
1 OFF	ab	Y12	1250	-	54				
	ba	Y10	4400	-	42	straight			
	dowels	Y16	700	-	14	straight			
BEAM									
BEAM 1	t	Y12	2150	-	2				
220x425	b	Y12	2300	-	2				
1 OFF	s	R8	1300	-	10				
				375	170				
2000									
140									
2000									
10s @ 220									
t t									
b b s									

NOTES
1. FOR GENERAL NOTES SEE DRAWING -/1

REFERENCE DRAWINGS

DRG NO. TITLE

No. REVISION

A FOR TENDER PURPOSES ONLY

DATE 08/03/2023

DRAWN C.JJ

CLIENT



P.O. Box 167

SAF

TEL: (031) 751 5255

FAX: (031) 751 5255

STABILIS

Development(Pty)Ltd

13 Bishops Ave.

Sanlam Complex

Building D

KIMBERLEY

Tel: (053) 833 1654

E-mail: reception@stabilis.co.za

PROJECT TITLE

BLACKROCK: NCHWANING III

CHARGING BAY II

DRAWING TITLE

TEAROOM & STORE AREA

FIRST FLOOR SLAB LAYOUT:

STEEL PLACING AND BENDING SCHEDULE

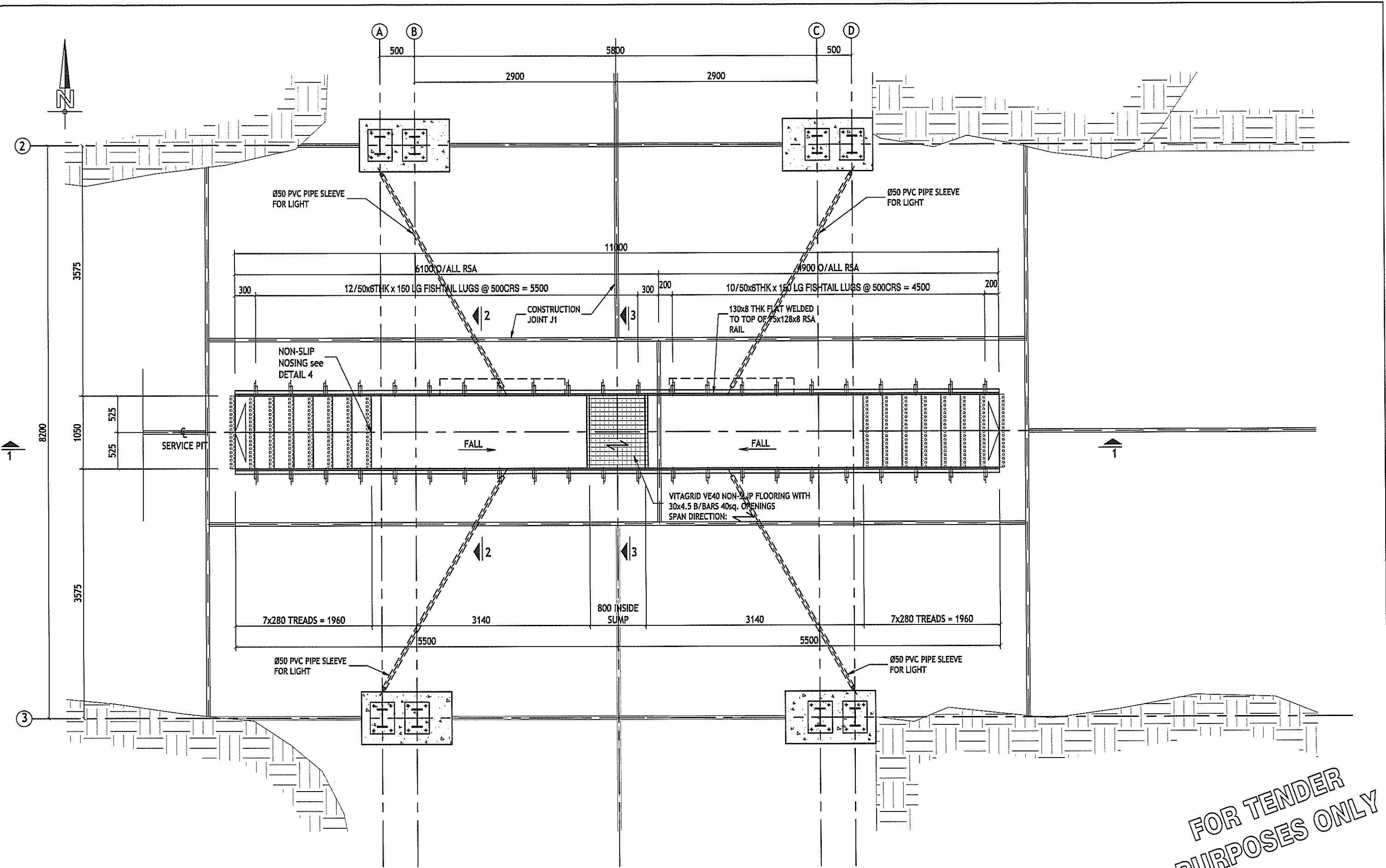
DRAWING NO.

SK4050/47

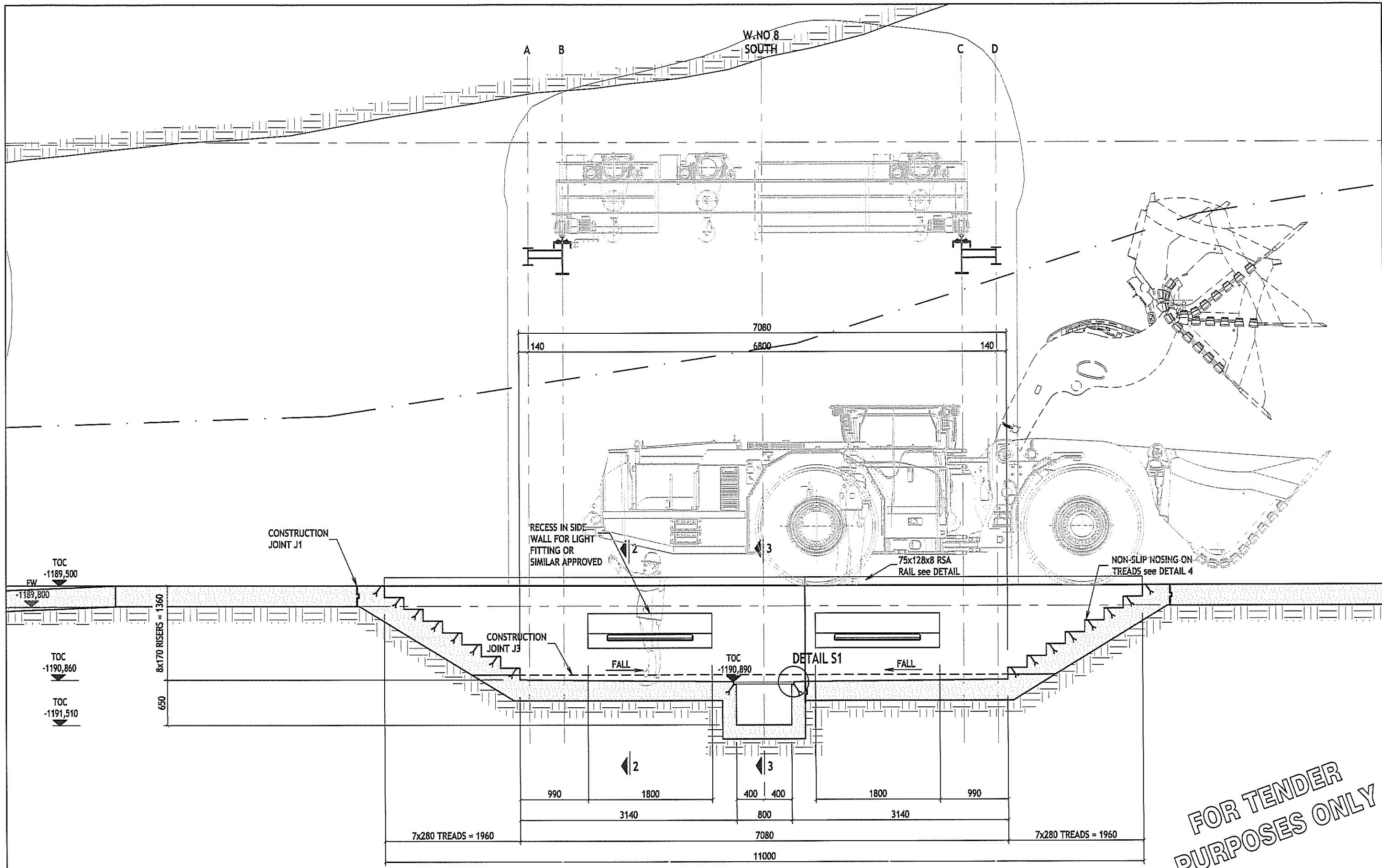
REV.

A

FOR TENDER
PURPOSES ONLY



FOR TENDER PURPOSES ONLY



**FOR TENDER
PURPOSES ONLY**

NOTES
1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE Poured UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
5. ALL EXPOSED EDGES TO HAVE 25x25 CHAMFER
6. ALL EXPOSED SURFACES TO HAVE OFF SHUTTER FINISH
7. TOC = TOP OF CONCRETE



CLIENT

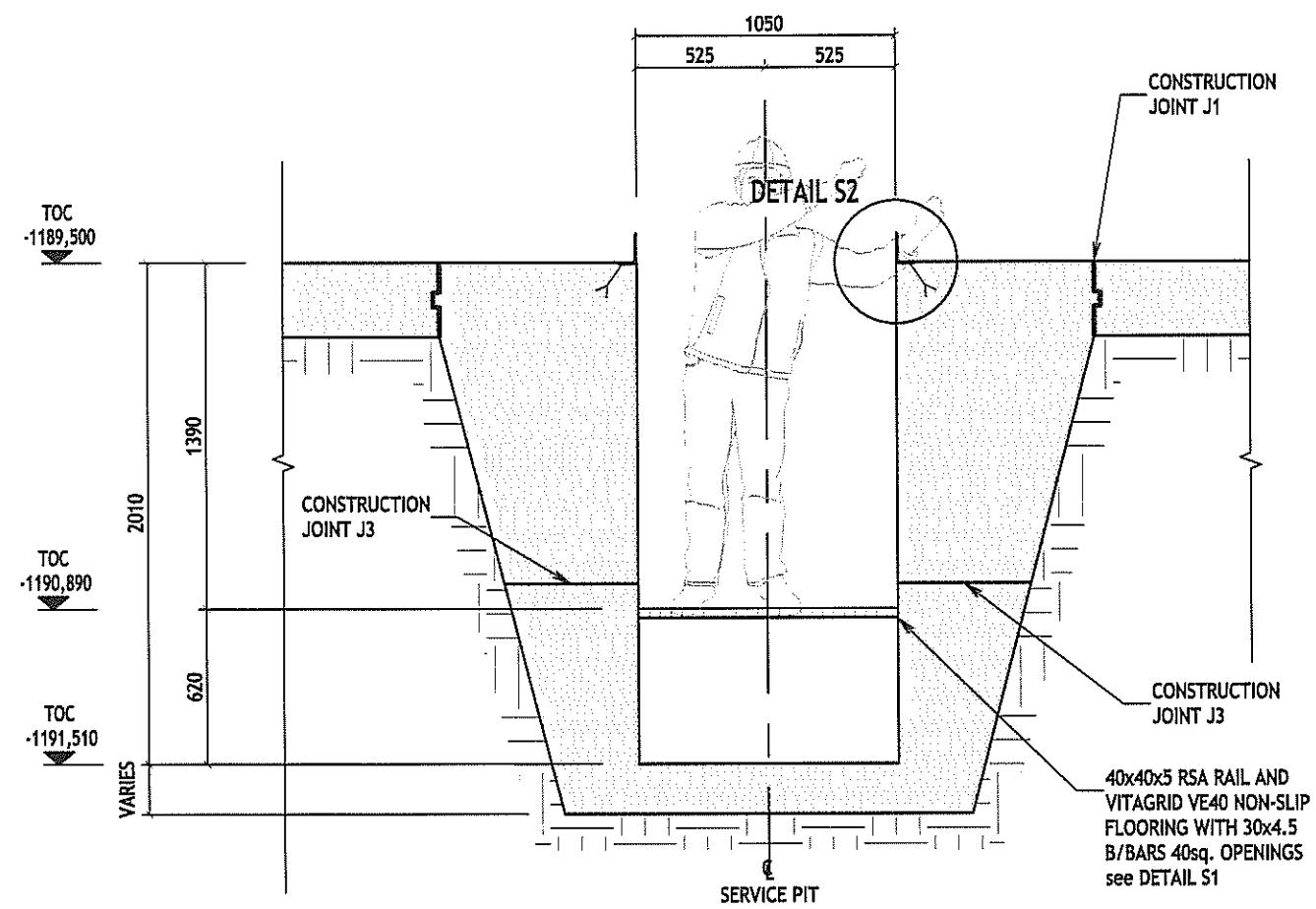
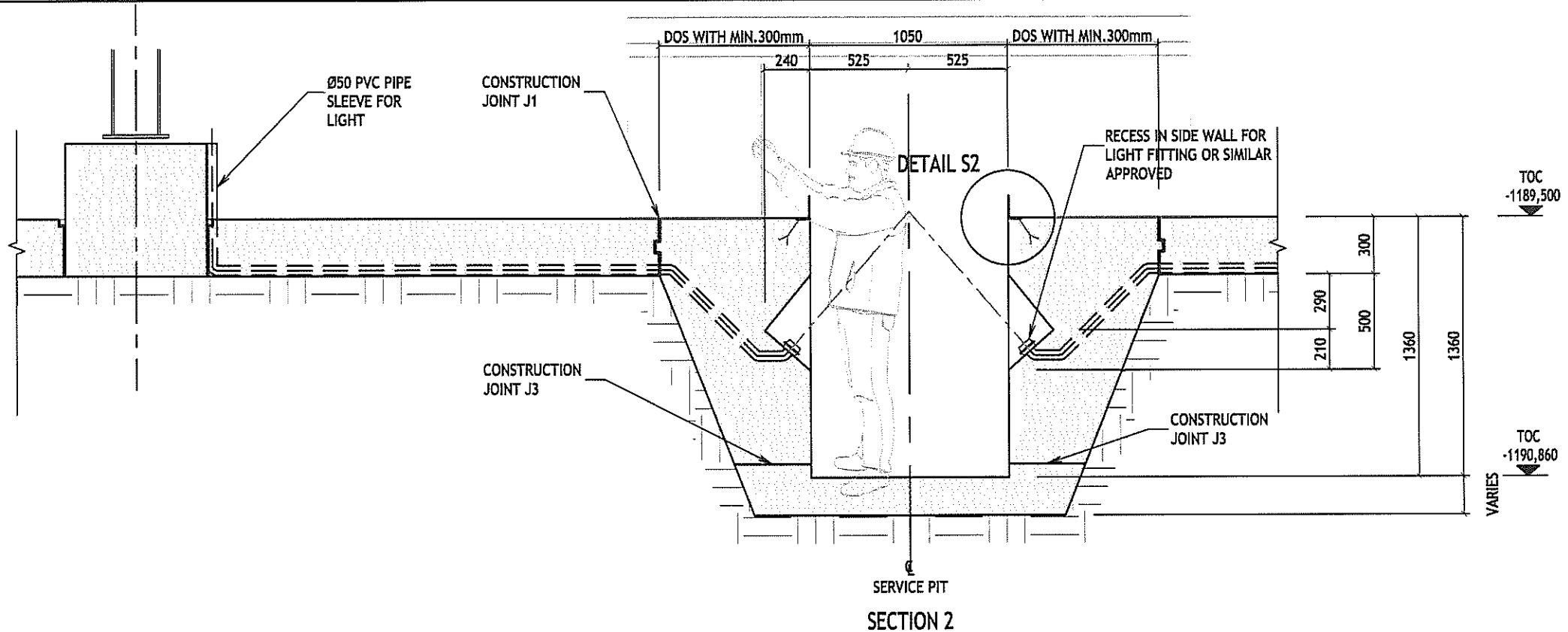
ASSMANG
MANGANESE
 BLACK ROCK MINE OPERATIONS

P.O. Box 187
WYOMING
TEL (303) 751 5555
FAX (303) 751 5251

PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

**DRAWING TITLE
SERVICE PIT
LAYOUT**

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za
DRAWING NO. SK4050/51 REV. C



**FOR TENDER
PURPOSES ONLY**

NOTES

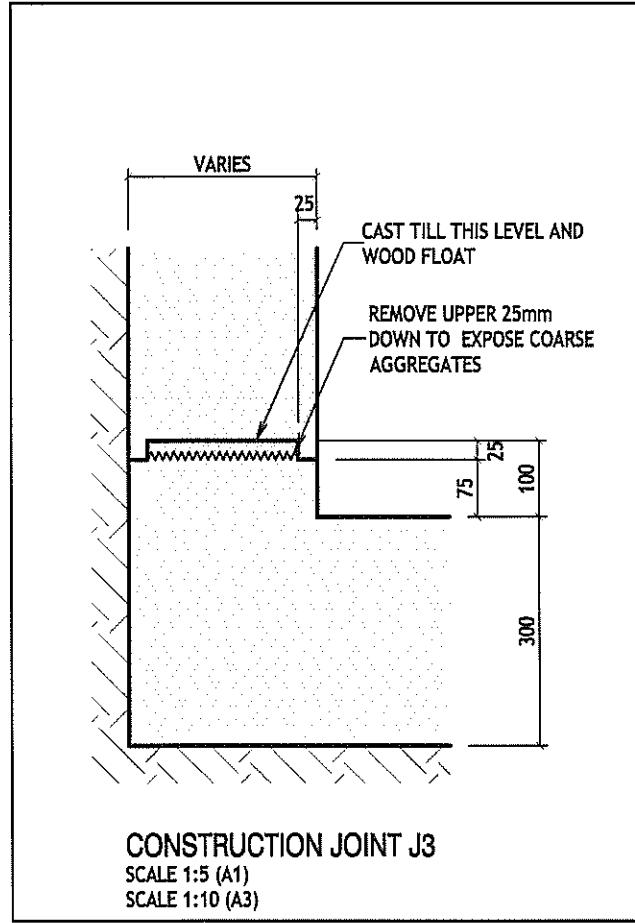
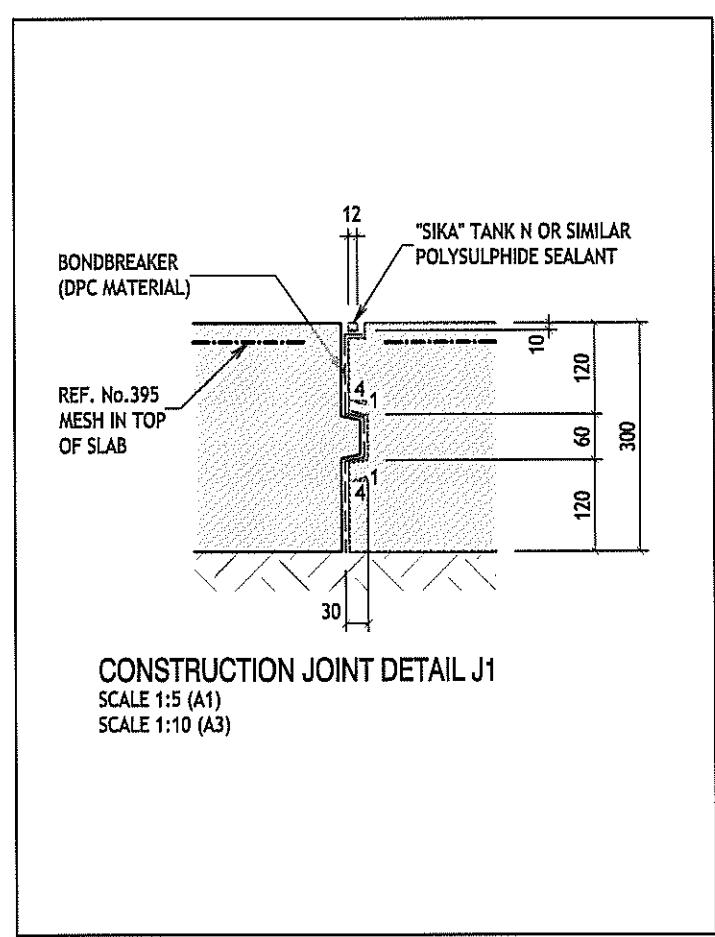
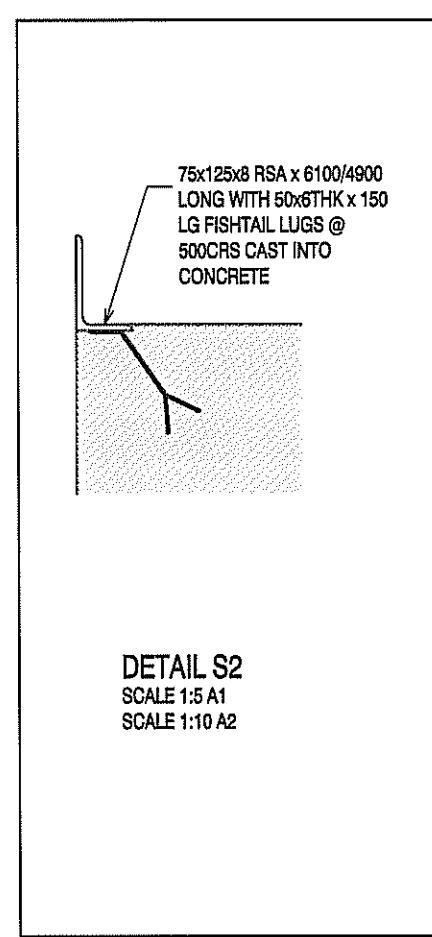
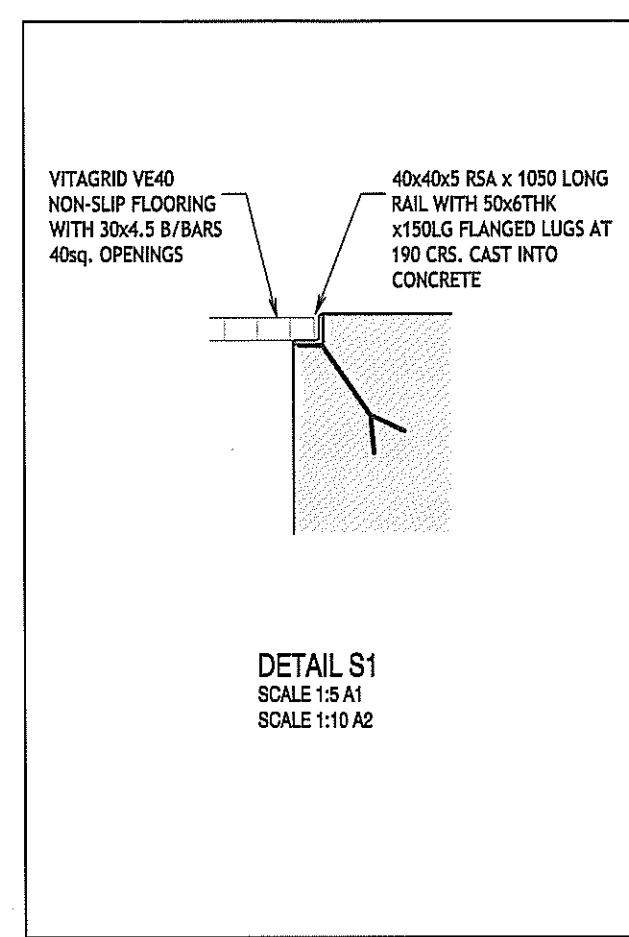
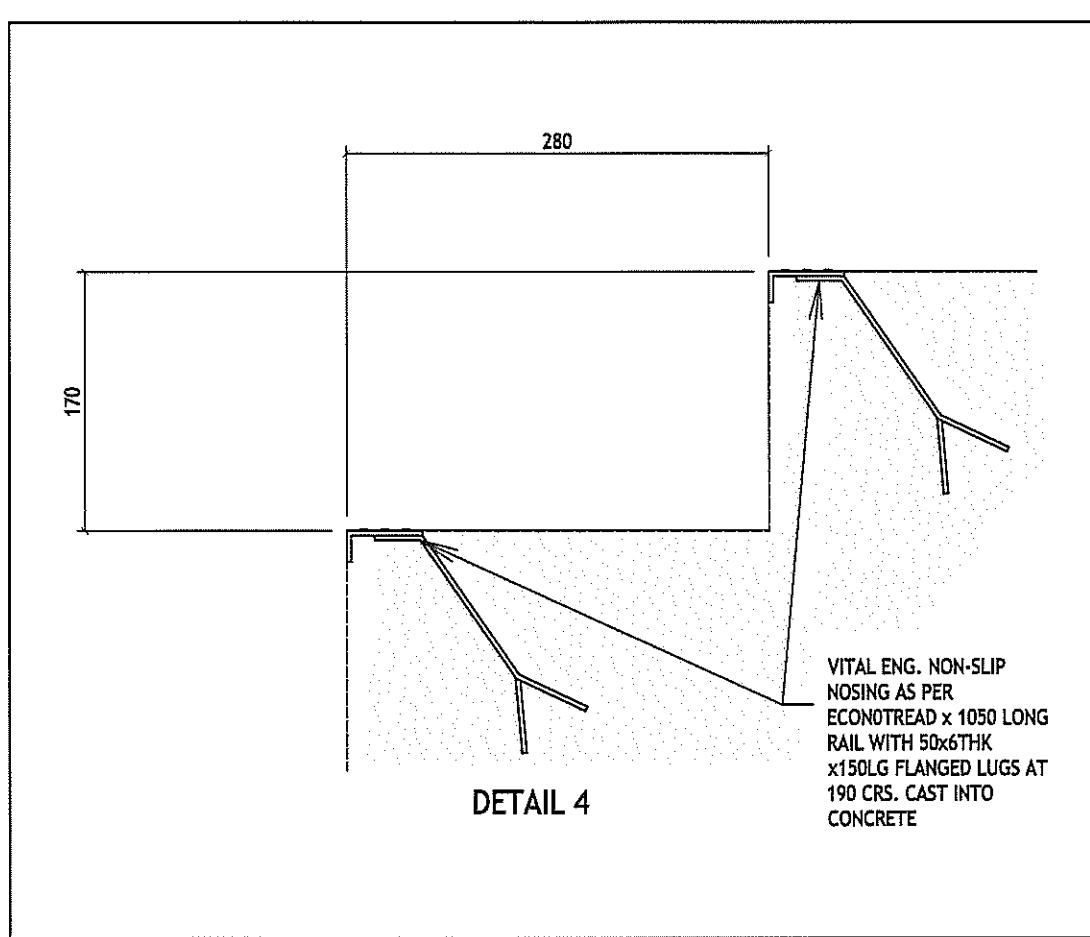
1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
5. ALL EXPOSED EDGES TO HAVE 25x25 CHAMFER.
6. ALL EXPOSED SURFACES TO HAVE OFF SHUTTER FINISH
7. TOC = TOP OF CONCRETE



