NALA LOCAL MUNICIPALITY

CONTRACT No. NLM/TS/006/2025-26

CONSTRUCTION OF BOTHANIA 9 PUMP STATION IN KGOTSONG

TENDER DRAWINGS

Nala Local Municipality
Private Bag X15
Bothaville
9660
Tel: 053 998 4455

Contact Person: Mr. IJ Mokotedi
Email: my1wa@yahoo.com

BVi Consulting Engineers (Central)
17 President Steyn Avenue
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Contact Person: Mr. JL Reynders
Email: janr@bvi.co.za

NOTES / LEGEND

- SEWER PIPE (BY OTHERS)
- NEW SEWER PIPE
- NEW RISING MAIN
- WATERCOURSE
- SEWER MH (BY OTHERS)
- NEW SEWER MANHOLE
- SLEEVE PIPE (HDD)
- SLIPLINING
- ENV. BUFFER ZONE
- TELEPHONE LINE
- POWERLINE

MANHOLE LABELS: MANHOLE NAME / COVER LEVEL (m) / INVERT LEVEL (m) / DEPTH (m)

SEWER PIPE LABELS: PIPE LENGTH x PIPE Ø, MATERIAL / PIPE FLOW/CAPACITY @ SLOPE

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES		SUITABILITY CODES	
A,B,C...	BEFORE TENDER	IFI	ISSUED FOR INFORMATION
T0