 WANG ENGINEERING CO., LTD. MINING OPERATIONS	PROJ. NO. 167 SAVANT 8491 TELE: (033) 751-5555 FAX: (033) 751-5251	APPROVAL	DATE	DRAWN BY	CHRIS
	PROJECT MANAGER		DATE	JAN. 2023	
			SCALE	1 : 15	A
	PROJECT ENGINEER		DESIGN BY		
PROF. ENGINEER					

	PROJECT TITLE
	BLACKROCK: NCHWANING III
	CHARGING BAY II
1	DRAWING TITLE
3	

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za



**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -/1
2. ALL WELDS 6mm CONT. FILLET U.O.S
3. ALL STRUCTURAL STEEL TO BE GR S355JR U.O.S
4. ALL STEELWORK TO BE HOT DIP GALVANIZED

	DATE	DRAWN
	20/02/2023	CJJ
	09/03/2023	CJJ



P.O. Box 187
SAVANNAH
GA 31402
TEL. (912) 751 5555
FAX. (912) 751 5291

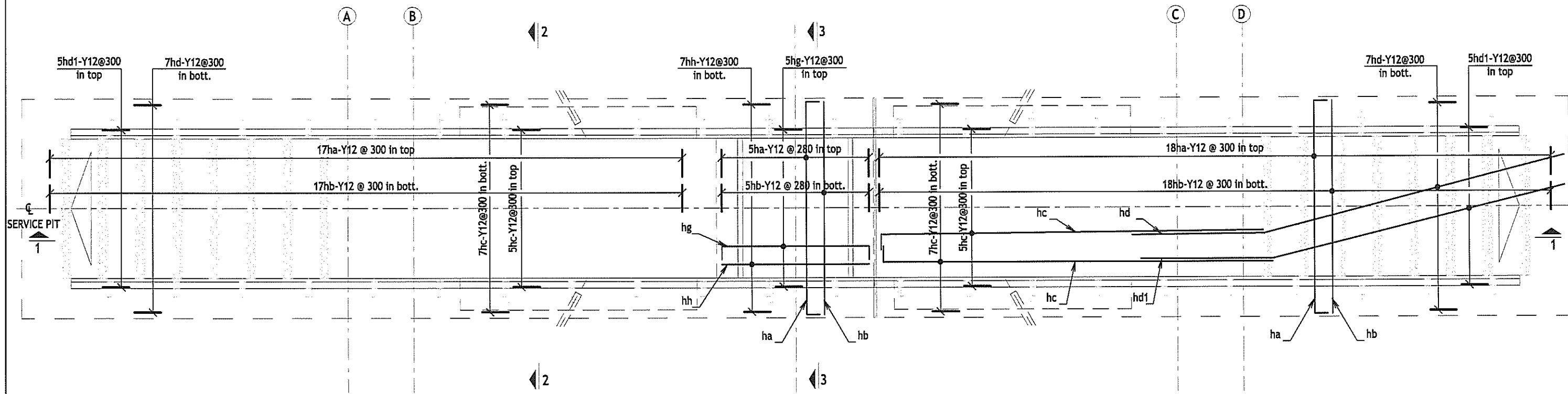
APPROVAL	DATE	DRAWN BY	CHRIS
OBJECT MANAGER		DATE	JAN. 2023
		SCALE	NTS A NTS A
OBJECT ENGINEER		DESIGN BY	
		PROF. ENGINEER	

PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

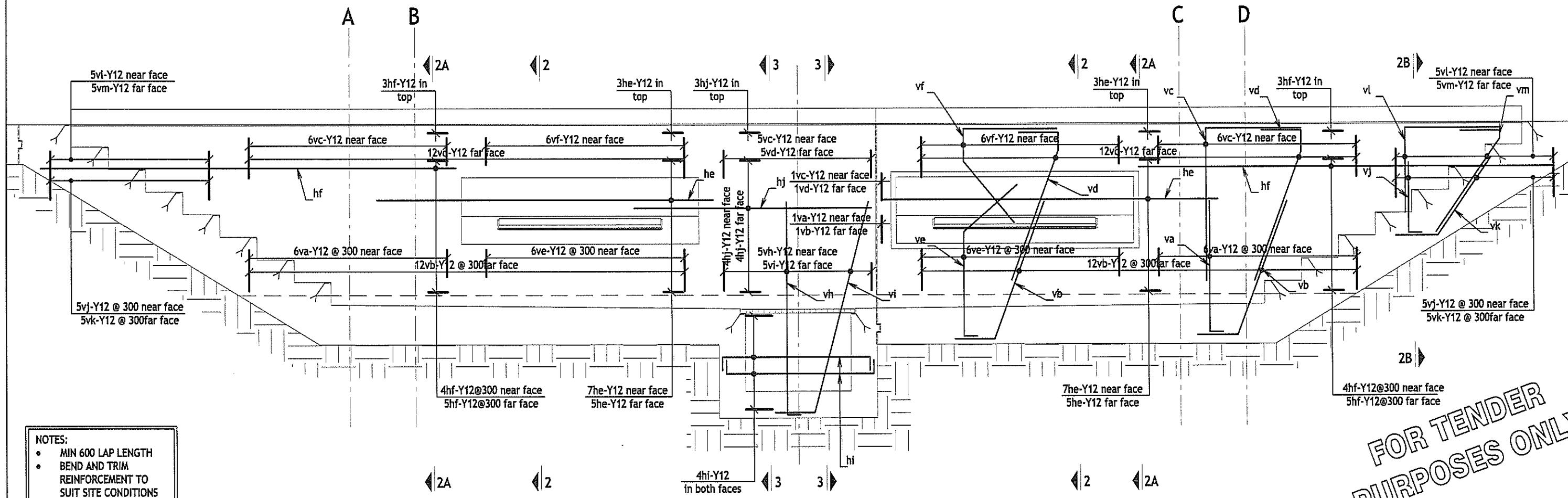
DRAWING TITLE
SERVICE PIT

DETAILS 4, S1 & S2





LAYOUT



NOTES:

- MIN 600 LAP LENGTH
- BEND AND TRIM REINFORCEMENT TO SUIT SITE CONDITIONS

**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCING STEEL HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED.
5. ALL EXPOSED EDGES TO HAVE 25x25 CHAMFER
6. ALL EXPOSED SURFACES TO HAVE OFF SHUTTER FINISH
7. TOC = TOP OF CONCRETE

ITEM NO. DESCRIPTION REMARKS	REFERENCE DRAWINGS		DRAWN BY CHECKED BY APPROVED BY DATE
	DRG NO.	TITLE	
	SK-1--		

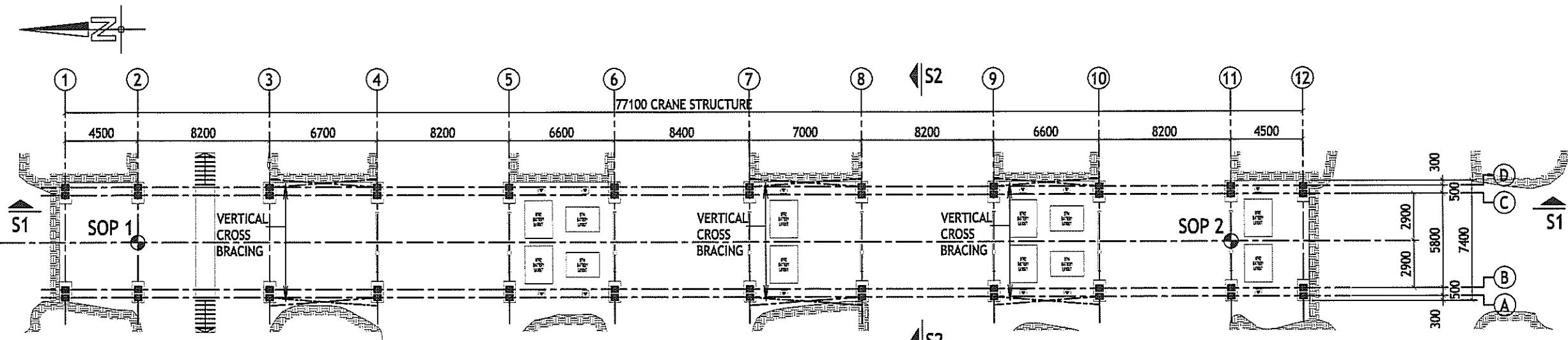


SECTION 1

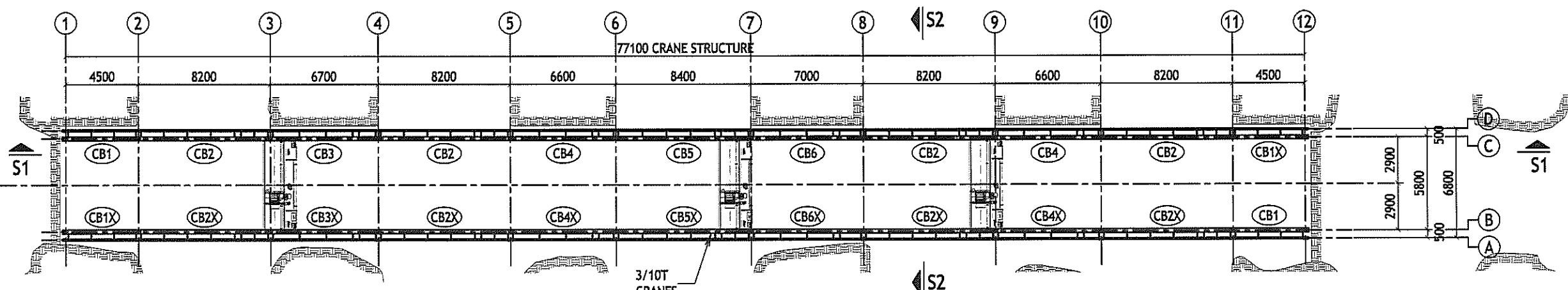
WN CLIENT

ASSMANG
 MANCANDE
 BLACK ROCK MINE OPERATIONS

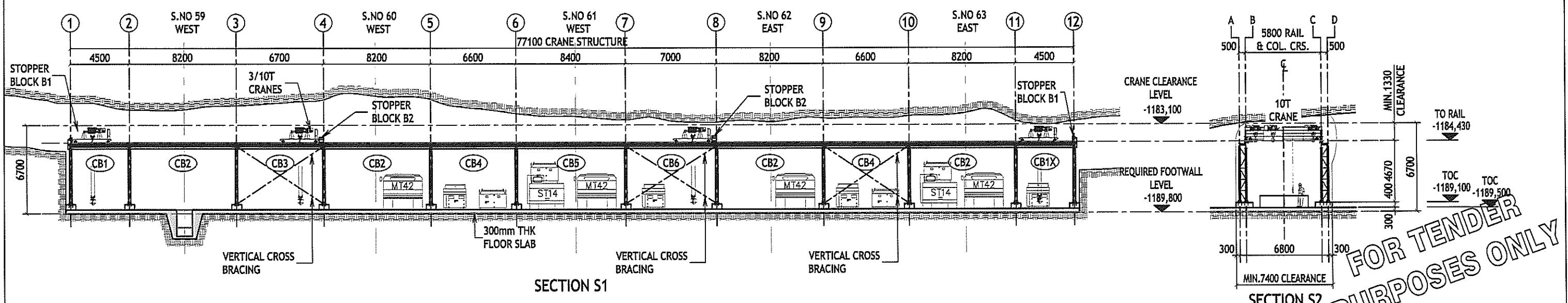
WN	CLIENT	PO BOX 187 MIDVALE TEL (031) 731 5555 FAX (031) 731 5351	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE	STABILIS
	 <p>ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS</p>	PROJECT MANAGER PROJECT ENGINEER		DATE		JAN. 2023	BLACKROCK: NCHWANING III CHARGING BAY II	 13 Bishops Ave. Santam Complex Building D KIMBERLEY
				SCALE	1 : 15	A1	DRAWING TITLE	Tel. (053) 833 1654
				DESIGN BY	1 : 30	A3	SERVICE PIT	E-mail: reception@stabilis.co.za
				PROF. ENGINEER			STEEL PLACING: LAYOUT & SECTION 1	DRAWING NO. SK4050/54 REV. A



PLAN ON CRANE STRUCTURE FOOTINGS



CRANES

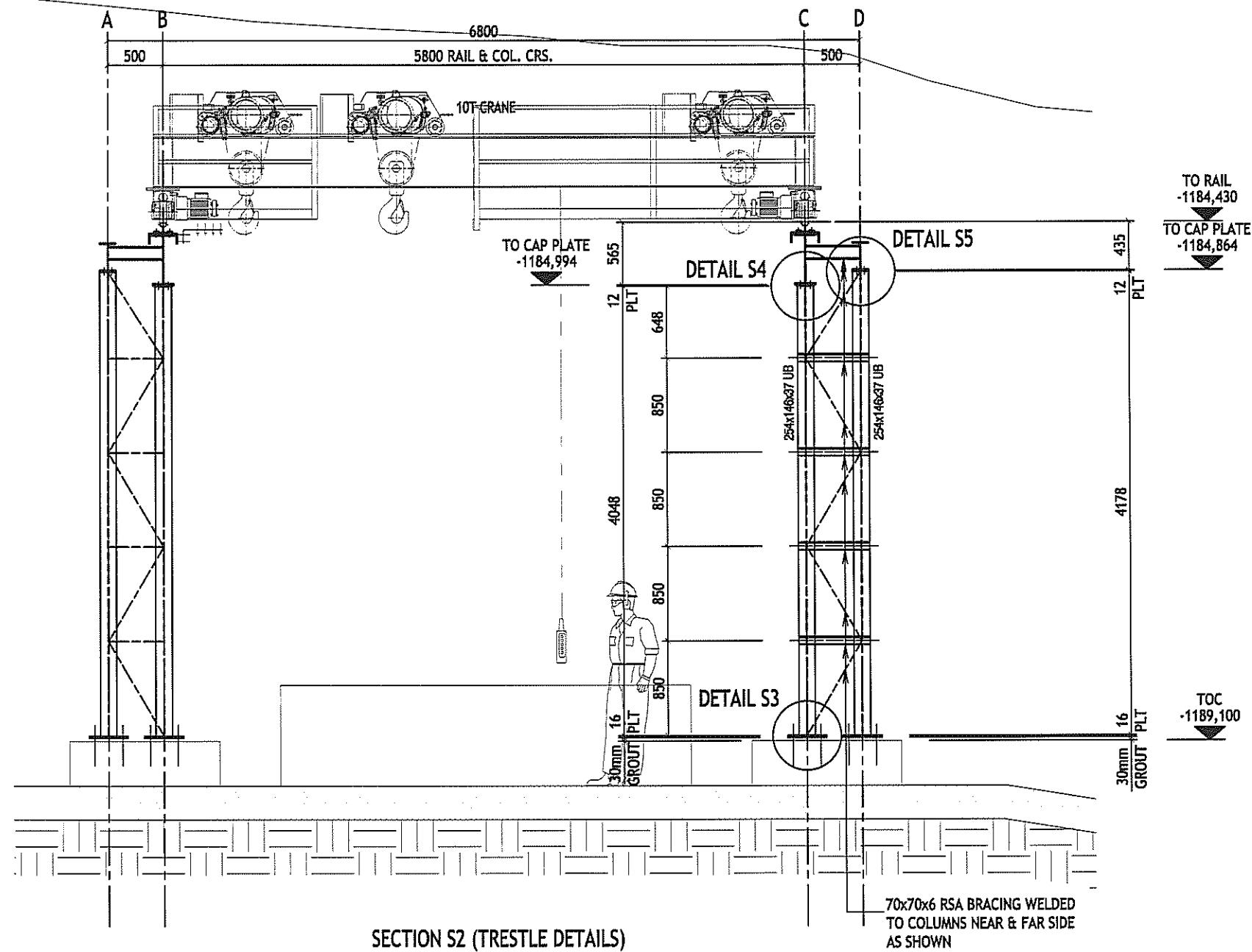


**FOR TENDER
PURPOSES ONLY**



 <p>ASGMANG Manganese BLACK ROCK MINE OPERATIONS</p>	P.O. Box 187 DOD B69 TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II DRAWING TITLE CRANE STRUCTURE GENERAL ARRANGEMENT
	PROJECT MANAGER		DATE	JAN. 2023		
			SCALE	1 : 150 A1	1 : 300 IA3	
	PROJECT ENGINEER		DESIGN BY			
PROF. ENGINEER						

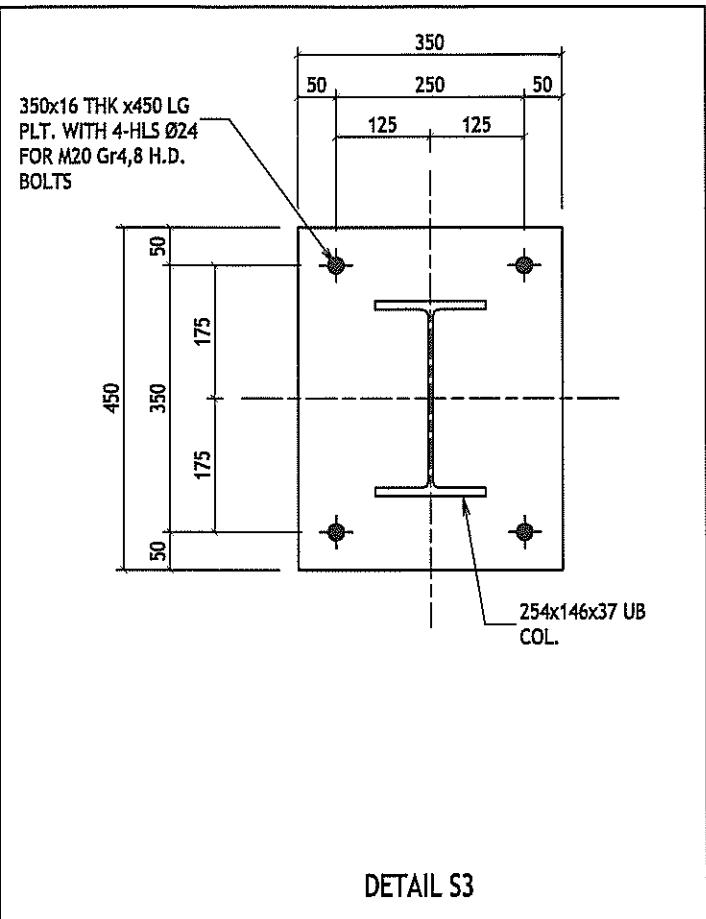
STABILIS
Development(Pty) Ltd.
13 Bishops Ave,
Sanlam Complex
Building D
KIMBERLEY Tel. (053) 833 1654
E-mail: reception@stabilis.co.za



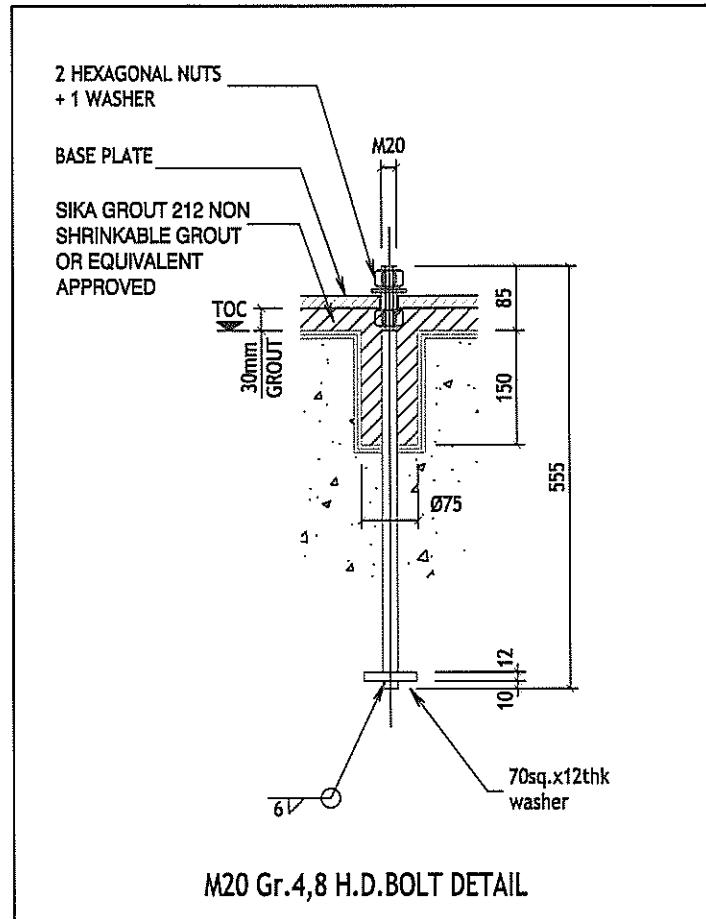
**FOR TENDER
PURPOSES ONLY**

NOTES

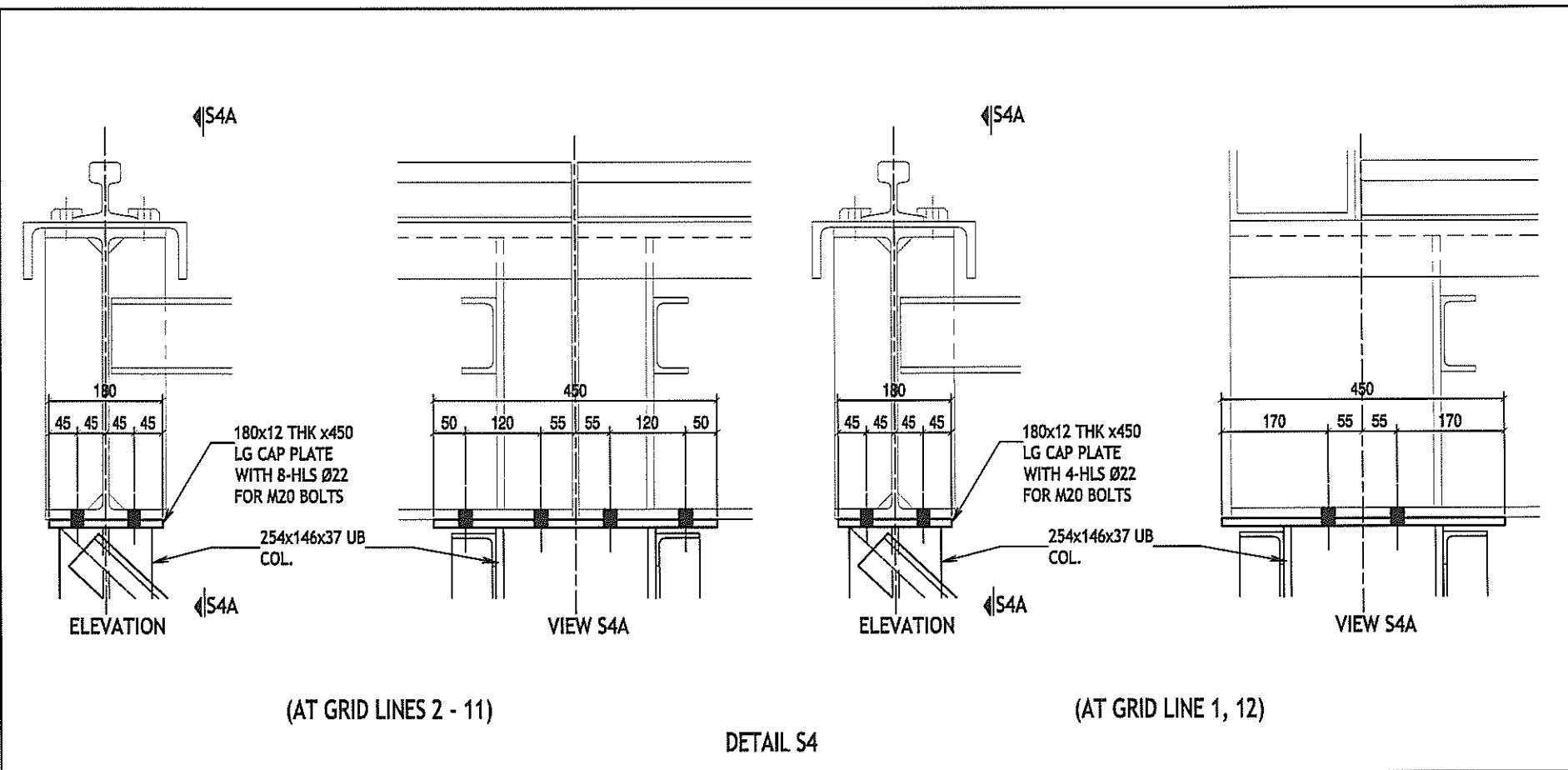
1. FOR GENERAL NOTES SEE DRAWING -1
2. ALL STEELWORK GR S355JR U.O.S.
3. ALL WELDS 6mm CONT. FILLET U.O.S.
4. ALL HOLES Ø22 FOR M20 G8.8 BOLTS U.O.S.
5. ALL STEELWORK TO BE HOT DIP GALVANIZED



DETAIL S3



M20 Gr.4.8 H.D. BOLT DETAIL



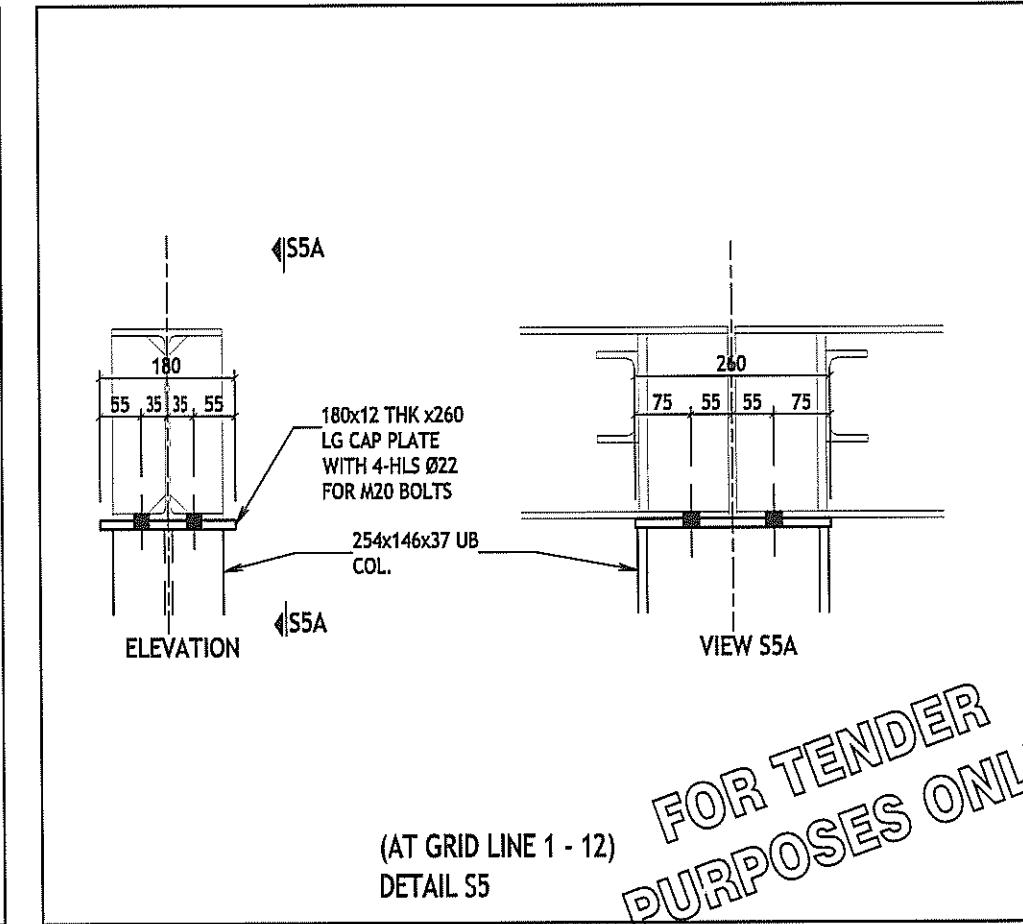
(AT GRID LINES 2 - 11)

DETAIL S4

(AT GRID LINE 1, 12)

ELEVATION

VIEW S4A

(AT GRID LINE 1 - 12)
DETAIL S5

NOTES	
1.	FOR GENERAL NOTES SEE DRAWING -1
2.	ALL STEELWORK GR S355JP U.O.S
3.	ALL WELDS 6mm CONT. FILLET U.O.S
4.	ALL HOLES Ø22 FOR M20 Gr4.8 BOLTS U.O.S
5.	ALL STEELWORK TO BE HOT DIP GALVANIZED

DRG NO	TITLE
SK-----	

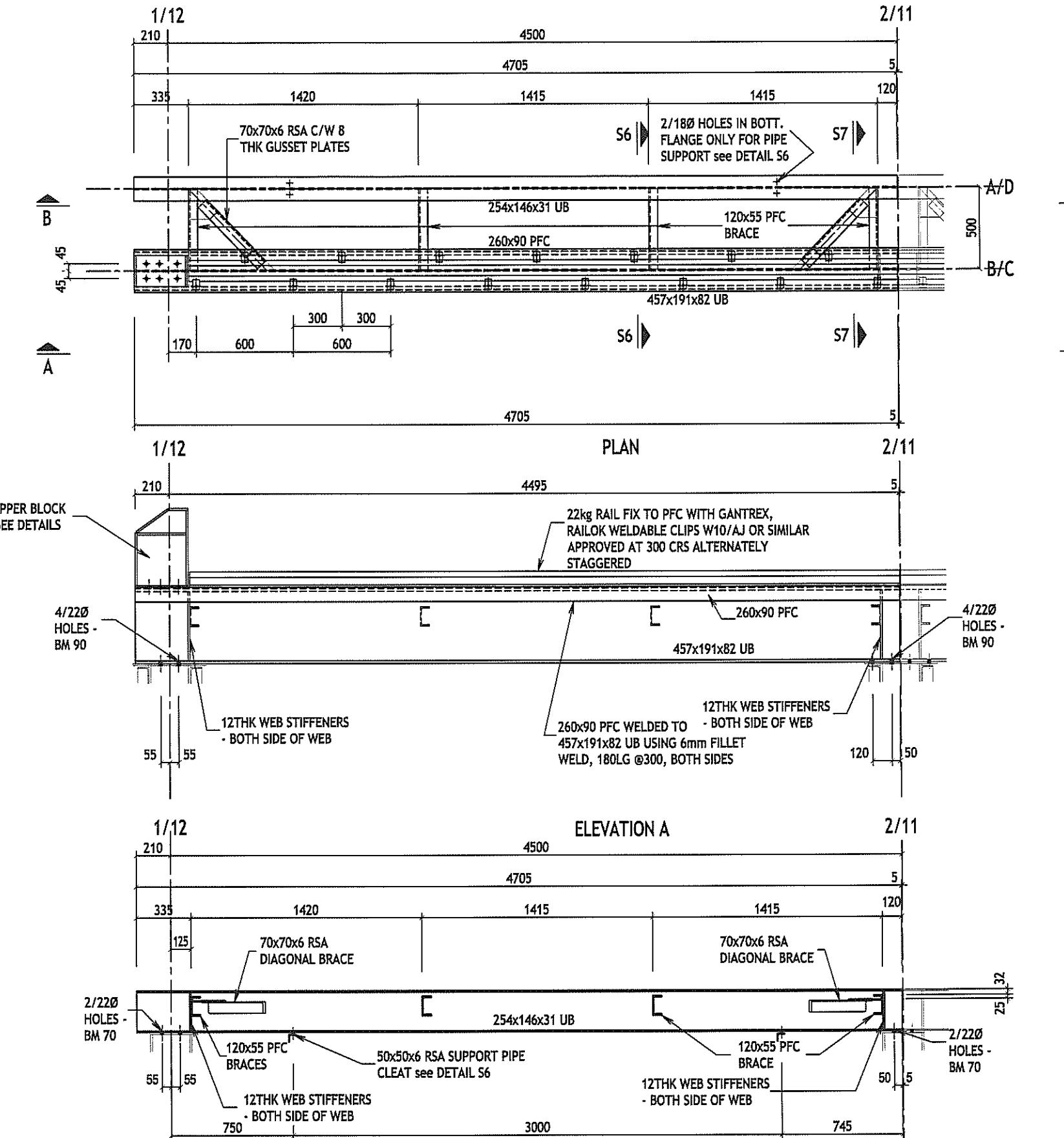
REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN	CLIENT	P.O. BOX 187 SAFETY TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE
	A	FOR DESIGN REVIEW	20/02/2023	CJU			PROJECT MANAGER		JAN. 2023		BLACKROCK: NCHWANING III CHARGING BAY II
	B	FOR TENDER PURPOSES ONLY	09/03/2023	CJU			SCALE		1 : 5 A1		



PROJECT ENGINEER	DESIGN BY	PROF. ENGINEER	DRAWING TITLE
			CRANE STRUCTURE DETAIL S3 - S5

DRAWING NO.	REV.
SK4050/62	B

STABILIS
Development(Pty) Ltd.
13 Bishops Ave,
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za



SECTION B
CRANE BEAM TYPE CB1
2 OFF REQ'D AS DRAWN (CB1)
2 OFF HANDED (CB1X)

NOTES
 1. FOR GENERAL NOTES SEE DRAWING -/1
 2. ALL STEELWORK GR S355JR U.O.S.
 3. ALL WELDS 6mm CONT. FILLET U.O.S.
 4. ALL HOLES Ø22 FOR M20 G18.8 BOLTS U.O.S.
 5. ALL STEELWORK TO BE HOT DIP GALVANIZED

DRG NO.	REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN	CLIENT	P.O. BOX 197 SAF TEL: (031) 751 5555 FAX: (031) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE
								PROJECT MANAGER	DATE	JAN 2023	A1	BLACKROCK: NCHWANING III CHARGING BAY II
SK-/-	TITLE					ASSMANG MANGANESE BLACK ROCK MINE OPERATIONS		SCALE	1 15	A1		DRAWING TITLE
									1 30	A3		CRANE STRUCTURE
								PROJECT ENGINEER	DESIGN BY	/ /		CRANE BEAM CB1
									PROF. ENGINEER	/ /		

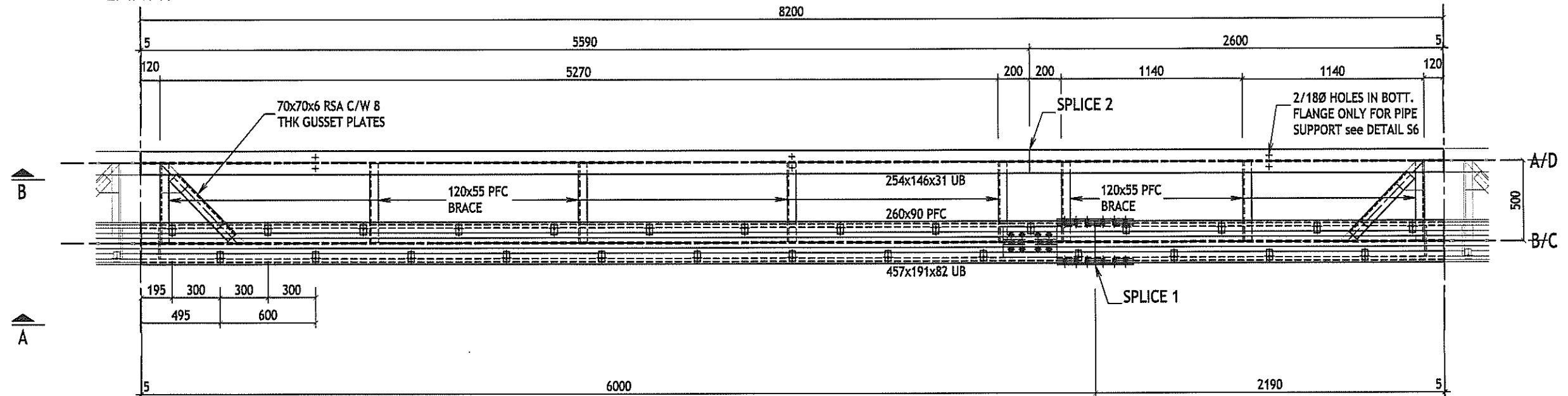
FOR TENDER
PURPOSES ONLY

STABILIS
Development(Pty) Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING NO. SK4050/63 REV. B

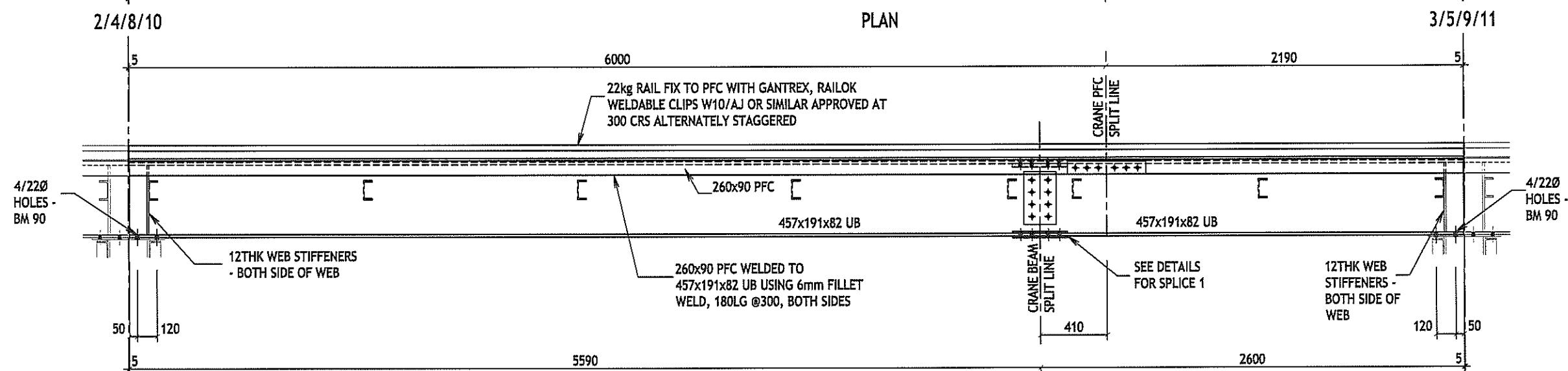
2/4/8/10

3/5/9/11



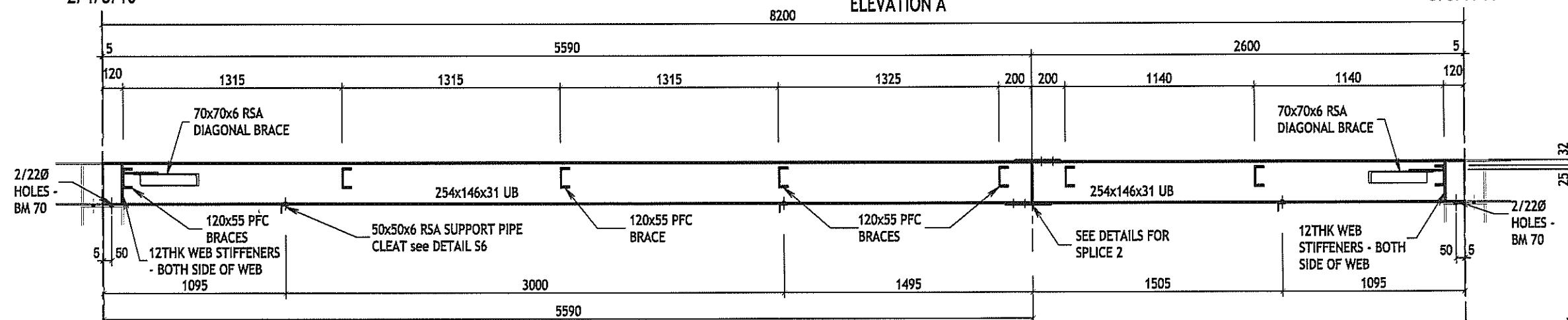
2/4/8/10

3/5/9/11



2/4/8/10

3/5/9/11



SECTION B

CRANE BEAM TYPE CB2

4 OFF REQ'D AS DRAWN (CB2)

4 OFF HANDED (CB2X)

FOR TENDER PURPOSES ONLY

NOTES	
1. FOR GENERAL NOTES SEE DRAWING -/1	
2. ALL STEELWORK GR S355JR U.O.S.	
3. ALL WELDS 6mm CONT. FILLET U.O.S	
4. ALL HOLES Ø22 FOR M20 Gr8.8 BOLTS U.O.S.	
5. ALL STEELWORK TO BE HOT DIP GALVANIZED	

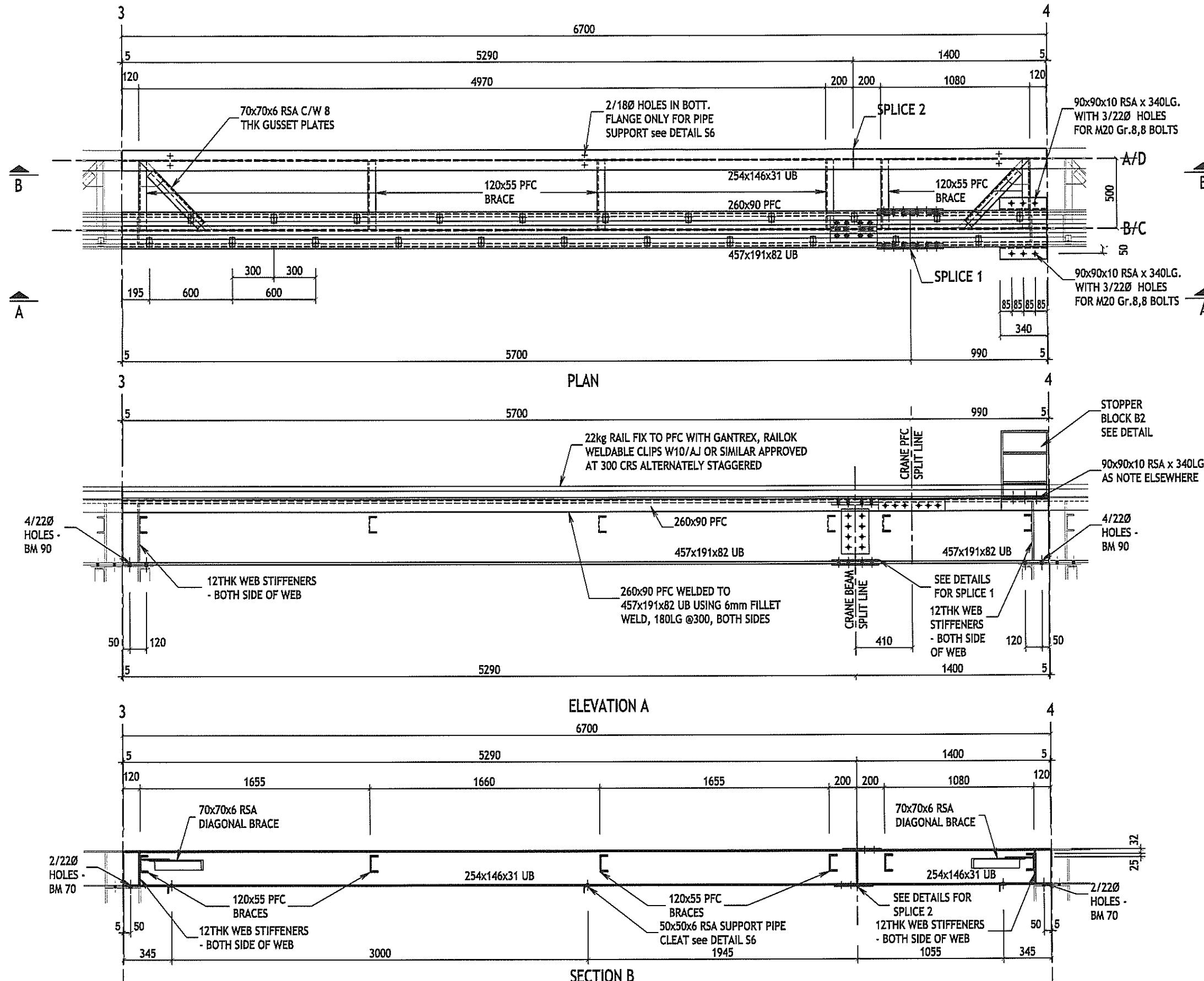
DRG NO.	REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN	CLIENT
SK-----		A	FOR DESIGN REVIEW	20/02/2023	GJ	
		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJU	
						P.O. Box 187 SAFETY TEL: (053) 751 5555 FAX: (053) 751 5251

PROJECT MANAGER	SCALE	APPROVAL	DATE	DRAWN BY	CHRIS
				JAN. 2023	
		1:15	A1	1:30	A3
PROJECT ENGINEER	PROF. ENGINEER	DESIGN BY			DRAWING TITLE
		SAC	L	SAC	CRANE STRUCTURE

PROJECT TITLE	
BLACKROCK: NCHWANING III CHARGING BAY II	
DRAWING TITLE	

DRAWING NO.	REV.
SK4050/64	B

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sandton Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za



SECTION B

CRANE BEAM TYPE CB3

1 OFF REQ'D AS DRAW

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. ALL STEELWORK GR S355JR U.O.S.
3. ALL WELDS 6mm CONT. FILLET U.O.S.
4. ALL HOLES Ø22 FOR M20 GR8.8 BOLTS U.O.S
5. ALL STEELWORK TO BE HOT DIP GALVANIZED



P.O. Box 187
SANTO DOMINGO,
D.R.
TEL. (053) 751 5555
FAX. (053) 751 5241

APPROVAL	DATE	DRAWN BY	CHRIS
CT MANAGER	DATE		JAN. 2
	SCALE		1 : 15 1 : 30
CT ENGINEER		DESIGN BY	

PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

DRAWING TITLE
CRANE STRUCTURE



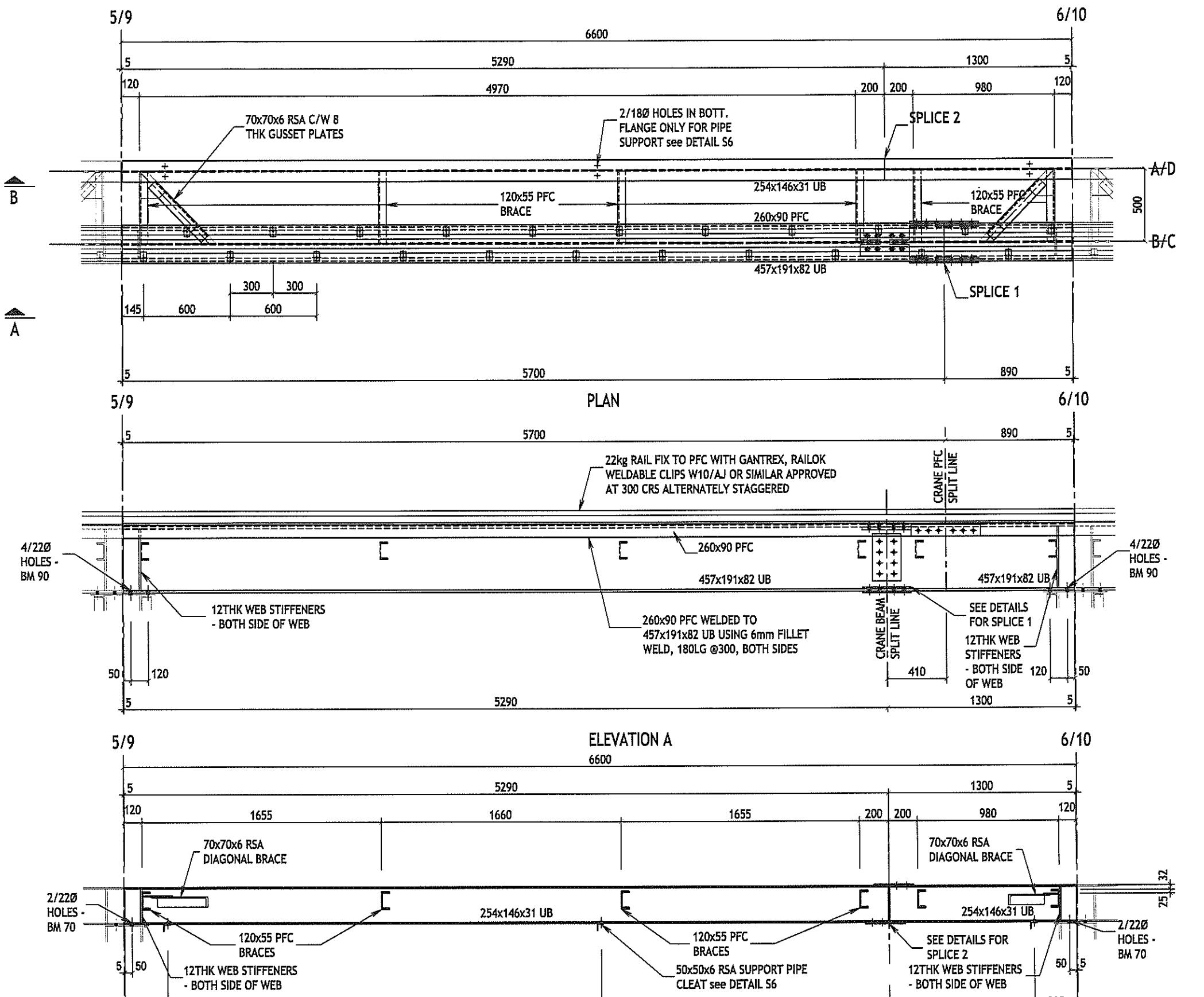
STABILIS

Development(Pvt) Ltd

Tel. (053) 833.1654

Tel: (031) 888 7654
eception@stabilis.co.za

50/50

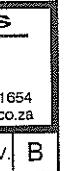
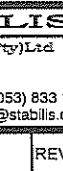
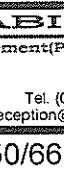
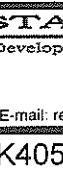
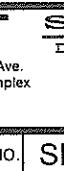
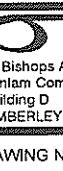
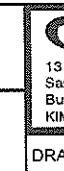
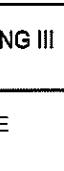
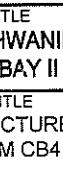
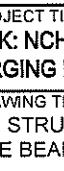
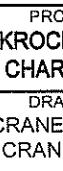
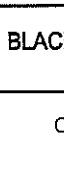
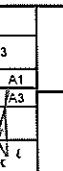
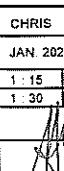
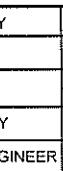
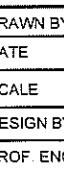
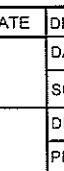
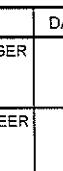
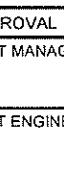
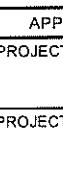
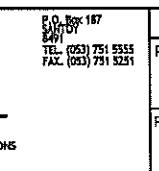


SECTION B
CRANE BEAM TYPE CB4
2 OFF REQ'D AS DRAWN (CB4)
2 OFF HANDED (CB4X)

FOR TENDER
PURPOSES ONLY

NOTES	
1.	FOR GENERAL NOTES SEE DRAWING -/1
2.	ALL STEELWORK GR S355JR U.O.S.
3.	ALL WELDS 6mm CONT. FILLET U.O.S.
4.	ALL HOLES Ø22 FOR M20 Gr8.8 BOLTS U.O.S.
5.	ALL STEELWORK TO BE HOT DIP GALVANIZED

DRG NO.	REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN
SK-/-	TITLE	A	FOR DESIGN REVIEW	20/02/2023	CJJ
		B	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ

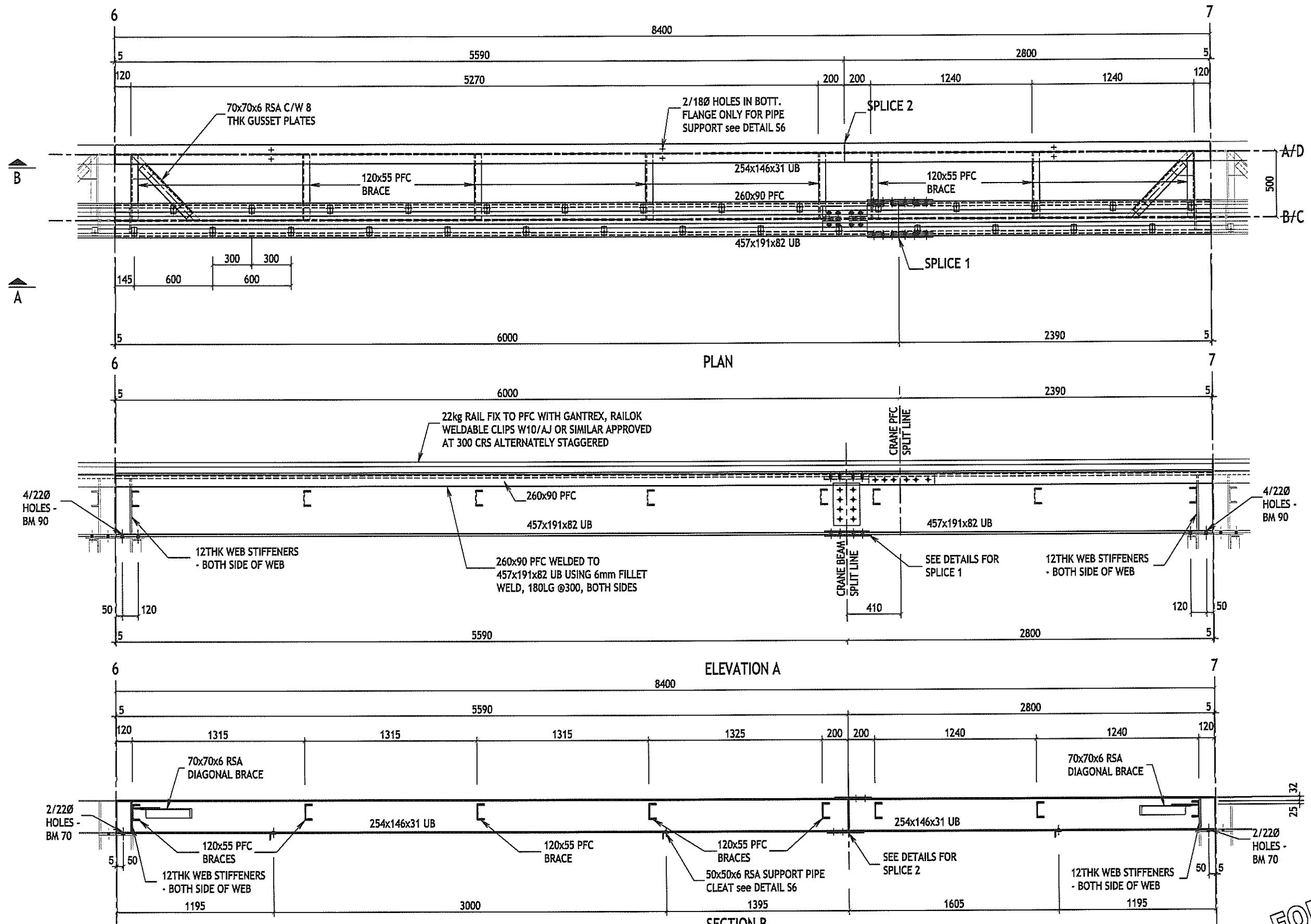


PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II

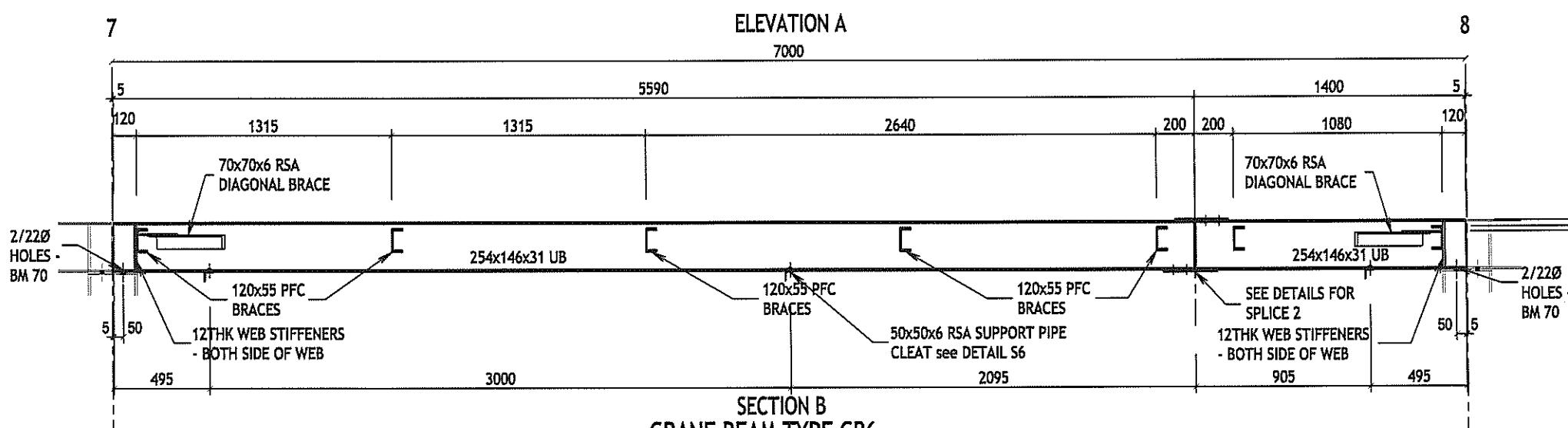
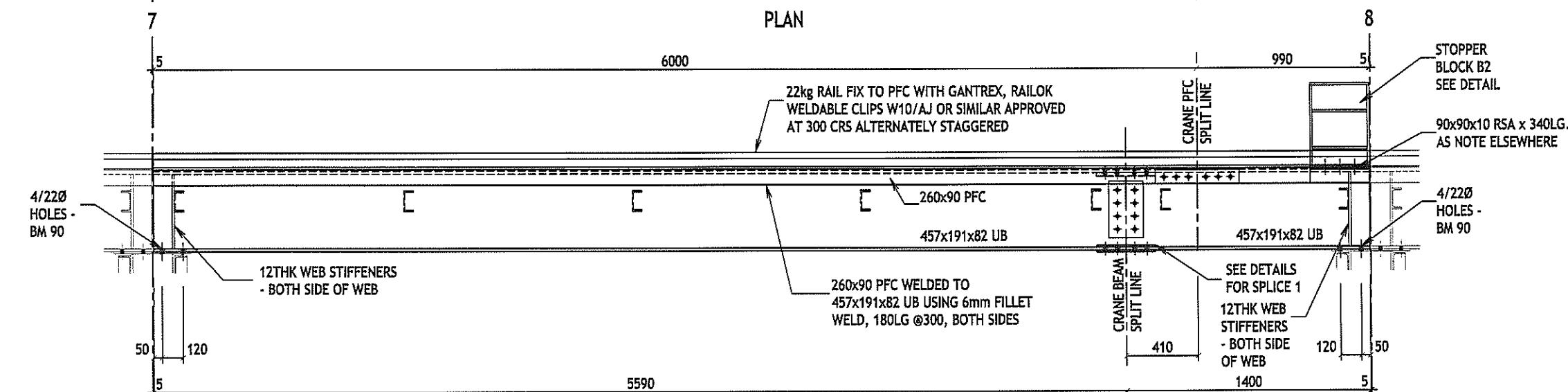
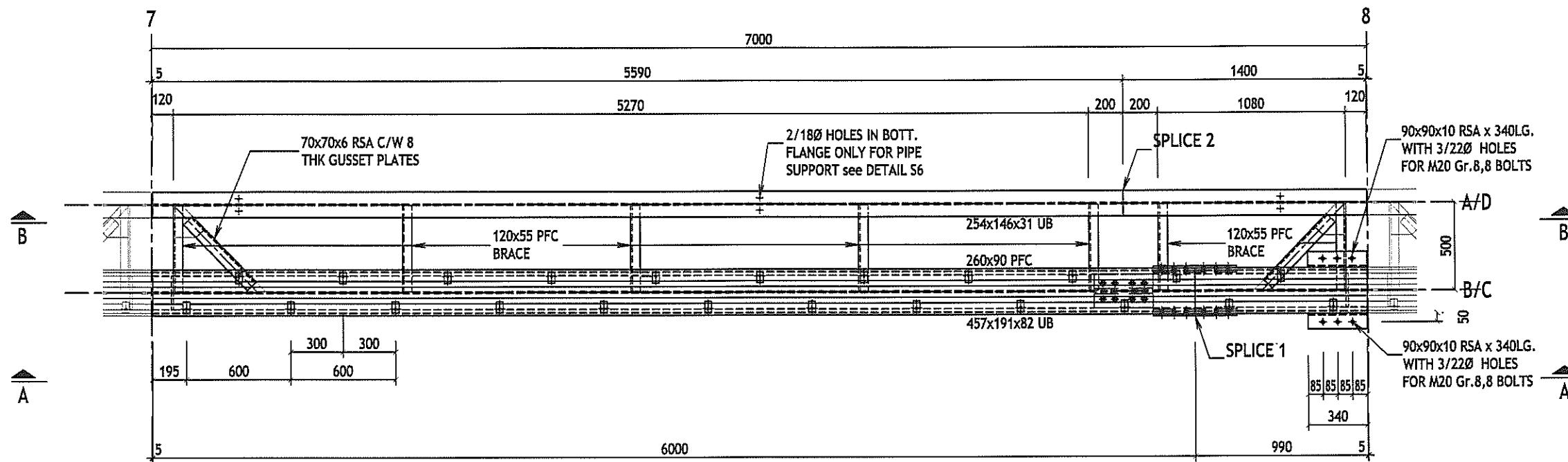
STABILIS
Development(Pty) Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING TITLE
CRANE STRUCTURE
CRANE BEAM CB4

DRAWING NO. SK4050/66 REV. B



NOTES	DRG NO.	REFERENCE DRAWINGS	No.	REVISION	DATE	DRAWN	CLIENT	P.O. BOX 117 SANTAM TEL: (031) 751 5555 FAX: (031) 751 5551	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II
									PROJECT MANAGER				
1. FOR DESIGN REVIEW	A	FOR DESIGN REVIEW			20/02/2023	CJU			DATE	JAN. 2023			
2. FOR TENDER PURPOSES ONLY	B	FOR TENDER PURPOSES ONLY			09/03/2023	CJU			SCALE	1 : 15 A1 1 : 30 /B			
3. ALL STEELWORK TO BE HOT DIP GALVANIZED									PROJECT ENGINEER	DESIGN BY			
4. ALL WELDS 6mm CONT. FILLET U.O.S.									PROF. ENGINEER	/A/			
5. ALL HOLES Ø22 FOR M20 Gr8.8 BOLTS U.O.S.													



SECTION B
CRANE BEAM TYPE CB6

1 OFF REO'D AS DRAWN (CB6)

1 OFF HANDED (CB6X)

NOTES

1. FOR GENERAL NOTES SEE DRAWING -/1
2. ALL STEELWORK GR S355JR U.O.S.
3. ALL WELDS 6mm CONT FILLET U.O.S.
4. ALL HOLES Ø22 FOR M20 Gr8.8 BOLTS U.O.S.
5. ALL STEELWORK TO BE HOT DIP GALVANIZED





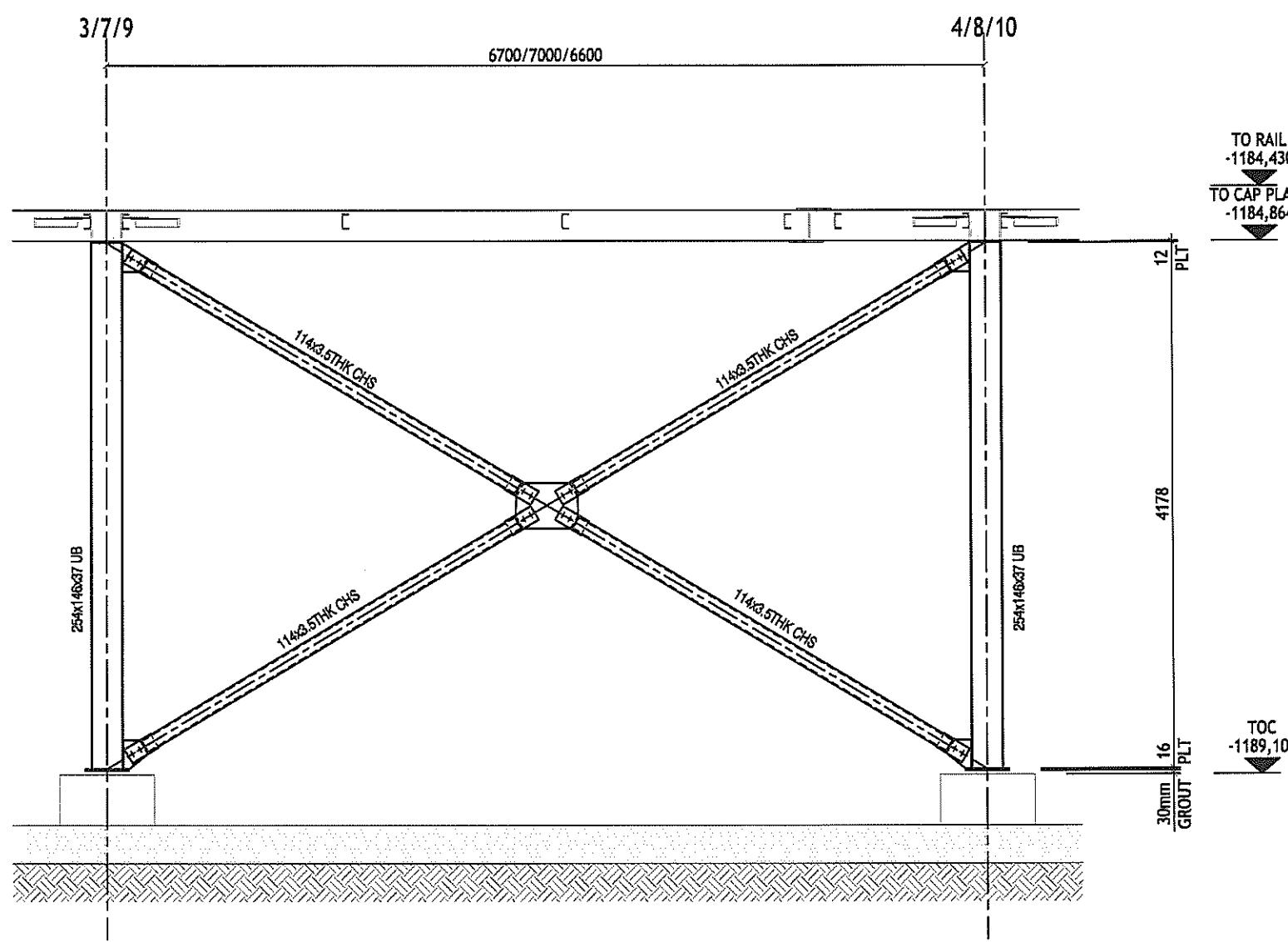
ASSMANG
MANUFACTURERS

P.O. Box 187 SARASOTA TEL: (053) 751 5535 FAX: (053) 751 3251	APPROVAL	DATE	DRAWN BY
	PROJECT MANAGER		DATE
			SCALE
PROJECT ENGINEER		DESIGN BY	

	PROJECT TITLE
23	BLACKROCK: NCHWANING III
A1	CHARGING BAY II
A3	DRAWING TITLE
	CRANE STRUCTURE

**FOR TENDER
PURPOSES ONLY**

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY Tel. (053) 833 1654
E-mail: reception@stabilis.co.za



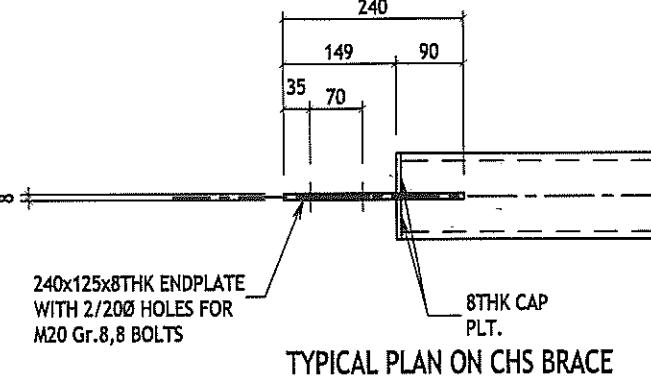
TYPICAL VERTICAL CROSS BRACING ON GRID LINES A & D

2 OFF REQ'D PER CRANE BAY (BETWEEN GRIDS 3 & 4)
2 OFF REQ'D PER CRANE BAY (BETWEEN GRIDS 7 & 8)
2 OFF REQ'D PER CRANE BAY (BETWEEN GRIDS 9 & 10)

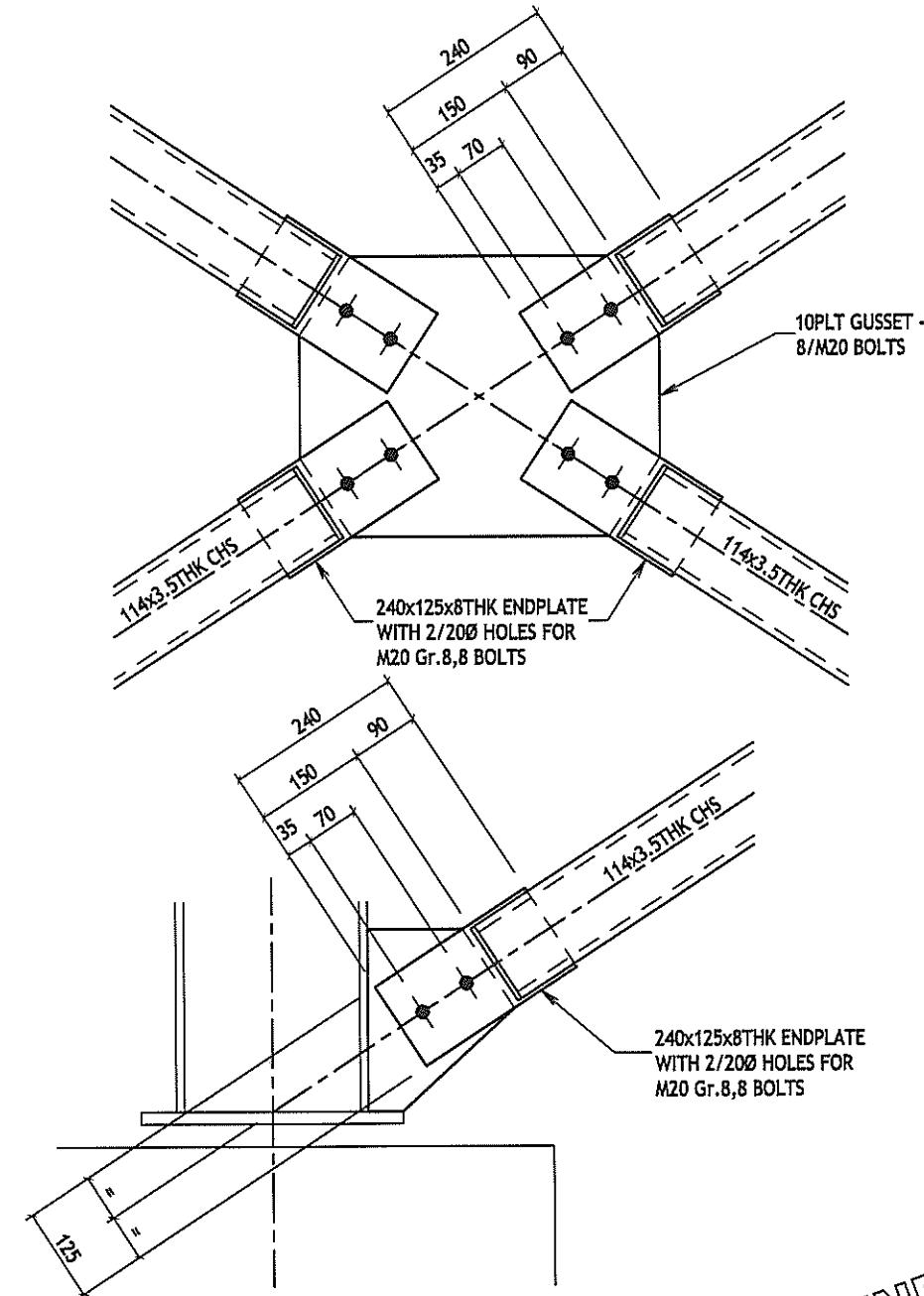
2 OFF REQ'D PER CRANE BAY (BETWEEN GRIDS 3 & 4)
2 OFF REQ'D PER CRANE BAY (BETWEEN GRIDS 7 & 8)
2 OFF REQ'D PER CRANE BAY (BETWEEN GRIDS 9 & 10)



NOTES		REFERENCE DRAWINGS		No.	REVISION
DRG NO	TITLE	A	FOR DESIGN REVIEW	2	
SK----		B	FOR TENDER PURPOSES ONLY	0	
1 FOR GENERAL NOTES SEE DRAWING -/1					
2 ALL STEELWORK GR S355JR U.O.S					
3 ALL WELDS 6mm CONT. FILLET U.O.S.					
4 ALL HOLES Ø22 FOR M20 Gr8,8 BOLTS U.O.S.					
5 ALL STEELWORK TO BE HOT DIP GALVANIZED					



TYPICAL PLAN ON CHS BRACE



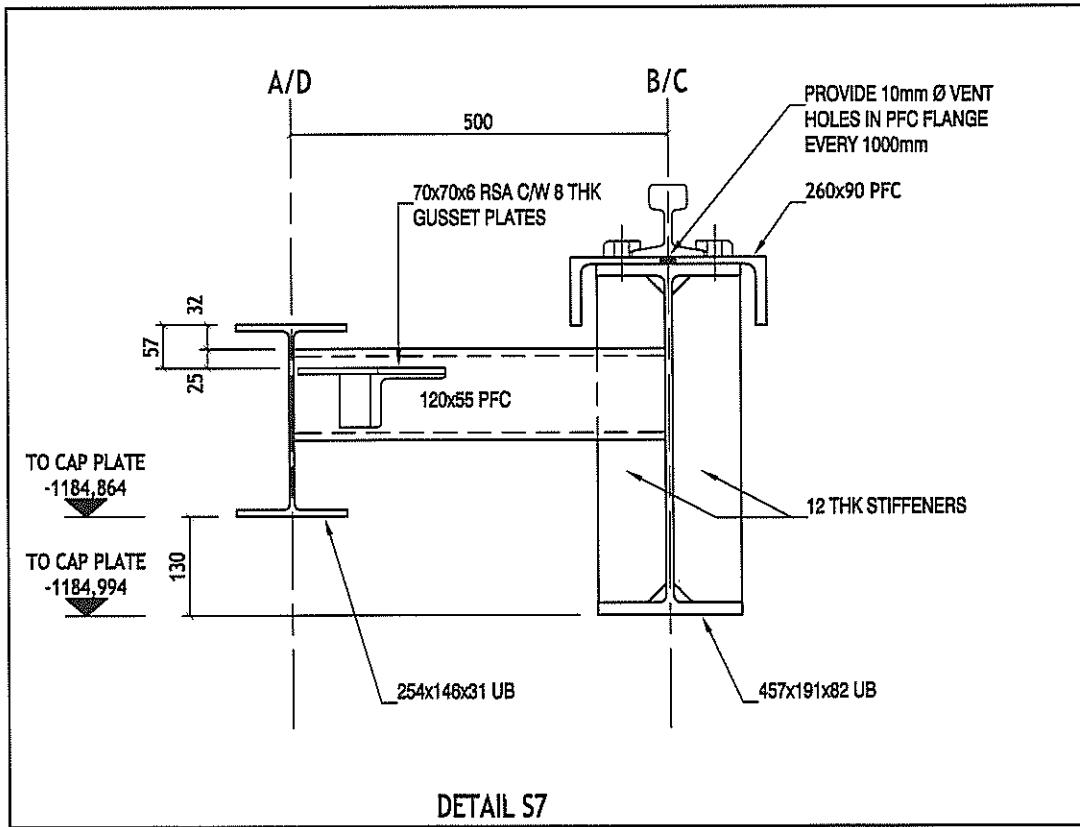
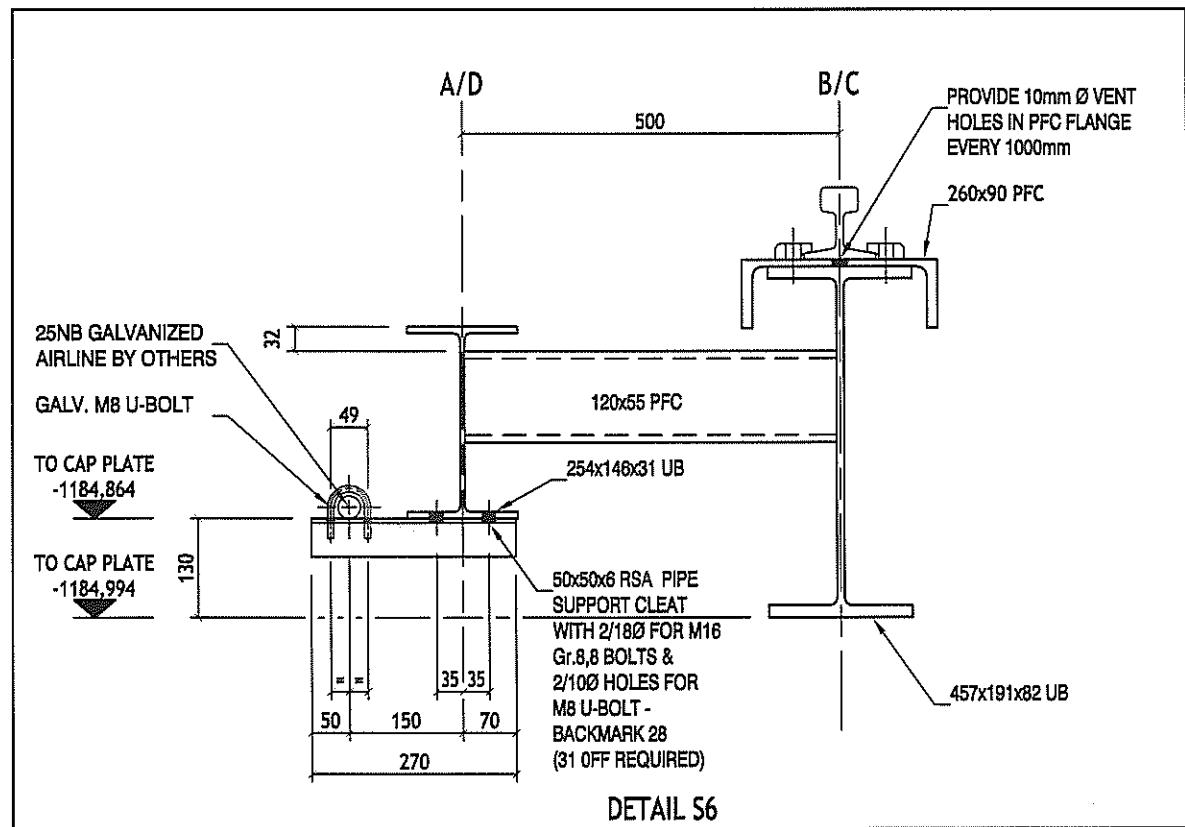
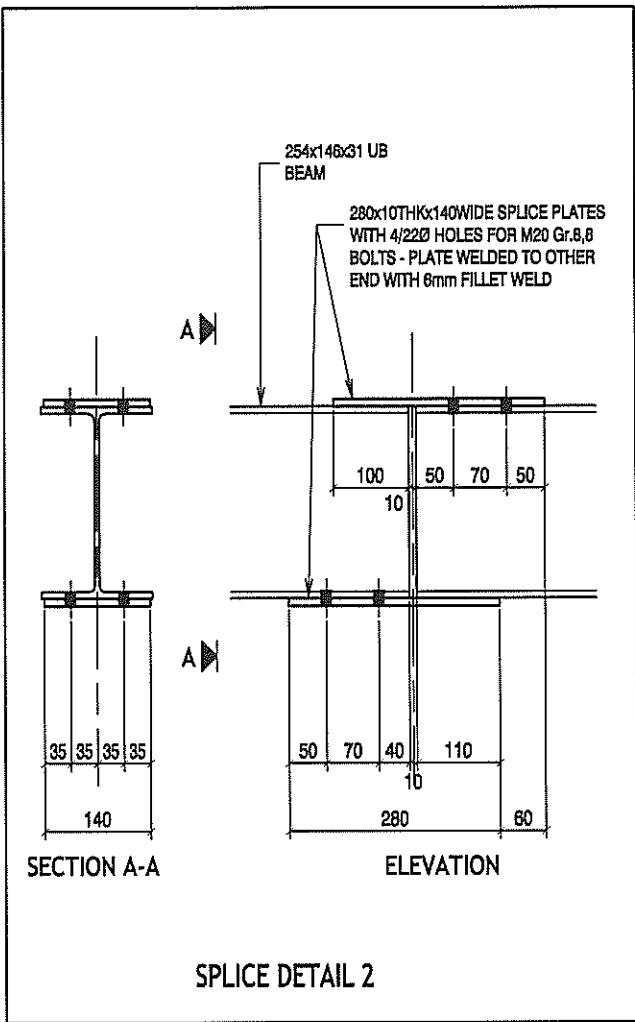
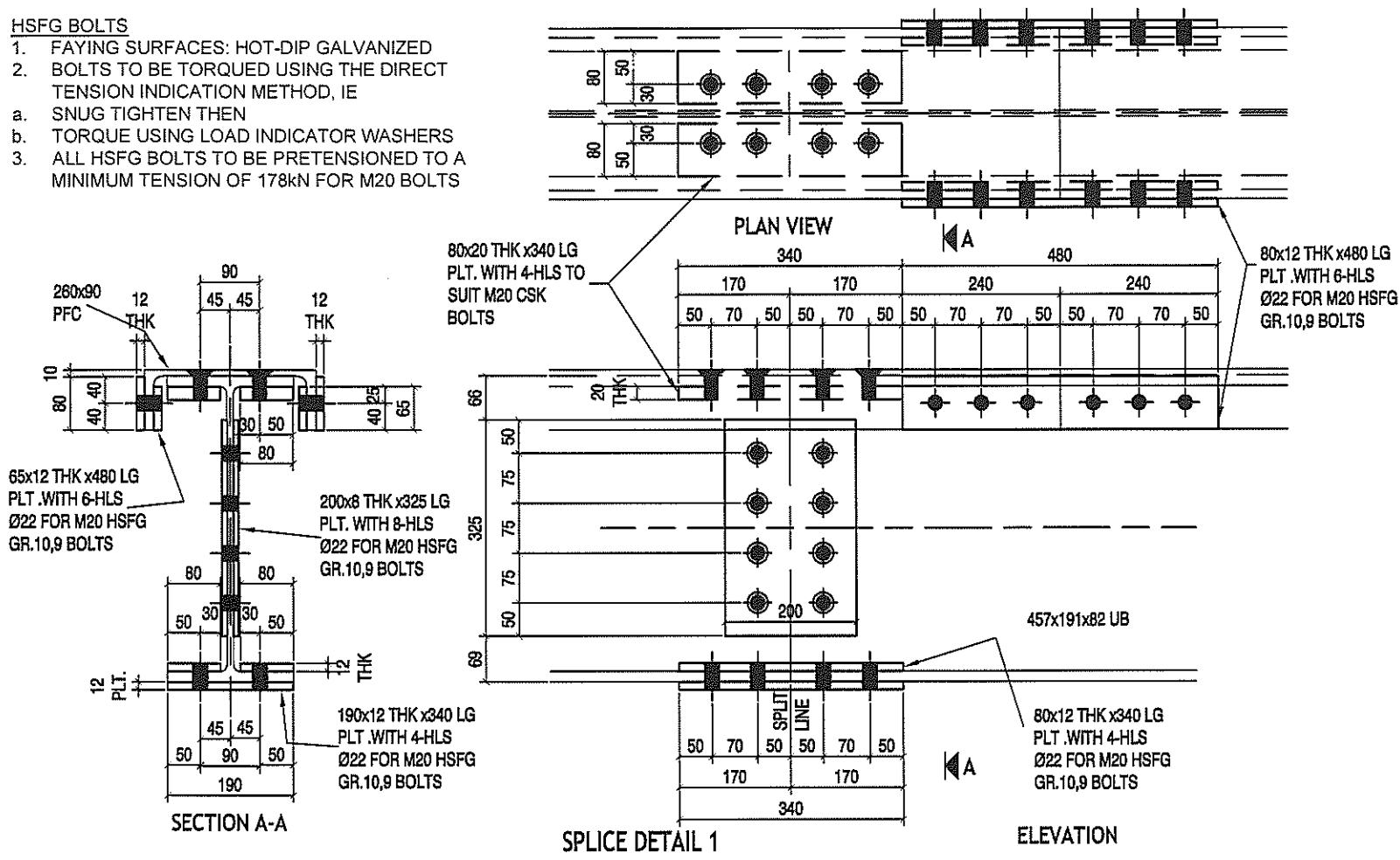
TYPICAL VERTICAL BRACING DETAILS

NOTE:
ALL GUSSETS 8PLT WELDED
ON CENTERLINE OF COLUMN

**FOR TENDER
PURPOSES ONLY**

HSFG BOLTS

1. FAYING SURFACES: HOT-DIP GALVANIZED
 2. BOLTS TO BE TORQUED USING THE DIRECT TENSION INDICATION METHOD, IE
 - a. SNUG TIGHTEN THEN
 - b. TORQUE USING LOAD INDICATOR WASHERS
 3. ALL HSFG BOLTS TO BE PRETENSIONED TO A MINIMUM TENSION OF 178kN FOR M20 BOLTS



**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -/1
2. ALL STEELWORK GR S355JR U.O.S.
3. ALL WELDS 6mm CONT. FILLET U.O.S.
4. ALL HOLES Ø22 FOR M20 Gr8.8 BOLTS U.O.S.
5. ALL STEELWORK TO BE HOT DIP GALVANIZED

	REFERENCE DRAWINGS	No.	REVISION	DATE
DRG NO	TITLE	A	FOR DESIGN REVIEW	20/02/2024
SK-----		B	FOR TENDER PURPOSES ONLY	09/03/2024



DRAWN	CLIENT
CJ	
CJ	ASSMANG
	MANGANESE
	BLACK ROCK MINE OPERATIONS

P.O. Box 187 MONTREAL H4T 1P6 TEL: (514) 731-5555 FAX: (514) 731-3251	APPROVAL	DATE	DRAWN BY	CHRIS	BLACK
PROJECT MANAGER		DATE	JAN. 2023		
		SCALE	1:5	A1	
PROJECT ENGINEER		DESIGN BY	1:10		
		PROF. ENGINEER	A3		

**PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II**

**DRAWING TITLE
CRANE STRUCTURE
SPLICING DETAILS AND SECTIONS S6, S7**



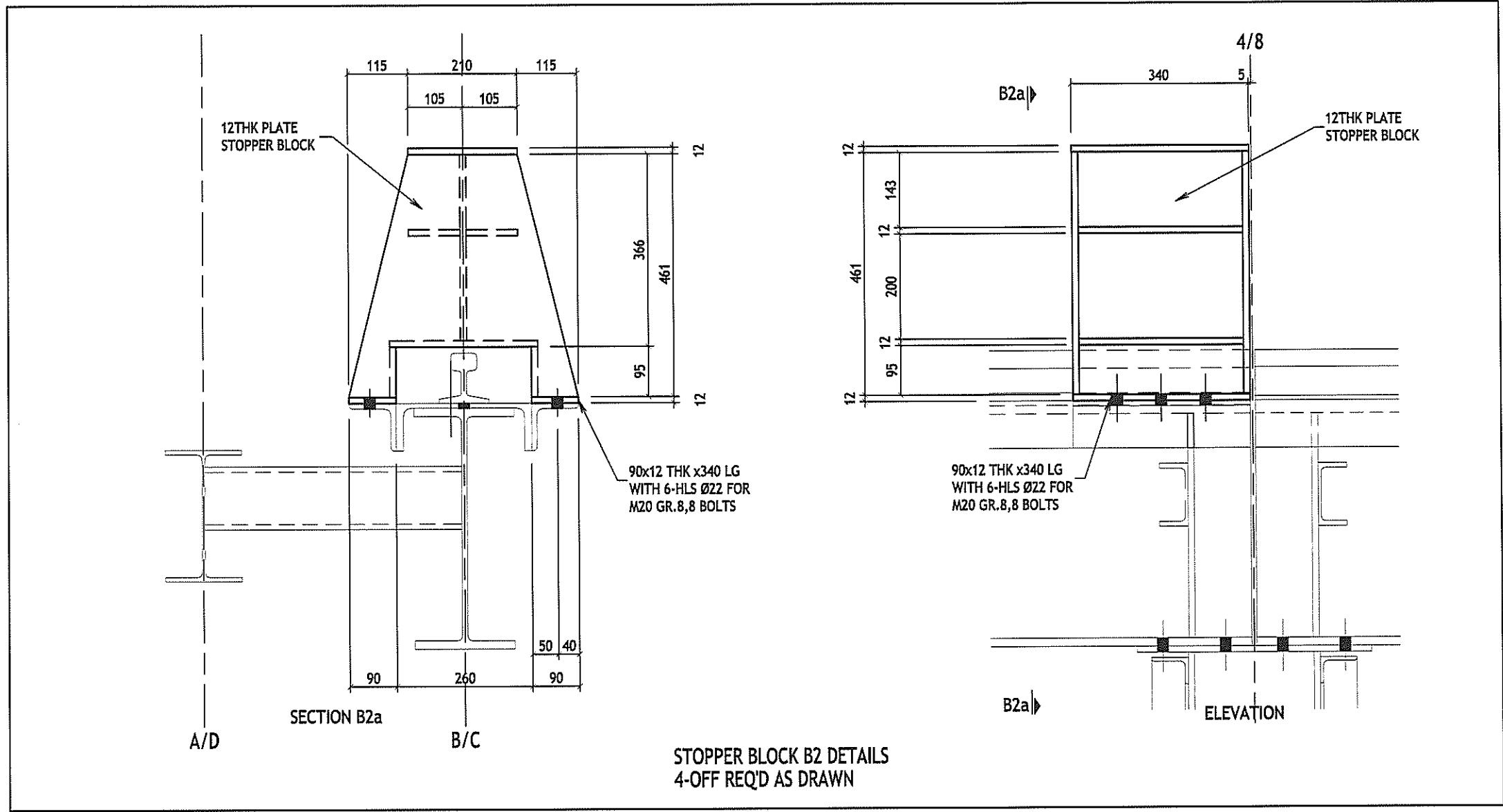
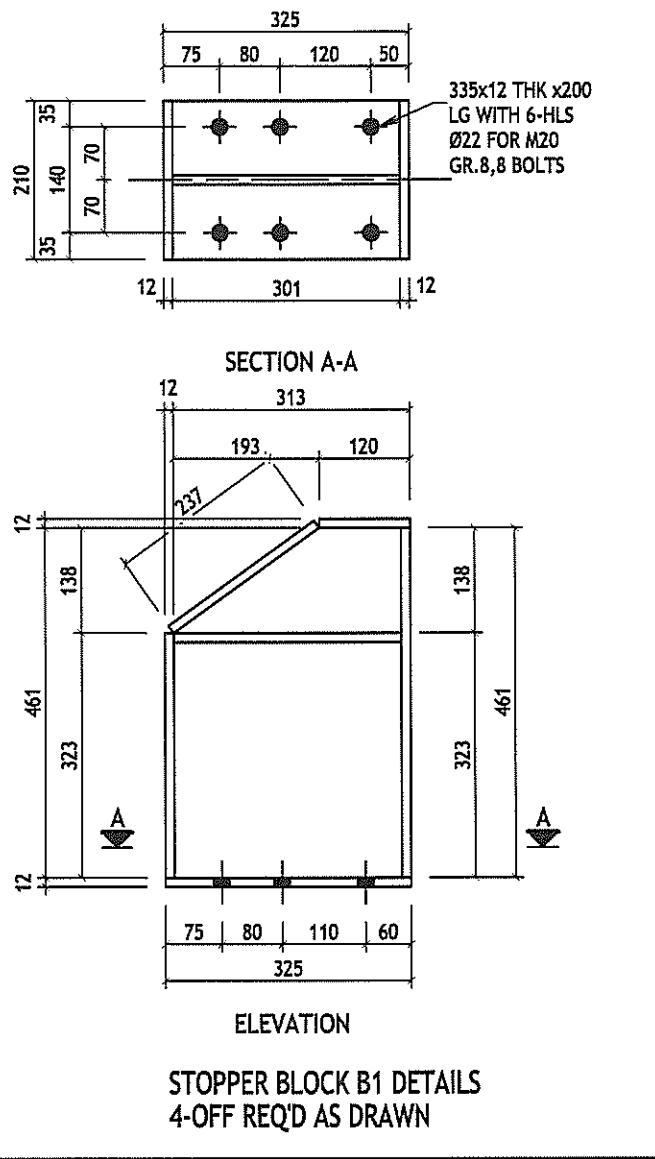
STABILIS
Development(Pty) Ltd

REFERENCES

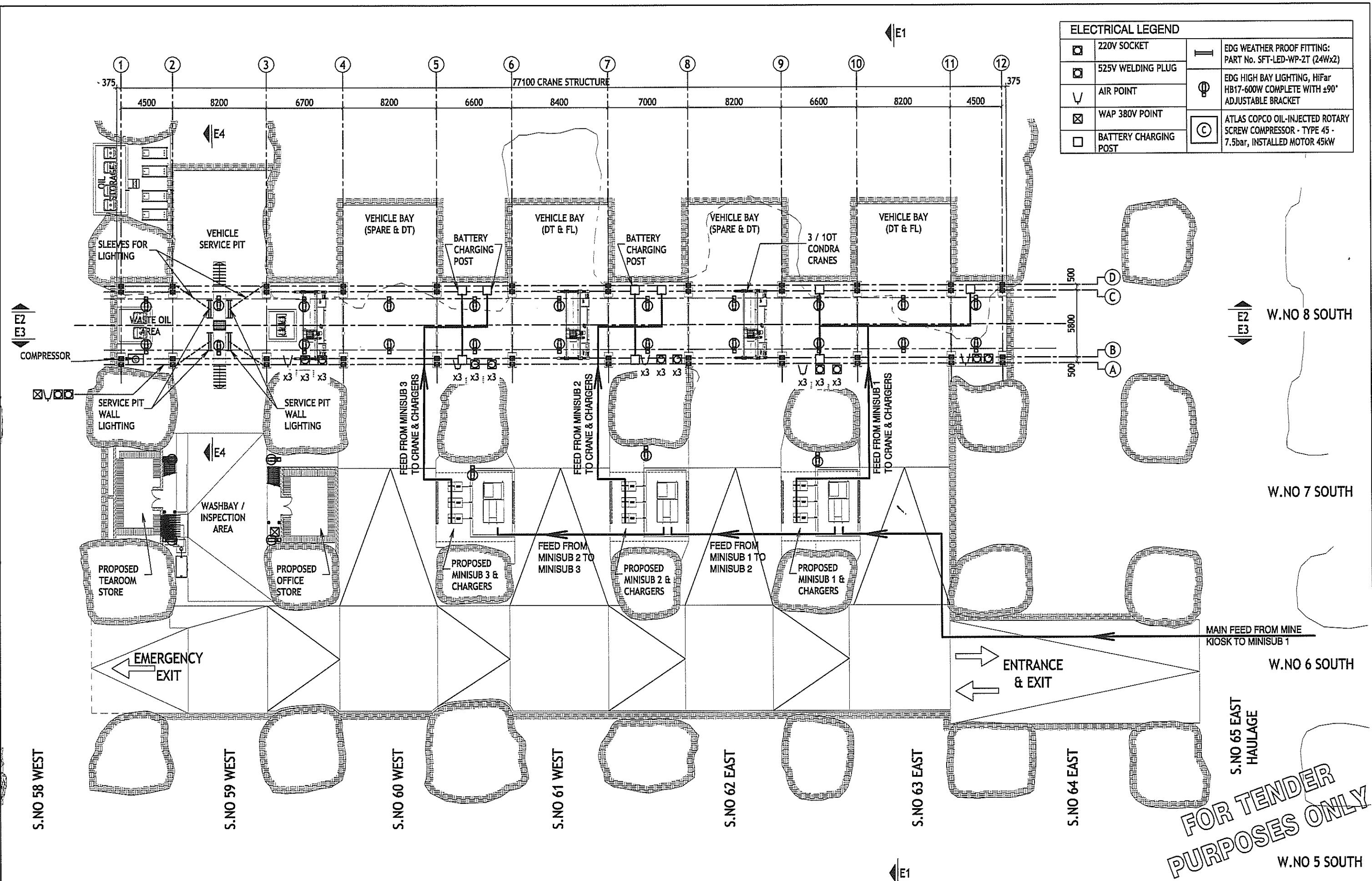
Tel. (053) 833 1654

E-mail: reception@stabilis.co.za

DEO/ZD BEV B



**FOR TENDER
PURPOSES ONLY**



NOTES
1. FOR GENERAL NOTES SEE DRAWING -1

DRG NO.	REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN
	TITLE	REV.				
SK-/-	A FOR DESIGN REVIEW	12/02/2023	CJU			
	B FOR TENDER PURPOSES ONLY	09/03/2023	CJU			



P.O. BOX 187
KIMBERLEY 84000
TEL: (053) 751 5555
FAX: (053) 751 5221

PROJECT MANAGER	APPROVAL	DATE	DRAWN BY	CHRIS
	SCALE	1 : 150	A1	
		1 : 300	A3	

PROJECT ENGINEER	DESIGN BY	DRAWN BY	CHRIS

PROJECT TITLE
**BLACKROCK: NCHWANING III
CHARGING BAY II**

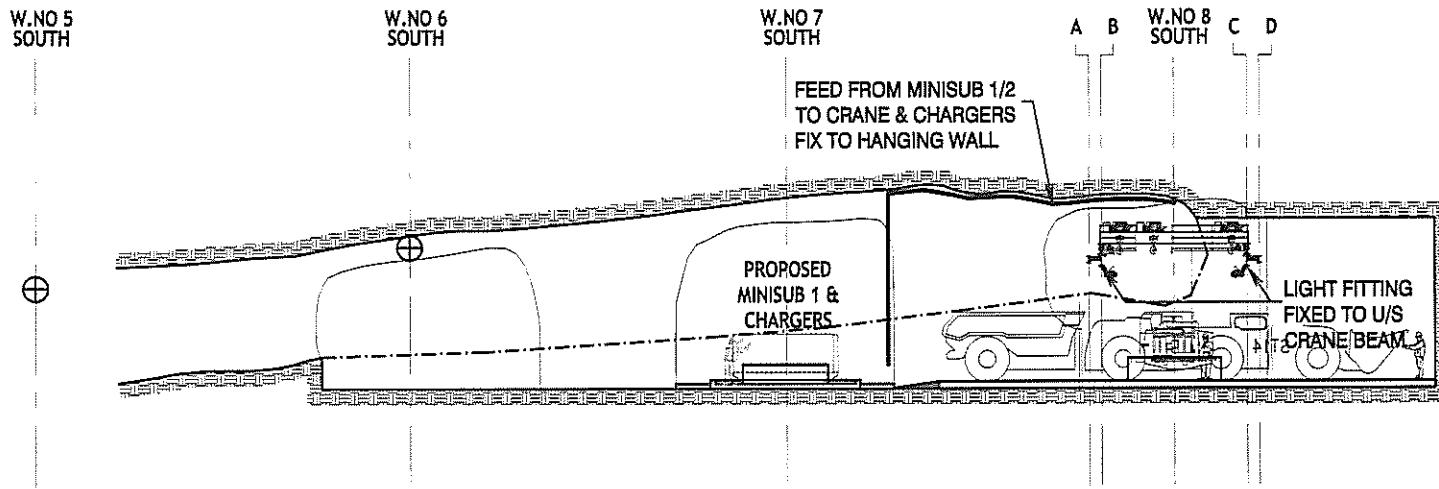
DRAWING TITLE
**ELECTRICAL & COMPRESSED AIR
GENERAL ARRANGEMENT**

STABILIS
Development(Pty)Ltd
13 Bishops Ave,
Sanlam Complex
Building D
KIMBERLEY
Tel: (053) 833 1654
E-mail: reception@stabilis.co.za

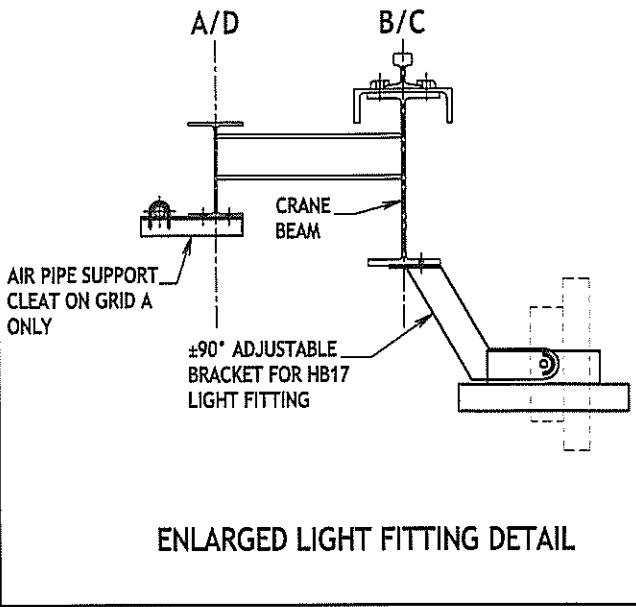
DRAWING NO. SK4050/90 REV. B

**FOR TENDER
PURPOSES ONLY**

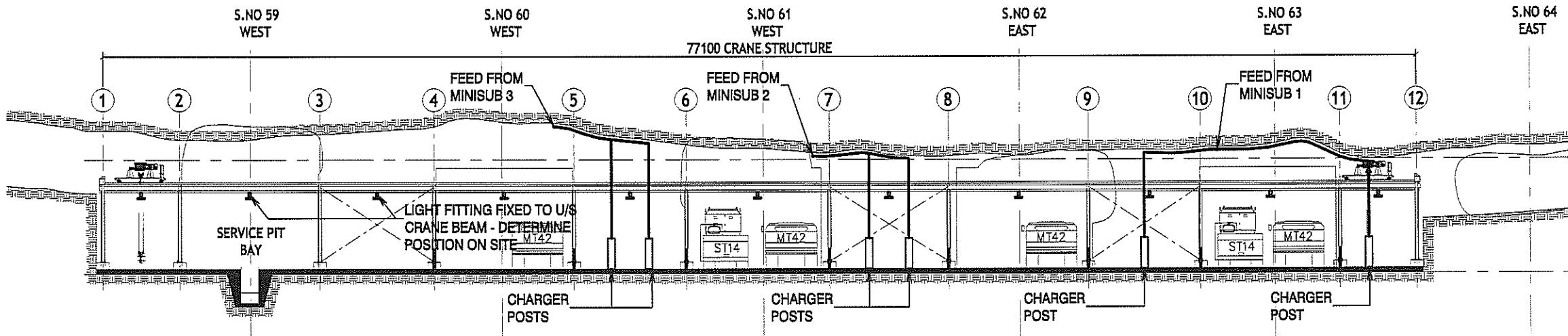
W.NO 5 SOUTH



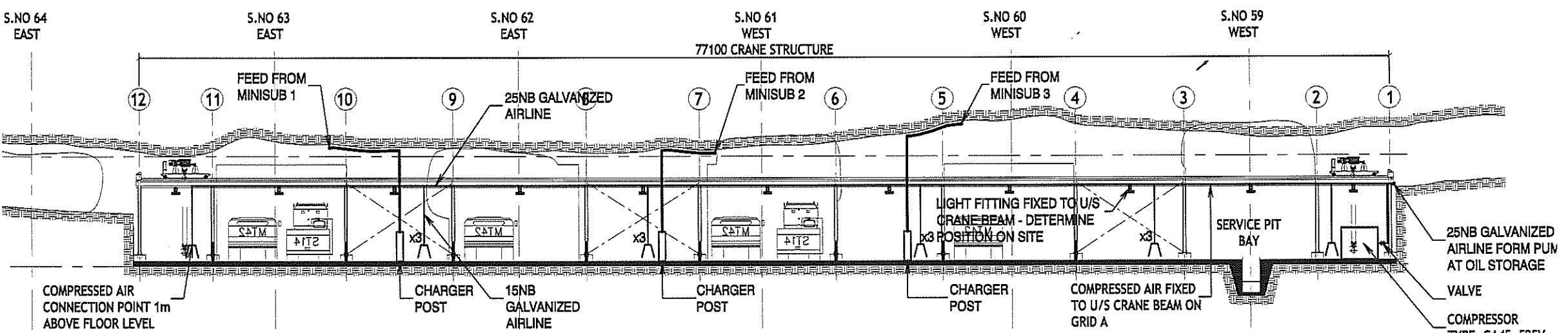
SECTION E1
(S.NO 63 EAST)



ENLARGED LIGHT FITTING DETAIL



SECTION E2
(W.NO 8 SOUTH)



SECTION E3
(W.NO 8 SOUTH)

FOR TENDER
PURPOSES ONLY

NOTES
1. FOR GENERAL NOTES SEE DRAWING -1

REFERENCE DRAWINGS

No.

REVISION

DATE

DRAWN

CLIENT

20/02/2023

CJU

20/02/2023

CJJ



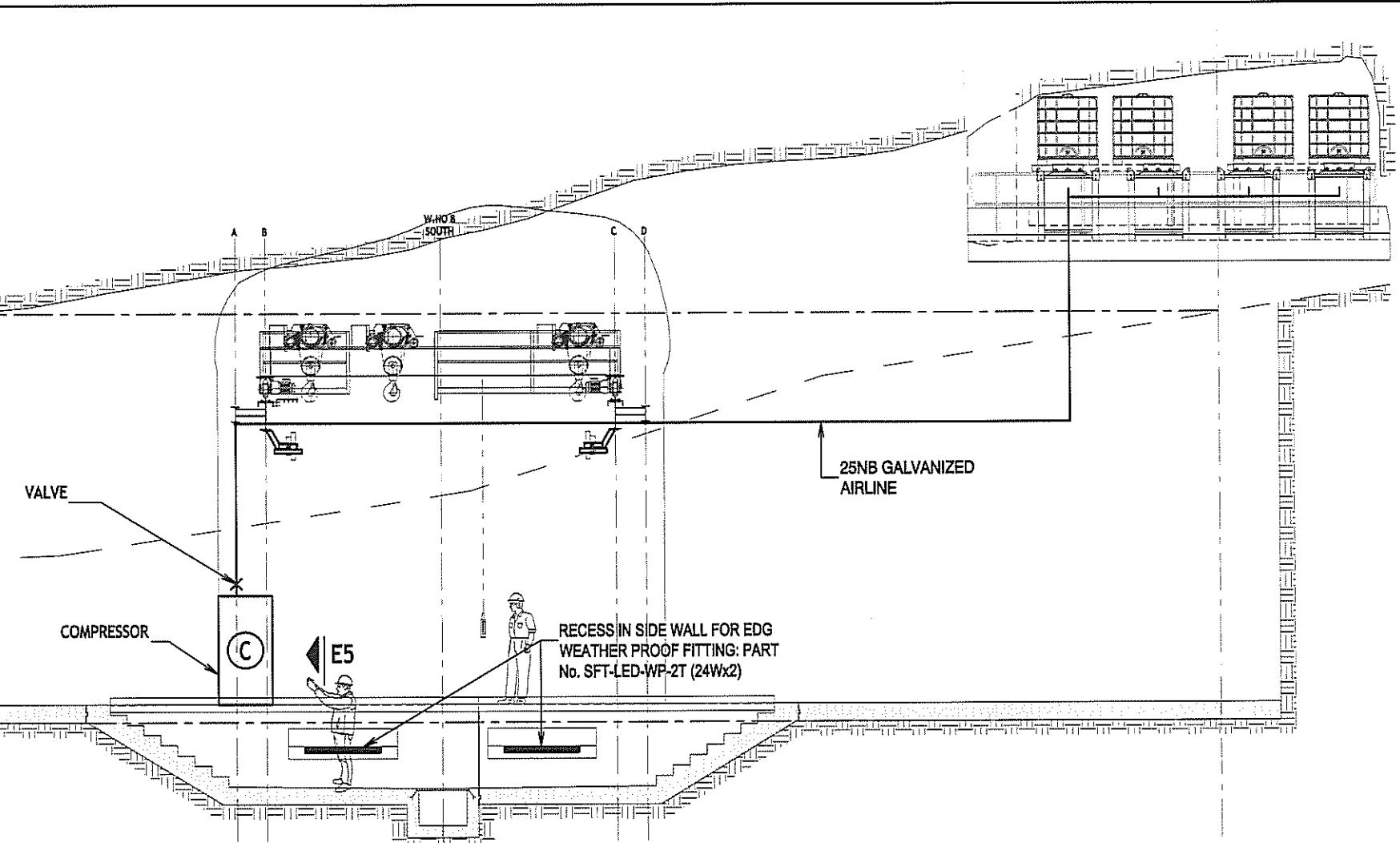
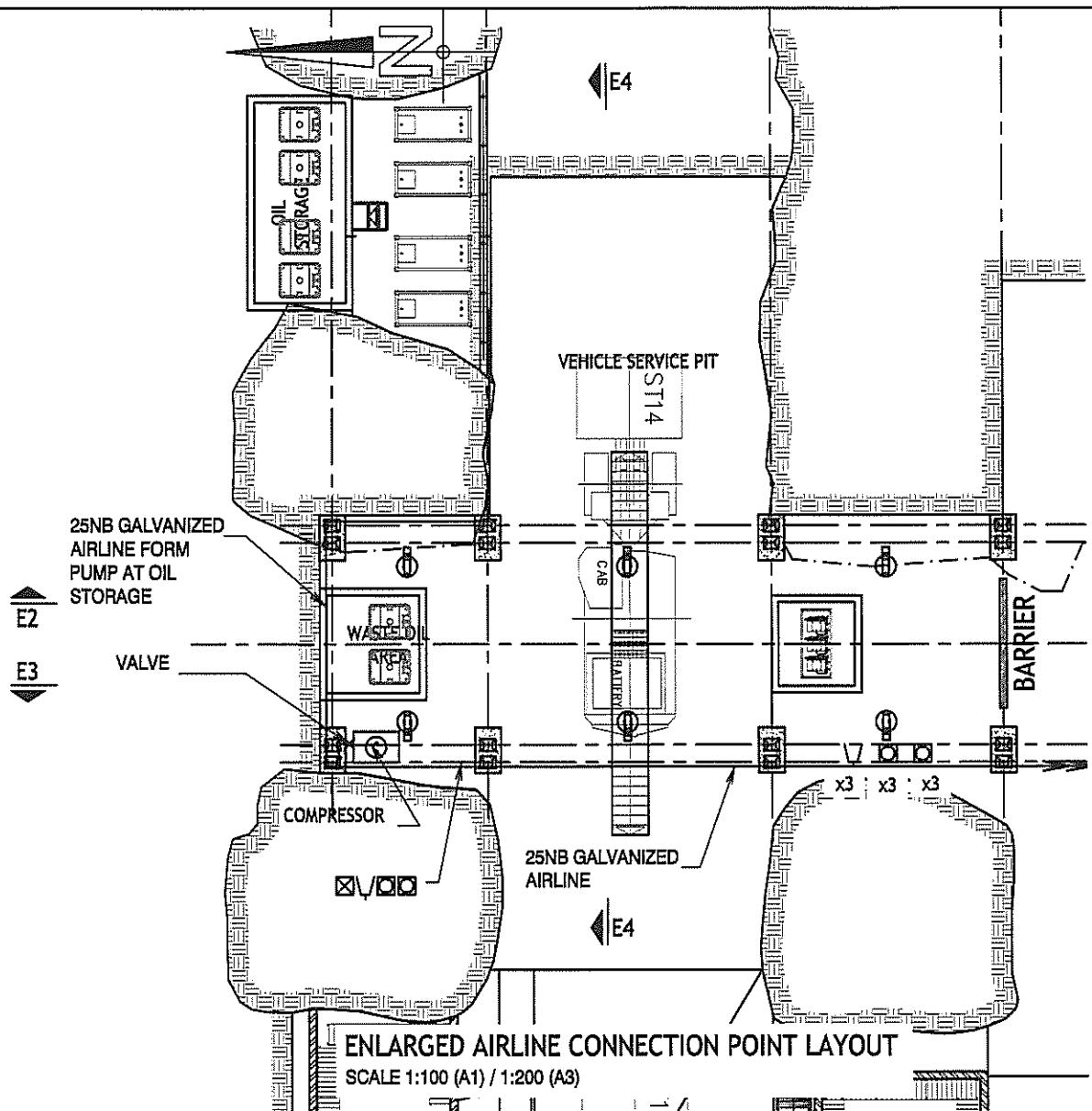
20/02/2023

CJJ

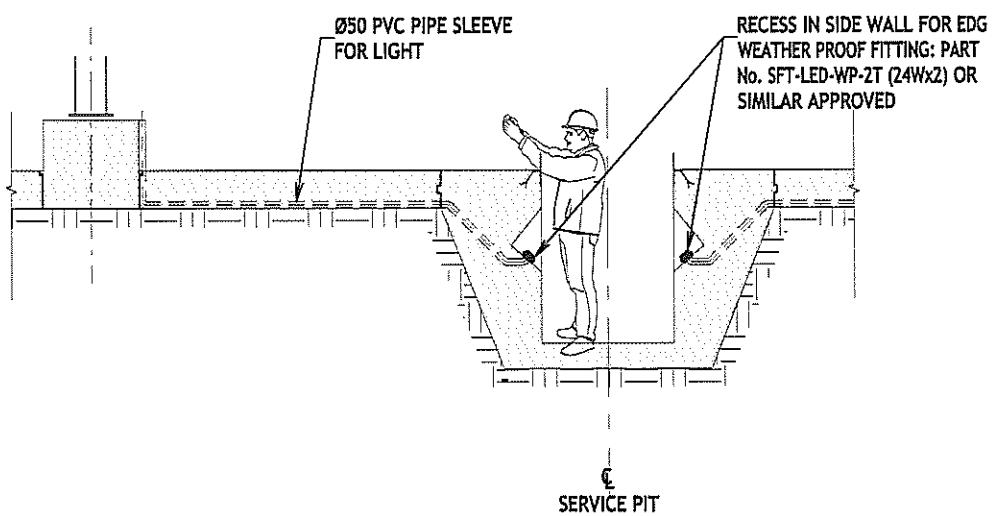
STABILIS
Development(Pty) Ltd
13 Bishops Ave,
Santam Complex
Building D
KIMBERLEY
Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

PROJECT TITLE
BLACKROCK: NCHWANING III
CHARGING BAY II
DRAWING TITLE
ELECTRICAL & COMPRESSED AIR
SECTIONS E1 - E3

DRAWING NO. SK4050/91 REV. B



SECTION E4
SCALE 1:50 (A1) / 1:100 (A3)



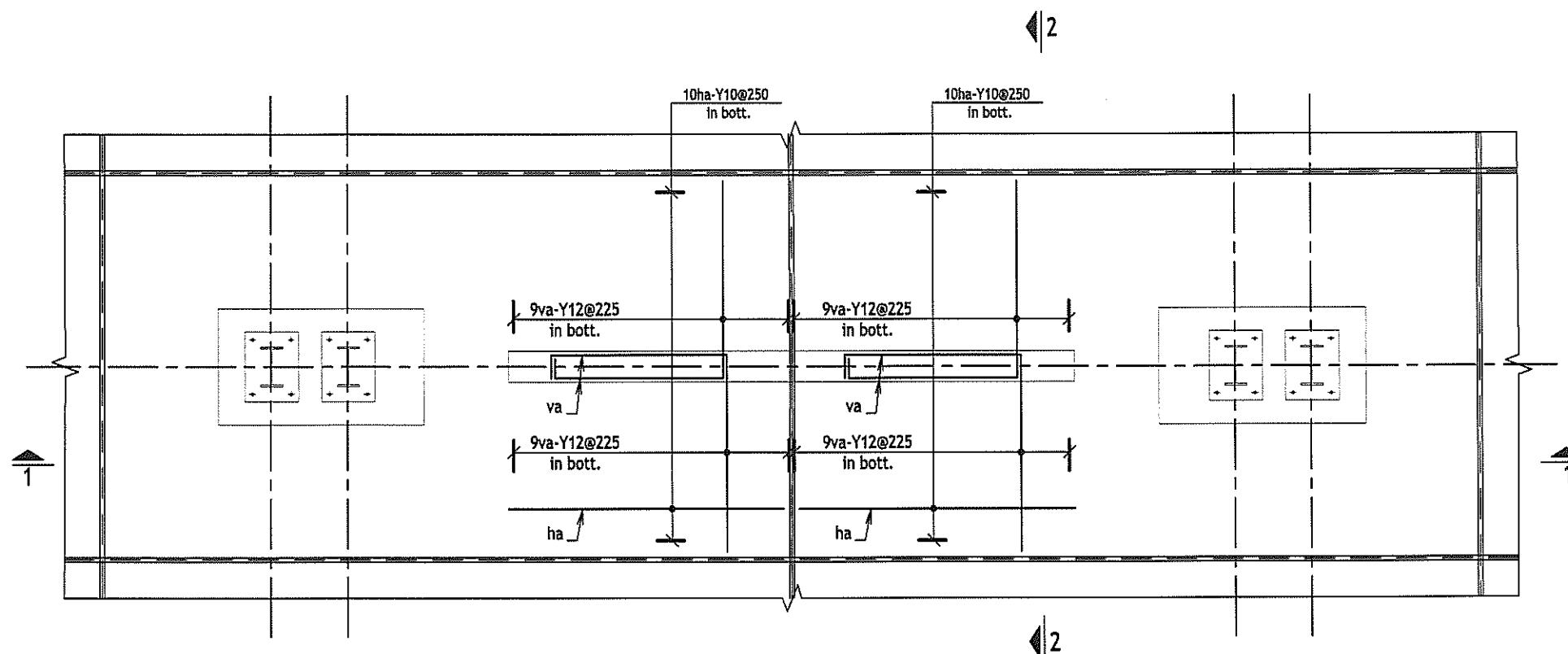
SECTION E5
SCALE 1:30 (A1) / 1:60 (A3)

**FOR TENDER
PURPOSES ONLY**

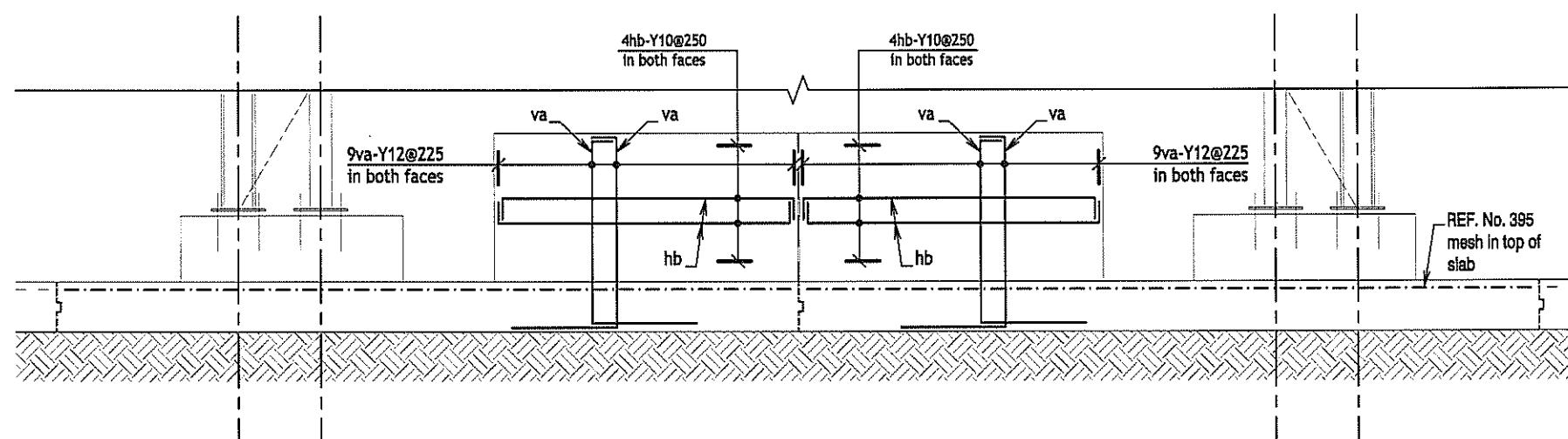



LASSMANG
 BLACK ROCK MINE OPERATIONS

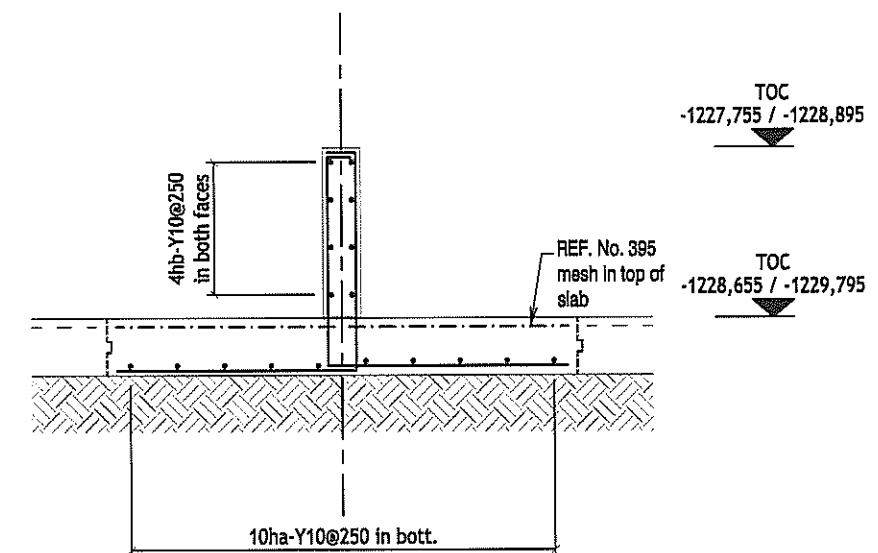
ASMB MANAGEMENT BLACK ROCK MINE OPERATIONS	P.O. Box 187 S.A.F.T. TEL: (053) 751 5555 FAX: (053) 751 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II	DRAWING TITLE ELECTRICAL & COMPRESSED AIR ENLARGED AIRLINE CONNECTION POINT LAYOUT, SECTIONS E4 - E6	DRA	13 Bishops Ave. Sanlam Complex Building D KIMBERLEY	STABILIS Development(Pty)Ltd
	PROJECT MANAGER		DATE		JAN. 2023					
		SCALE		AB BROWN	A1					
	PROJECT ENGINEER		DESIGN BY		A3					
		PROF. ENGINEER						DRAWING NO.	SK4050/92	REV. A
									Tel. (053) 833 1654	
									E-mail: reception@stabilis.co.za	



LAYOUT



SECTION 1



SECTION 2

**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
5. TOC = TOP OF CONCRETE




AECMANG
 AANGANBET
 BLACK ROCK MINE OPERATIONS

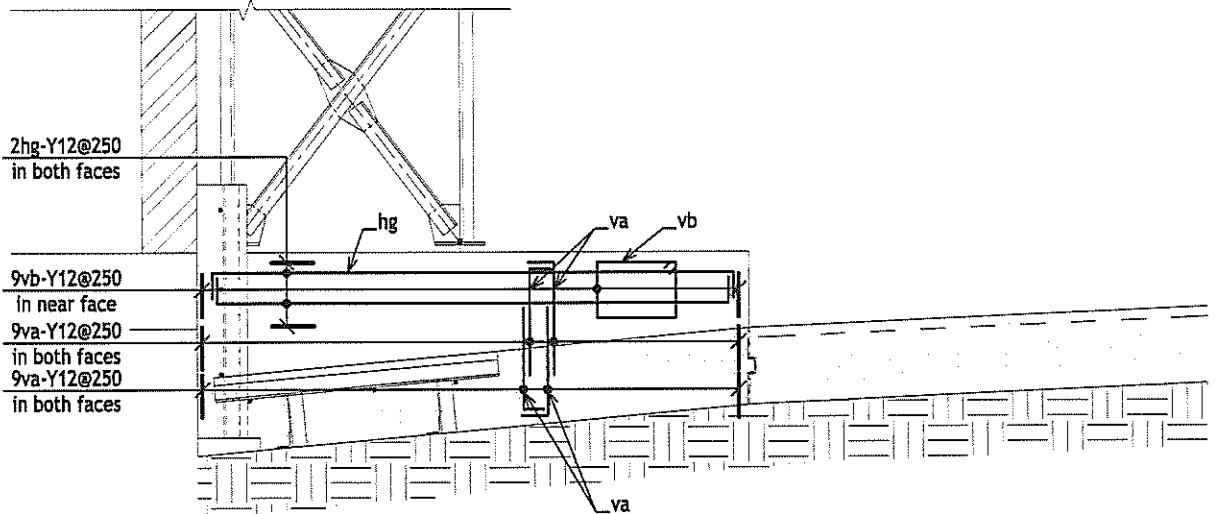
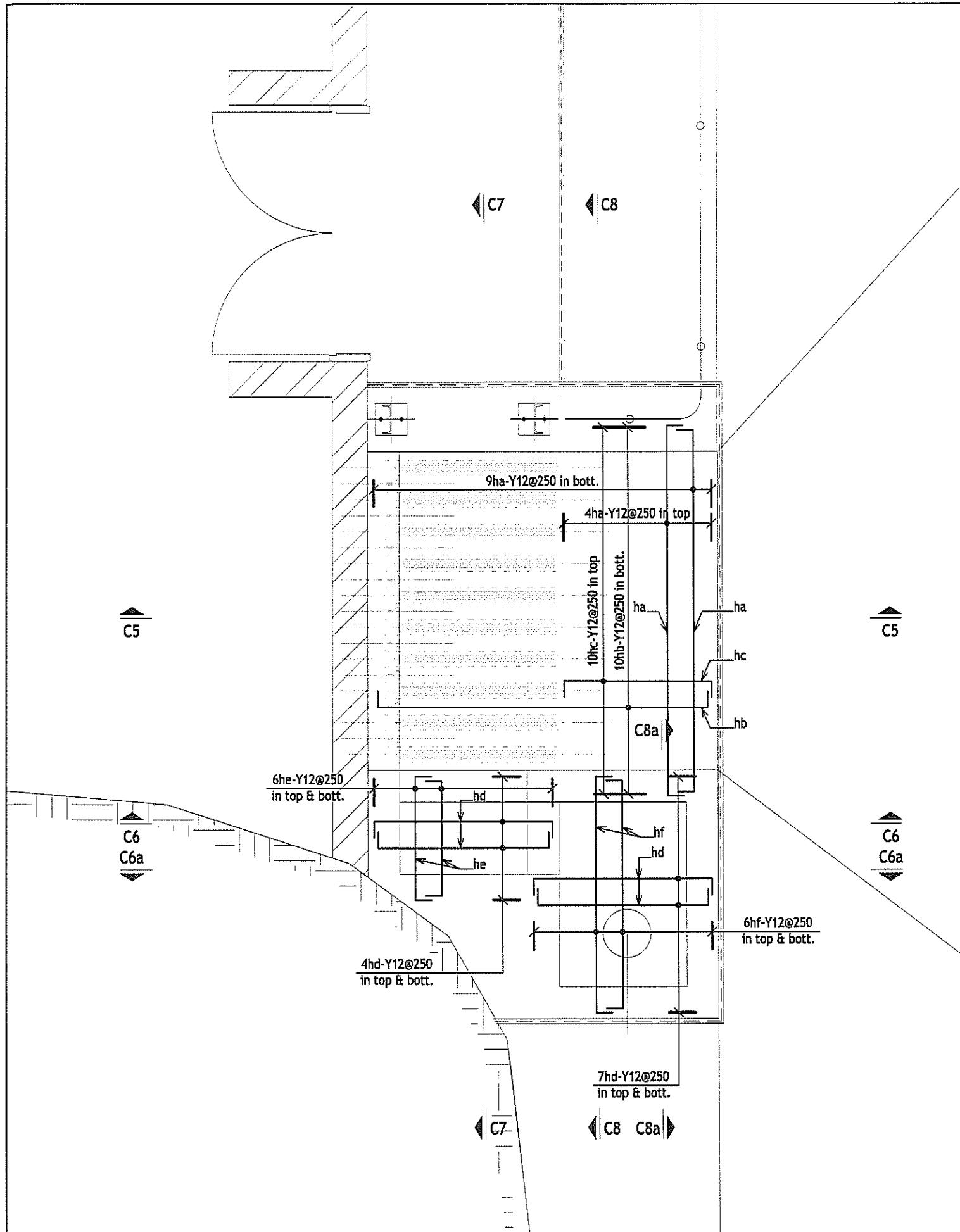
P.O. Box 187
SAINT JOSEPH
MI 49085
TEL. (517) 751-5355
FAX. (517) 751-5251

OVAL	DATE	DRAWN BY
MANAGER		DATE
		SCALE
ENGINEER		DESIGN BY
		PROF. ENGI

CHRIS		PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II
JAN. 2023		
1. 20	A1	
1. 40	B3	
		DRAWING TITLE BARRIER STEEL PLACING
EER		

STABILIS
Development(Pty)Ltd
13 Bishops Ave.
Sanlam Complex
Building D
KIMBERLEY Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

DRAWING NO.	SK4050/100	REV.	A
-------------	------------	------	---



SECTION C5

**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1
2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
5. TOC = TOP OF CONCRETE



AWN CLIP

P.O. Box 187
SAINT TOME
BAHAMAS
TEL. (053) 751 5355
FAX. (053) 751 5251

APPROVAL
PROJECT MANA
PROJECT ENGI

	DATE	
AGER		
NEER		

DRAWN BY
DATE
SCALE
DESIGN BY
PROF. ENGINEER

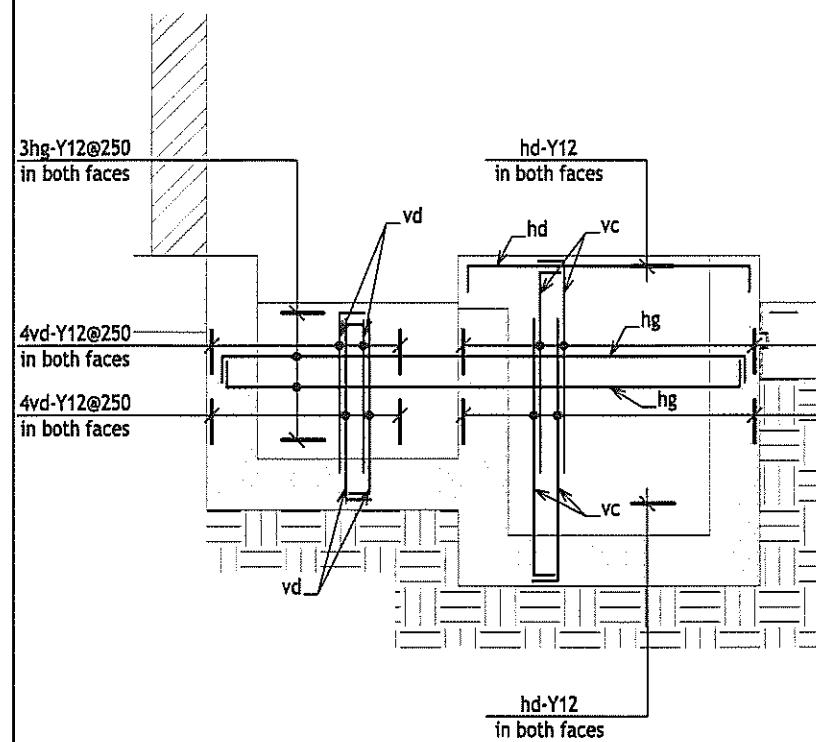
	CHRIS
	JAN. 2023
1 : 15	A1
1 : 30	A3

PR
BLACKROO
CHA
DR
WASHE
STEEL PLACIN

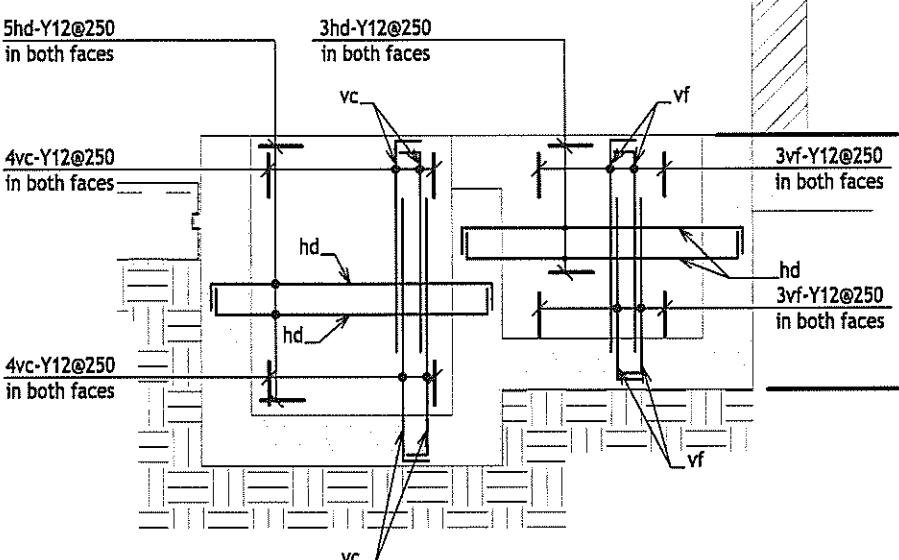
PROJECT TITLE
ACK: NCHWAN
URGING BAY I
DRAWING TITLE
BAY SUMP AR
G: LAYOUT & SP

ING III
I
REA
SECTION C5
RE

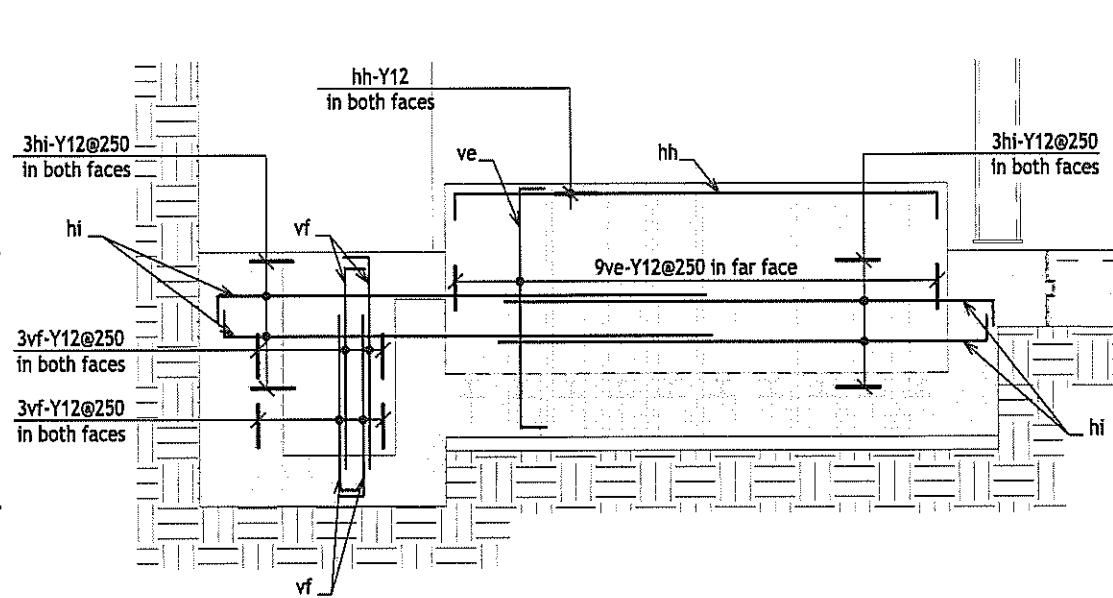
STABILIS
Development(Pty)Ltd
3 Bishops Ave.
Janlam Complex
Building D
KIMBERLEY
E-mail: reception@stabilis.co.za



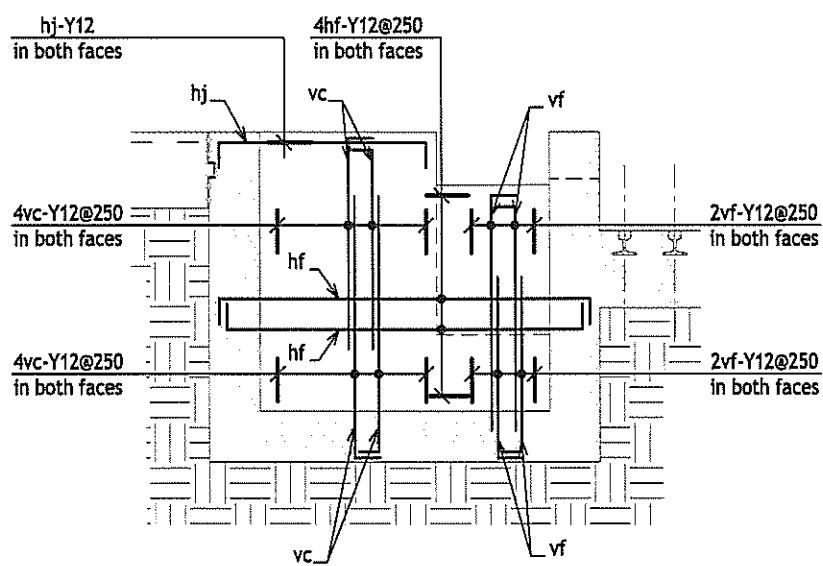
SECTION C6



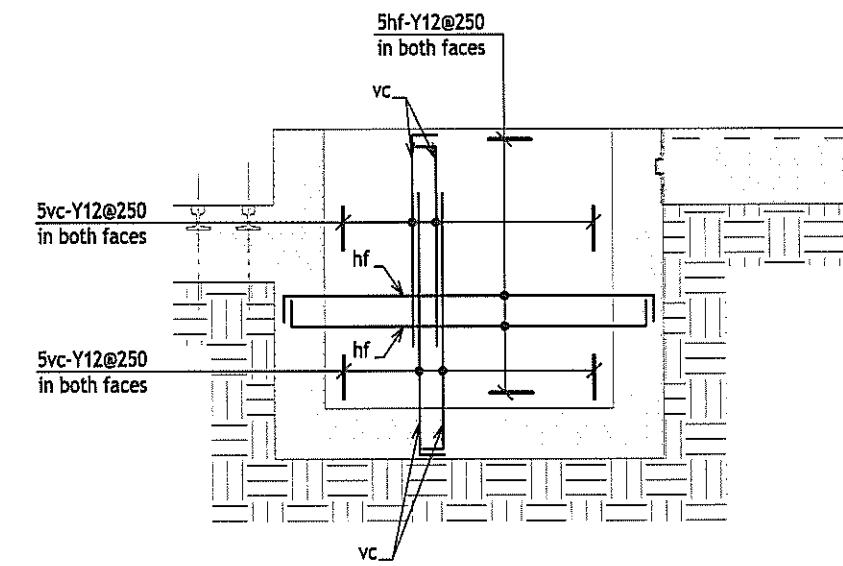
SECTION C6a



SECTION C7



SECTION C8



SECTION C8a

NOTES
 1. FOR GENERAL NOTES SEE DRAWING -1
 2. CONCRETE STRENGTH TO BE 30MPa AT 28 DAYS
 3. NO CONCRETE SHALL BE POURED UNTIL THE REINFORCEMENT HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.
 4. ALL LEVELS & DIMENSIONS TO BE CHECKED AND APPROVED ON SITE.
 5. TOC = TOP OF CONCRETE

REFERENCE DRAWINGS		No.	REVISION	DATE	DRAWN	CLIENT	P.O. Ref. 187 E491 TEL: (053) 731 5555 FAX: (053) 731 5251	APPROVAL	DATE	DRAWN BY	CHRIS
DRG NO.	TITLE	A	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ			PROJECT MANAGER		JAN 2023	
SK-/-								SCALE	1 : 15	A1	
									1 : 30	A3	



P.O. Ref. 187

E491

TEL:

(053)

5555

FAX:

(053)

731

5251

PROJECT TITLE
BLACKROCK: NCHWANING III CHARGING BAY II
 DRAWING TITLE
 WASHBAY SUMP AREA
 STEEL PLACING: SECTIONS C6 - C8

STABILIS
 Development(Pty) Ltd
 13 Bishops Ave.
 Sanlam Complex
 Building D
 KIMBERLEY
 Tel. (053) 833 1654
 E-mail: reception@stabilis.co.za

FOR TENDER
 PURPOSES ONLY

DRAWING NO. SK4050/102 REV. A

POSITION PLASING	BAR - STAAF			NO. OFF AANTAL		SKETS MET AFMETINGS DIMENSIONED SKETCH	MASSA MASS
	MARK MERK	DIA	LENGTH LENGTE	IN EA IN ELK	TOTAL TOTAAL		
WASTE OIL BUNDED AREA							
300 THK SLAB	a	Y10	6000	-	7	straight	600 LAP CUT TO SUIT ON SITE
200 WIDE x 300 HIGH BUND WALL	c	Y10	1150	-	52		150 280 200 @1000crs.
1 OFF				-	10m ²	REF. No. 395 MESH	
	st	R10	1000	-	9		c-Y10@250crs in middle Ref. No. 395 mesh in top of slab
DISPENCER HOSE REELS BUNDED AREA							
300 THK SLAB	a	Y10	6000	-	4	straight	600 LAP CUT TO SUIT ON SITE
200 WIDE x 150 HIGH BUND WALL	c	Y10	1000	-	42		400 150 280 200 @1000crs.
1 OFF				-	8m ²	REF. No. 395 MESH	
	st	R10	1000	-	9		c-Y10@250crs in middle Ref. No. 395 mesh in top of slab

**FOR TENDER
PURPOSES ONLY**

NOTES

1. FOR GENERAL NOTES SEE DRAWING -1



The logo consists of a stylized 3D diamond shape above the word "ASSMANG" in a bold, sans-serif font. Below "ASSMANG" is a horizontal line, followed by the words "MANCANIE" and "BLACK ROCK MINE OPERATIONS" stacked vertically.

P.O. Box 187 BOSTON, MA 02101 TEL. (617) 751-5255 FAX. (617) 751-5251	APPROVAL PROJECT MANAGER PROJECT ENGINEER	DATE DATE SCALE	DRAWN BY DESIGN BY PROF. ENGINEER
---	---	-------------------------------	---

CHRIS	PROJECT TITLE
JAN. 2023	BLACKROCK: NCHWANING III
NTS	A1
NTS	A3
DRAWING TITLE	
BENDING SCHEDULE	
CRANE STRUCTURE BASES,	
BARRIER AND FLOOR SLAB	



STABILIS
Development (Pty) Ltd

3 Bishops Ave.
Ganlam Complex
Building D
KUMBERLEY

Tel. (053) 833 1654
email: reception@stabilis.co.za

Tel. (053) 833 1654
mail: reception@stabilis.co.za

Tel. (053) 833 1654
E-mail: reception@stabilis.co.za

POSITION PLASING	BAR - STAAF		NO. OFF AANTAL		SKETS MET AFMETINGS DIMENSIONED SKETCH					MASSA MASS	POSITION PLASING	BAR - STAAF		NO. OFF AANTAL		SKETS MET AFMETINGS DIMENSIONED SKETCH					MASSA MASS		
	MARK MERK	DIA	LENGTH LENGTE	IN EA IN ELK	TOTAL TOTAAL	MARK MERK	DIA	LENGTH LENGTE	IN EA IN ELK			TOTAL TOTAAL											
WASHBAY SUMP AREA LAYOUT																							
SUMP AREA																							
ha	Y12	2450	-	13		100																	
hb	Y12	2350	-	10		100																	
hc	Y12	1050	-	10		100																	
hd	Y12	1250	-	44		100																	
he	Y12	900	-	12		100																	
hf	Y12	1600	-	30		100																	
hg	Y12	2250	-	10		100																	
hh	Y12	2050	-	2		100																	
hi	Y12	2150	-	12		100																	
hj	Y12	950	-	2		100																	
va	Y12	700	-	36		100																	
vb	R10	1300	-	9							220												
vc	Y12	1100	-	76		100																	
vd	Y12	750	-	16		100																	
ve	Y12	1050	-	9		100																	
vf	Y12	950	-	32		100																	
NOTES	1. FOR GENERAL NOTES SEE DRAWING -/1		REFERENCE DRAWINGS		No.	REVISION		DATE	DRAWN	CLIENT	P.O. Box 187 EAST TEL: (053) 731 5555 FAC: (033) 731 5251	APPROVAL	DATE	DRAWN BY	CHRIS	PROJECT TITLE BLACKROCK: NCHWANING III CHARGING BAY II					STABILIS Development(Pty)Ltd 13 Bishops Ave. Sanlam Complex Building D KIMBERLEY Tel: (053) 833 1654 E-mail: reception@stabilis.co.za		
	DRG NO.		TITLE		A	FOR TENDER PURPOSES ONLY	09/03/2023	CJJ			PROJECT MANAGER		DATE	JAN. 2023	NTS	A1							
	SK-----										SCALE		NTS	A1									
											PROJECT ENGINEER		DESIGN BY				DRAWING TITLE BENDING SCHEDULE WASHBAY SUMP AREA LAYOUT						
											PROF ENGINEER		PROF ENGINEER										
																	DRAWING NO.	SK4050/104	REV.	A			



FOR TENDER
PURPOSES ONLY



POSTAL ADDRESS:
P.O. BOX 187
8491, SANTOY
SOUTH AFRICA
TEL: (27 53) 751 5555
FAX: (27 53) 751 5251

BLACK ROCK MINE OPERATIONS

ROUTING OF REPORT

Memo from: Pelonomi Gae – Rock Engineer

Reference: 211-BRMO_Nch 3_PG_03112022_Battery Bay No.2

Route of report as indicated below must be followed. This report must be returned to the Rock Engineering offices within 7 days of initiation date of the report.

Attention:

<u>Mine Manager</u> <u>Mr. J. Jooste</u>	<u>Date Received:</u>	<u>Signature:</u>
<u>Comments:</u>		

<u>Mine Overseer Manager</u> <u>Mr. W. Kwinana</u>	<u>Date Received:</u>	<u>Signature:</u>
<u>Comments:</u>		

<u>Rock Engineer</u> <u>Mrs. P. Gae</u>	<u>Date Received:</u>	<u>Signature:</u>
<u>Comments:</u>		



ASSMANG
MANGANESE

BLACK ROCK MINE OPERATIONS

POSTAL ADDRESS:

P.O. BOX 187

8491, SANTOY

SOUTH AFRICA

TEL: (27 53) 751 5555

FAX: (27 53) 751 5251

Name	Job Title	Distribution format
Mr. M. Schutte	Production Engineer	Email
Mr. J. Jooste	Mine Manager	Email
Mr. W. Kwinana	Mine Overseer	Email
Mr. J. Breet	Senior Production Engineer	Email
Mr. C. Ross	Chief Planner	Email
Mr. S. Jenniker	Manager Mineral Resource	Email

Date: 03rd November 2022

Ref no.: 211-BRMO _Nch 3_PG_03112022_ Battery Charging Bay No.2

Subject: Battery Charging Bay No.2 at Nchwaning 3

1. INTRODUCTION

Black Rock Mine Operation (BRMO) utilises diesel-operated dump trucks to load and haul manganese ore, however due to ventilation constraints, BRMO has opted for battery operated dump truck to eliminate the heat and fume emission from the diesel-operated dump trucks. Battery charging bay as indicated in Figure 1 is required for charging of the batteries operated dump truck.

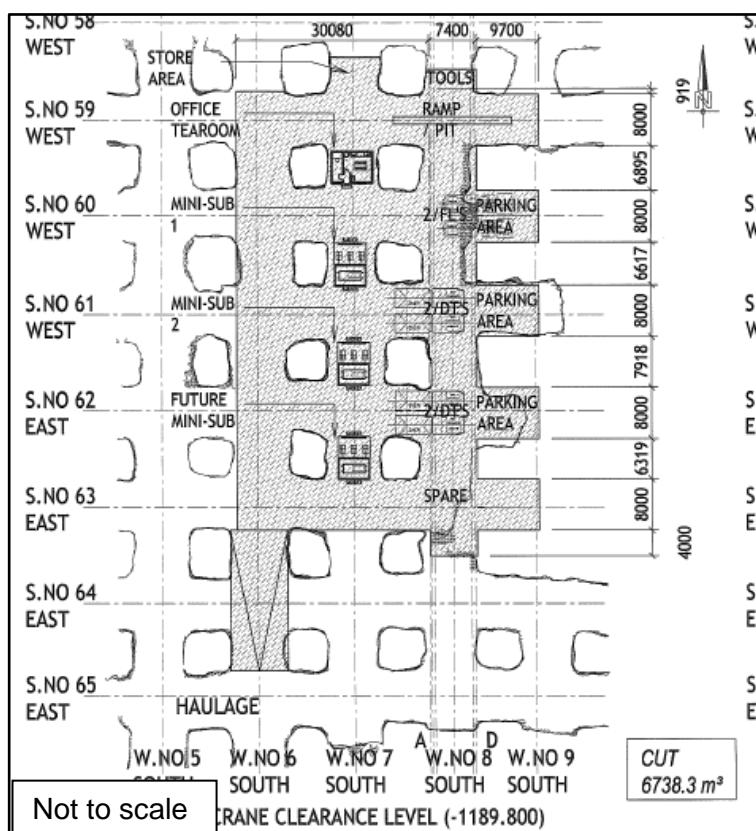


Figure 1: Plan indicating the position of proposed battery bay (hatched pattern)

1.1 PROBLEM STATEMENT

The maximum mining height is 5.0m with allowable mining height of 6.0m as per current pillar design. In order to accommodate cranes which will be used to replace charged batteries, mining heights must be increased to 7.5m around eight pillars. A geotechnical study is required to determine how will increasing the mining height affect the mine layouts and mine stability.

1.2 OBJECTIVES

The objectives of the geotechnical study are as follows:

- Determine the conditions and mining dimensions of the pillars at the position of the proposed battery bay.
- Determine how will increasing the mining height affect the pillar behaviour and overall mine stability based on analytical method and numerical modelling.
- Compile report and make recommendations on how to ensure life of mine stability of the pillars at the battery bay.

2. MINING ENVIRONMENT

BRMO is a bord and pillar mechanised underground manganese mine. the designed mine layouts include maximum bord widths of 8.0m and non-yield pillars with dimensions which are mining depth dependent as indicated in Table 1. Pillar design is based on the Tributary Area Theory (TAT) pillar loading system, Hedley and Grant pillar strength formula. Pillars are designed at minimum Factor of Safety (FOS) of 1.5. the planned position of Battery Bay no.2 is situated at ±425.443 m below surface, therefore, Width to Height ratio (W:H) must range between 1.2 and 1.7.

Table 1: Summary of the pillar dimensions and W:H ratio in relation to mining height and mining depth

Mining depth	Pillar dimensions and W: H ratio at specific mining height											
	H=3.5m		H=4.0m		H=4.5m		H= 5.0m		H=5.5m		H= 6.0m	
	Width	W:H	Width	W:H	Width	W:H	Width	W:H	Width	W:H	Width	W:H
180 – 299m	5.0m	1.4	5.0m	1.3	5.0m	1.1	5.0m	1.0	5.0m	0.9	6.0m	1.0
300 – 349m	5.0m	1.4	5.0m	1.3	5.0m	1.1	6.0m	1.2	6.0m	1.1	6.0m	1.0
350 – 399m	5.0m	1.4	6.0m	1.5	6.0m	1.3	6.0m	1.2	6.0m	1.1	7.0m	1.2
400 – 449m	6.0m	1.7	6.0m	1.5	6.0m	1.3	6.0m	1.2	6.0m	1.1	7.0m	1.2
450 – 499m	6.0m	1.7	6.0m	1.5	7.0m	1.6	7.0m	1.4	7.0m	1.3	8.0m	1.3
500 – 549m	6.0m	1.7	7.0m	1.8	7.0m	1.6	7.0m	1.4	8.0m	1.5	8.0m	1.3
550 – 599m	7.0m	2.0	7.0m	1.8	7.0m	1.6	8.0m	1.6	8.0m	1.5	8.0m	1.3
600 – 649m	7.0m	2.0	7.0m	1.8	8.0m	1.8	8.0m	1.6	9.0m	1.6	9.0m	1.5
650 – 699m	7.0m	2.0	8.0m	2.0	8.0m	1.8	9.0m	1.8	9.0m	1.6	9.0m	1.5
700 – 749m	8.0m	2.3	8.0m	2.0	9.0m	2.0	9.0m	1.8	9.0m	1.6	10.0m	1.7
750 – 800m	8.0m	2.3	8.0m	2.0	9.0m	2.0	9.0m	1.8	10.0m	1.8	10.0m	1.7

3. DATA GATHERED

3.1 LOCAL GEOLOGY

Mining took place on the lower body (Mn 1) exposing manganese as the immediate hangingwall and footwall. No geological structure is intersected in the battery-charging bay no.2 area. Rock mass is classified as good based on Barton Q rating system.

3.2 INSTALLED SUPPORT

The proposed battery bay no.2 area is supported with corroded resin bolts. Spacing of the resin bolts varies between 1.2m and 1.8m across the width, 1.8m and 2.4m along the length of the excavation. It was noted that no support is installed on the hangingwall in some areas as indicated in Figure 2. In supported areas the following support substandard were noted; support installed at an angle less than 80 degrees due to mining height less than 3.6m and resin bolts that are protruding by more than 0.4m and not replaced as indicated in Figure 2.

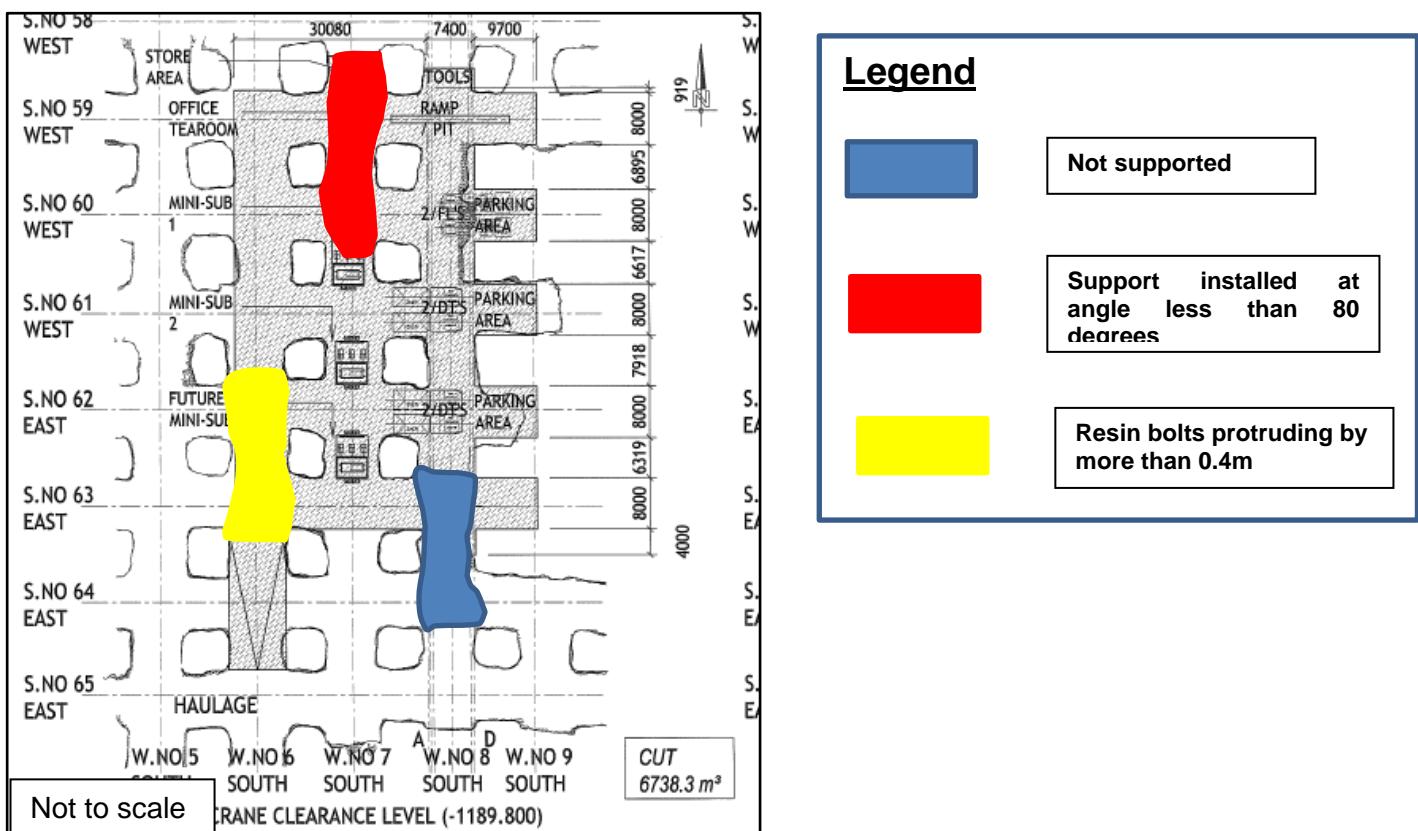


Figure 2: Plan indicating the support installed on the hangingwall at proposed battery bay (hatched pattern)

3.3 MINING LAYOUTS

Battery charging bay is situated 425.443m below surface; pillars were planned at 7.0m by 7.0m with maximum mining height of 5.0m. Figure 3 indicates bord widths around the pillars and Table 2 indicates the pillar dimensions at the battery-charging bay no.2. Bord width ranges between 7.4m and 9.6m.

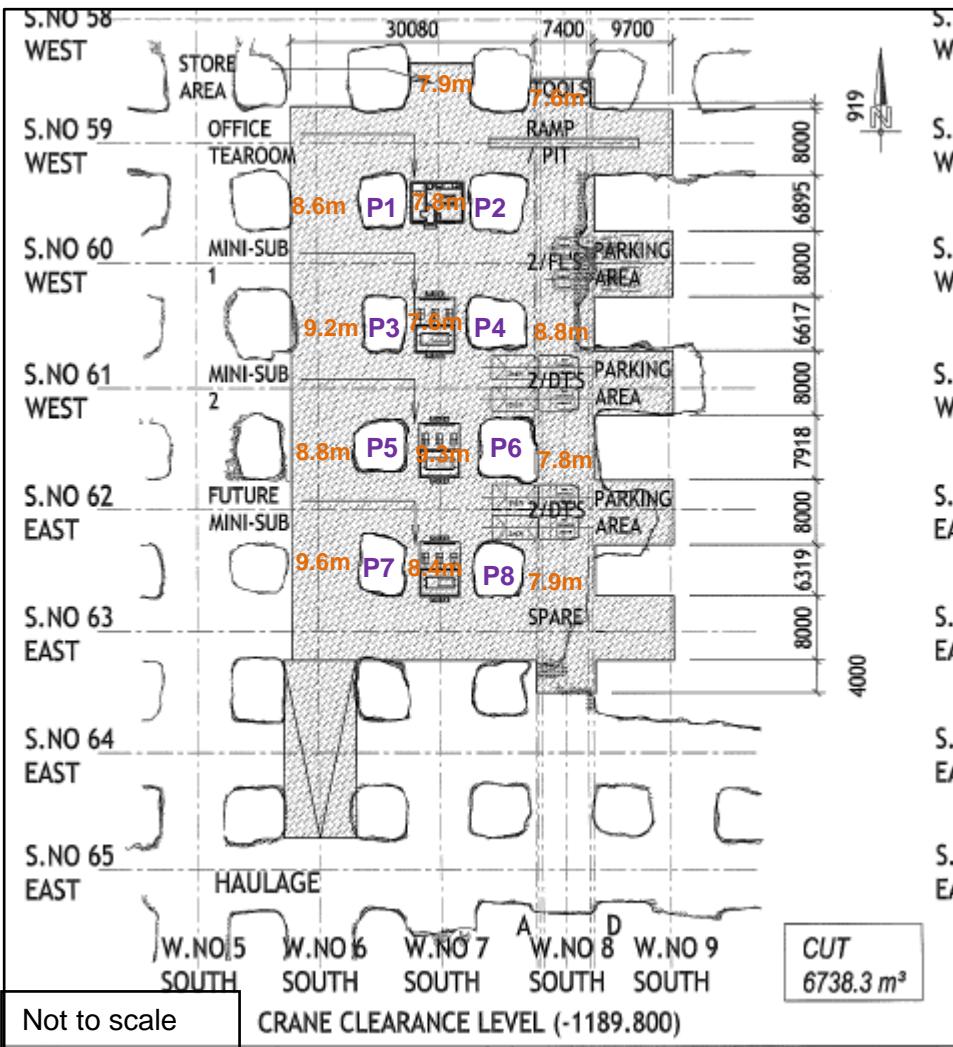


Figure 3: Plan indicating bord width around the pillars where footwall lifting will be conducted.

Table 2: Summary of the actual and planned pillar dimensions

	Pillar length (m)		Pillar width (m)	
	Actual	Planned	Actual	Planned
Pillar 1	8.0	7.0	5.9	7.0
Pillar 2	7.3	7.0	7.3	7.0
Pillar 3	5.0	7.0	7.1	7.0
Pillar 4	7.0	7.0	6.3	7.0
Pillar 5	6.4	7.0	5.8	7.0
Pillar 6	6.4	7.0	6.6	7.0
Pillar 7	6.1	7.0	8.1	7.0
Pillar 8	6.8	7.0	5.6	7.0

3.4 PILLAR DESIGN

3.4.1 PILLAR STRENGTH

Pillar strength is determined from Hedley and Grant pillar strength formula;

$$P_s = k \frac{w^{0.5}}{h^{0.75}}$$

K value of 133 MPa obtained from the back analysis is applied across the shaft. The back analysis was completed by conducting underground visits to sites where sub-standard pillar dimensions have been reported, taking measurements (pillar dimensions, bord widths and mining heights), making observations

(presence of scaling from joints, occurrence of stress fracturing and pillar failure) and then calculating the appropriate rock mass strength for this environment.

3.4.2 AVERAGE PILLAR STRESS (APS)

APS is determined from TAT as follows:

$$APS = \frac{\sigma_v}{1 - e}$$

Overburden density of 2800 kg/m³ is applied throughout the shaft, which is the average overburden density.

3.4.3 FACTOR OF SAFETY (FOS) AND WIDTH TO HEIGHT RATIO (W: H)

Table 3 indicate summary of FOS and W: H for the current mining layout at the battery-charging bay prior to increasing mining heights. FOS ranges between 1.3 and 2.3 with the W: H ranging between 1.1 and 1.6, which is within the mine standard.

Table 3: Factor of Safety and Width to Height ratio of the pillars before increasing mining heights

	Pillar length (m)	Pillar width (m)	Mining height (m)	W:H ratio	FOS
Pillar 1	8.0	5.9	5.0	1.2	1.8
Pillar 2	7.3	7.3	5.0	1.5	2.3
Pillar 3	5.0	7.1	5.0	1.4	1.3
Pillar 4	7.0	6.3	5.0	1.3	1.6
Pillar 5	6.4	5.8	5.0	1.2	1.5
Pillar 6	6.4	6.6	5.0	1.3	1.6
Pillar 7	6.1	8.1	5.0	1.6	1.7
Pillar 8	6.8	5.6	5.0	1.1	1.6

4. ANALYSIS OF DATA

Increase in mining height at the battery-charging bay will affect the pillar behaviour. Stacey, 2001 states that pillar behaviour is a function of the following:

- Pillar loading
 - Stress induced on the pillar determines whether the pillar will fail or not and it is a function of virgin stress and extraction ratio.
- Pillar strength
 - Strength of the pillar material determines whether the pillar will fail or not and it is a function of k value, pillar width and mining height.
- Pillar width to height ratio
 - Determines post-failure behaviours (brittle or ductile).

4.1 PILLAR LOADING

Pillar loading is the weight of the overburden working on the area of remaining solid pillars. This would tend to indicate that any change in the overburden density and extraction ratio would affect the loading on the pillars.

- Overburden density

- Increase in mining height does not affect overburden density.
- Average overburden of 2.8t/m³ is applied throughout all the pillars.
- Extraction ratio
 - Increasing the mining height will not affect the extraction ratio.

Table 3 indicates that based on TAT, an increase in mining height at the battery-charging bay will not increase pillar loading.

Table 4: Summary of the FOS and W: H ratio as the mining height increases

	Pillar length (m)	Pillar width (m)	Mining height (m)	W:H ratio	Average pillar stress (MPa)	Pillar strength (MPa)	FOS
Pillar 1	5.9	8.0	5.0	1.2	58.5	103.7	1.8
			5.5	1.1	58.5	96.5	1.7
			6.0	1.0	58.5	90.4	1.5
			6.5	0.9	58.5	85.1	1.5
			7.0	0.8	58.5	80.5	1.4
			7.5	0.8	58.5	76.5	1.3
Pillar 2	7.3	7.3	5.0	1.5	46.1	107.5	2.3
			5.5	1.3	46.1	100.1	2.2
			6.0	1.2	46.1	93.7	2.0
			6.5	1.1	46.1	88.3	1.9
			7.0	1.0	46.1	83.5	1.8
			7.5	1.0	46.1	79.3	1.7
Pillar 3	5.0	7.1	5.0	1.4	77.1	96.4	1.3
			5.5	1.3	77.1	89.7	1.2
			6.0	1.2	77.1	84.0	1.1
			6.5	1.1	77.1	79.1	1.0
			7.0	1.0	77.1	74.9	1.0
			7.5	0.9	77.1	71.1	0.9
Pillar 4	7.0	6.3	5.0	1.3	63.3	102.4	1.6
			5.5	1.3	63.3	95.4	1.5
			6.0	1.2	63.3	89.3	1.4
			6.5	1.1	63.3	84.1	1.3
			7.0	1.0	63.3	79.6	1.3
			7.5	1.0	63.3	75.6	1.2
Pillar 5	6.4	5.8	5.0	1.2	66.2	98.1	1.5
			5.5	1.1	66.2	91.4	1.4
			6.0	1.0	66.2	85.6	1.3
			6.5	0.9	66.2	80.6	1.2
			7.0	0.8	66.2	76.2	1.2
			7.5	0.8	66.2	72.4	1.1
Pillar 6	6.4	6.6	5.0	1.3	64.8	101.4	1.6
			5.5	1.2	64.8	94.4	1.5
			6.0	1.1	64.8	88.4	1.4
			6.5	1.0	64.8	83.3	1.3
			7.0	0.9	64.8	78.8	1.2
			7.5	0.9	64.8	74.8	1.2
Pillar 7	6.1	8.1		1.6	63.0	104.9	1.7
				1.5	63.0	97.7	1.5

				1.4	63.0	91.5	1.5
				1.2	63.0	86.2	1.4
				1.2	63.0	81.5	1.3
				1.1	63.0	77.4	1.2
Pillar 8	6.8	5.6		1.1	62.0	98.6	1.6
				1.0	62.0	91.8	1.5
				0.9	62.0	86.0	1.4
				0.9	62.0	81.0	1.3
				0.8	62.0	76.6	1.2
				0.7	62.0	72.7	1.2

4.2 PILLAR STRENGTH

Pillar strength is the function of rock mass strength, pillar width and mining height. For this report, rock mass strength and pillar width will not be analysed, only the pillar height will be analysed. Table 4 indicates that, the increased pillar height reduces the pillar strength.

4.2.1 PILLARS WIDTH TO HEIGHT RATIO

According to Stacey 2001, width to height ratio affects the post failure behaviour of the pillars. The higher the width: height ratios, the more ductile the post failure behaviour becomes, while lower width: height ratios give rise to sudden brittle failures as indicated in Figure 4 .

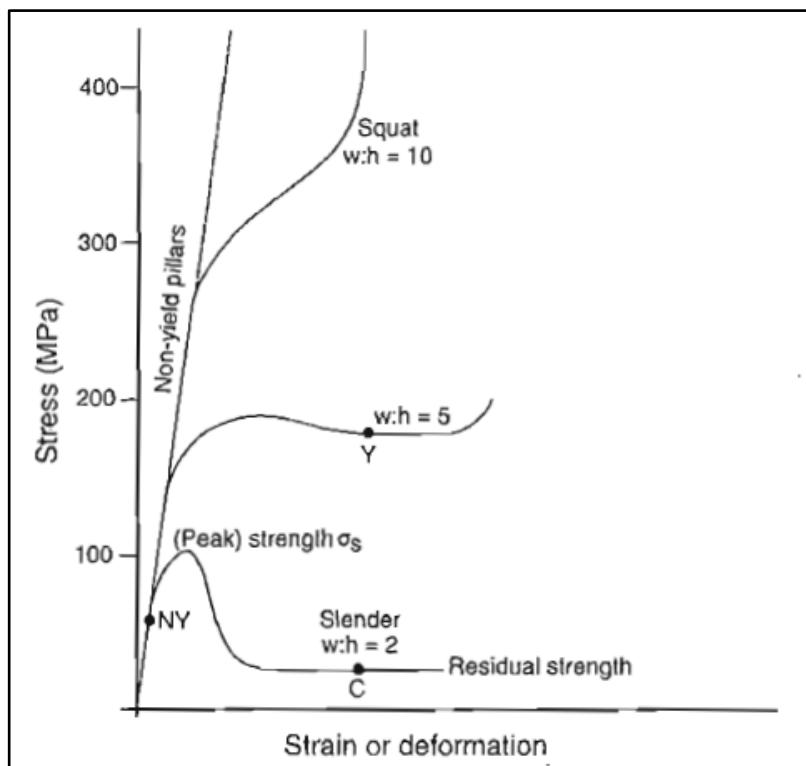


Figure 4: Stress: strain behaviour of hard rock pillars of different width to height ratio after Ryder and Jager (1999)

Table 4 indicates that W:H ratio decreases with increased mining height. Non-yield pillars are used in BRMO to support the overburden up to the surface, therefore increasing mining height will change the pillar type from non-yield pillars to yield pillars as indicated in Figure 4. According to Ryder and Jager (2002), yield pillars are designed such that the pillars can maintain constant stress after the yield point.

4.3 FACTOR OF SAFETY (FOS)

FOS is the ratio of Pillar strength to Average Pillar stress. Non-yield pillars at BRMO are designed at FOS of 1.5. Table 5 indicates that there is a significant variance between factor of safety at maximum mining height of 5.0m and 7.5m. Table 5 indicates that at maximum mining height of 7.5m seven of the pillars indicated in Figure 3 will have a factor of safety less than 1.5 and one pillar will have a factor of safety less than 1.0. According to Ryder and Jager (2002), pillars with factor of safety less than one are classified as crush pillars, experience has indicated that pillar with factor of safety of 0.7 are still stable in BRMO and have not failed.

Table 5: Summary of factor safety based

	Pillar length (m)	Pillar width (m)	Mining height (m)	W:H ratio	Average pillar stress (MPa)	Pillar strength (MPa)	FOS
Pillar 1	5.9	8.0	5.0	1.2	58.5	103.7	1.8
			7.5	0.8	58.5	76.5	1.3
Pillar 2	7.3	7.3	5.0	1.5	46.1	107.5	2.3
			7.5	1.0	46.1	79.3	1.7
Pillar 3	5.0	7.1	5.0	1.4	77.1	96.4	1.3
			7.5	0.9	77.1	71.1	0.9
Pillar 4	7.0	6.3	5.0	1.3	63.3	102.4	1.6
			7.5	1.0	63.3	75.6	1.2
Pillar 5	6.4	5.8	5.0	1.2	66.2	98.1	1.5
			7.5	0.8	66.2	72.4	1.1
Pillar 6	6.4	6.6	5.0	1.3	64.8	101.4	1.6
			7.5	0.9	64.8	74.8	1.2
Pillar 7	6.1	8.1	5.0	1.6	63.0	104.9	1.7
			7.5	1.1	63.0	77.4	1.2
Pillar 8	6.8	5.6	5.0	1.1	62.0	98.6	1.6
			7.5	0.7	62.0	72.7	1.2

5. DISCUSSION

Increasing the mining height will reduce pillar strength and width to height ratio. According to Ryder, J.A. and Jager, A.J. (2002) when the pillar strength is exceeded by the applied pillar load, the pillars begin to shed load until it reaches its residual strength. When pillars operate at residual strength, pillar-fracturing occurs, and pillars are unable to support the overburden weight. As a result, the load is transferred to the neighbouring pillars. Pillar fracturing and load transfer to the neighbouring pillars need to be contained by means of support and regional pillars.

5.1 SUPPORT

When a pillar begins to fail, spalling off on the sides of the pillar occurs. In order to contain and prevent spalling, pillars must be supported as follows:

- Wire mesh
 - Contain small fragments of rock that are scaling from the pillars.
 - Ability to absorb large displacements without completely failing.

- Wire rope lacing
 - According to the experiment that was conducted by Alejano, L.R., (2017), when the pillars are wrapped with wire rope lacing, dilation occurs in a controlled manner, and it can also maintain the residual strength of the pillar. Over wire mesh, lacing is a proven surface support capable of containing major yielding of rock mass.
- Shotcrete
 - Strengthen the skin of the rock mass by bonding with the rock surface on the pillars and penetrate cracks formed by slabbing securing rock fragments that dislodge from the pillars.

5.2 LOAD ON THE PILLARS

5.2.1 REGIONAL PILLARS

At increased mining height the stress-strain behaviour of non-yield pillars changes from ductile behaviour to brittle behaviour, which also changes the function of the pillars from non-yield pillars to yield pillars. According to Ryder, J. A. and Jager, A. J. (2002), when non-yield pillars are used, regional pillars are required to support the overburden to surface and compartmentalise the battery bay thus ensuring that pillar run does not occur. Figure 6 indicates that there are large unmined blocks around the batter bay that may be used as regional pillars.

5.2.2 MULTI SEAM MINING

Middling between battery bay and upper seam is 18.0m, based on the study conducted by Hanekom, J. (2011), multi seam must not be conducted in areas with mining height is more than 6.5m.

6. CONCLUSION

Increased mining height has reduced the factor of safety to less than 1.5 and width to height ration to less than 1.3. Reduced pillar factor of safety and width to ratio will change the pillar behaviour from elastic behaviour to brittle and ductile pillar behaviour. Support and mining layout will be used to control the anticipated pillar behaviour and ensure life of mine stability of the battery bay no.2.

7. RECOMMENDATIONS

7.1 SUPPORT

- Primary support
 - Re-support the hangingwall with 2.0m long resin grouted resin bolts, spaced 2.0m along the length and 1.5m across the width the width of the excavation as indicated in Figure 5.
- Secondary support
 - To contain the pillar fracturing or scaling that might occur on the pillars due to low pillar strength the following support recommendation must be adhered to:
 - Apply 25mm thick Fiber-crete on the hangingwall once primary support has been installed as indicated in Figure 5.

- Apply 25mm thick Fiber-crete on the pillars from hangingwall to footwall.
- Once footwall lifting has been completed, pillars will be assessed to determine whether mesh and strapping of the pillars is required.

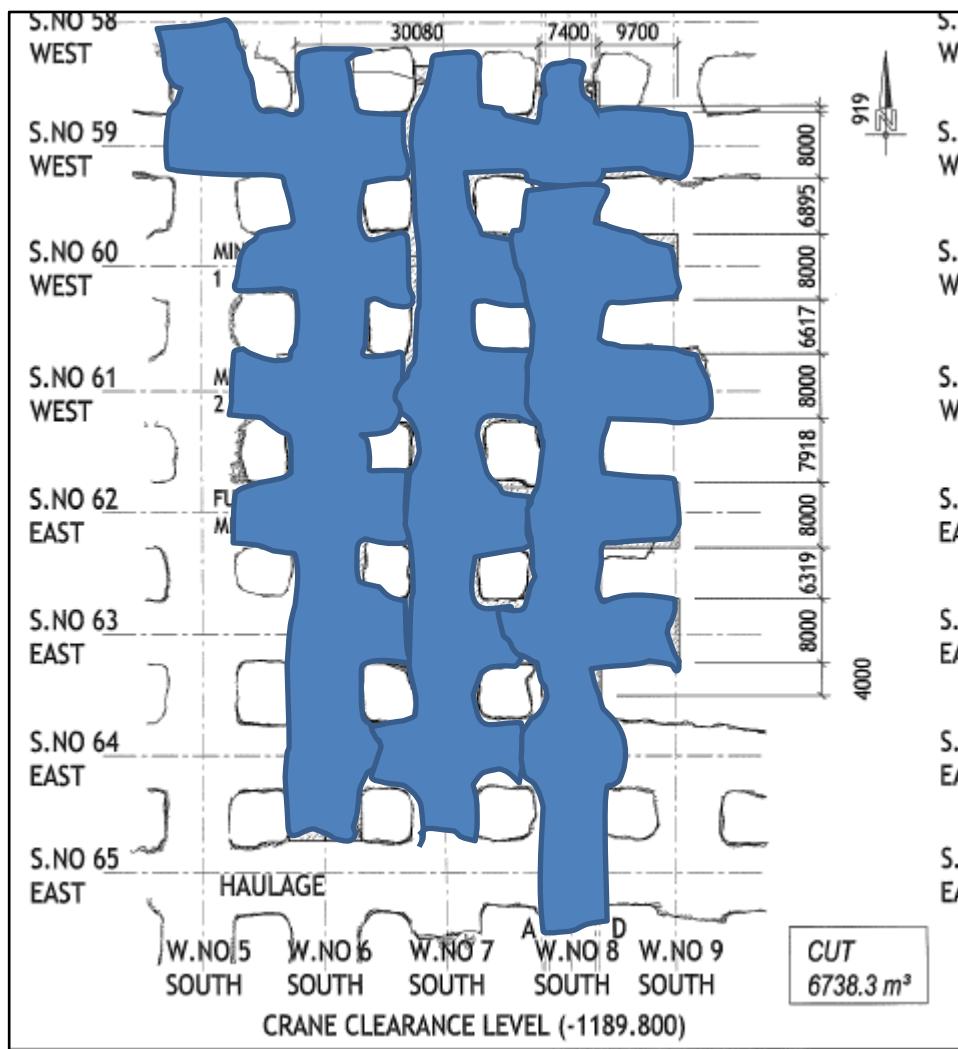


Figure 5: Plan indicating hangingwall that must be supported with both primary (resin bolts) and secondary support.

7.2 MINING LAYOUTS

To prevent increased average pillar stress due to load redistribution the following must be adhered to:

- Unmined blocks around the battery bay to be left unmined as indicated in Figure 6 to act as regional pillars.
- Multi seam mining must not be carried out on the upper manganese seam above the battery bay as indicated in Figure 7.



Figure 6: Plan indicating unmined block around battery bay that must not be mined in future.

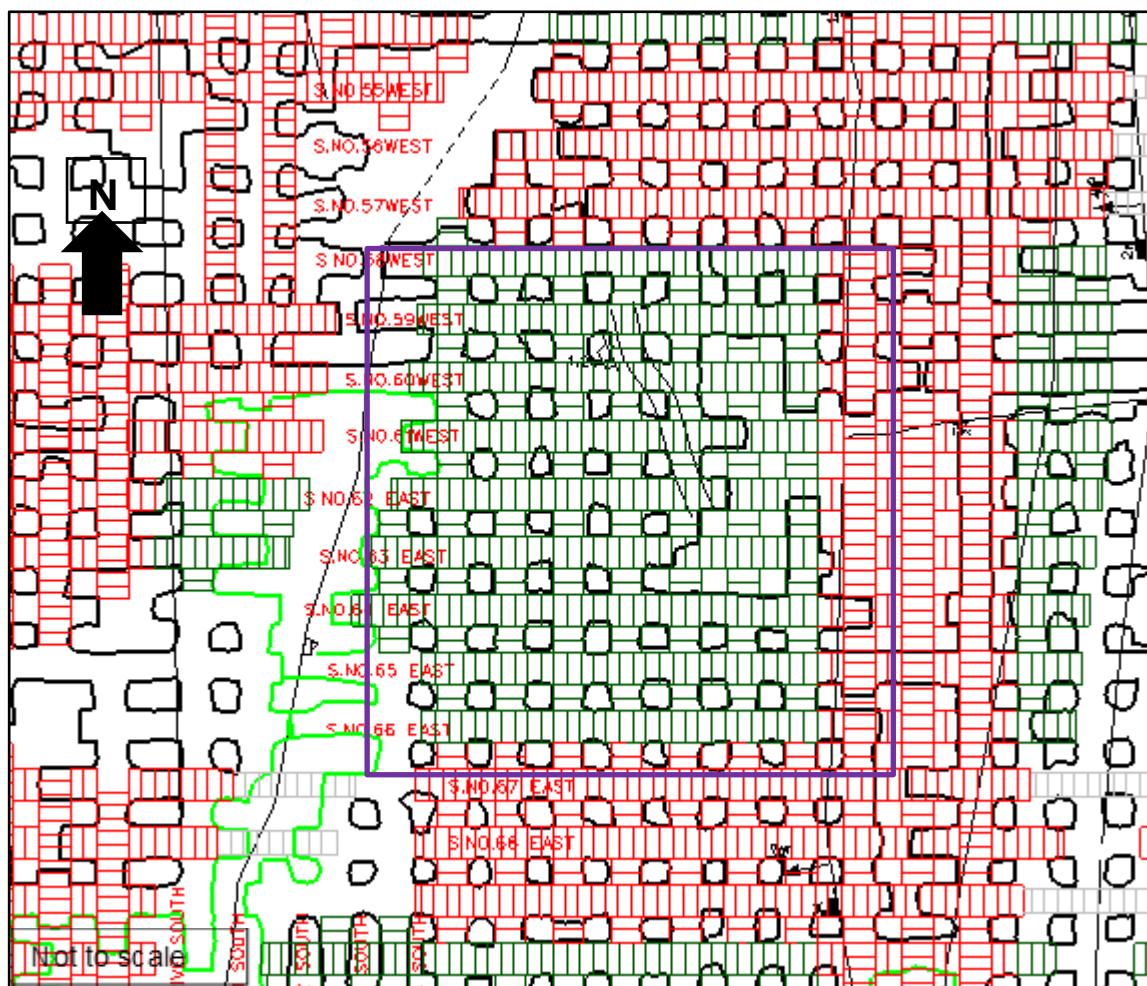


Figure 7: Plan indicating protection pillar that must be left unmined on seam 2 above the battery bay no. 2.

7.3 BLASTING

- Survey notes indicating the maximum footwall to be blasted must be signed off by the relevant mining personnel and Rock Engineer prior to footwall blasting.
- No slipping of the pillars must be conducted without consultation and approval from the Rock Engineer.
- 3D Scan must be conducted after blasting to ensure that mining layouts are adhered to the approved mine design.

Compiled by
Rock Engineer

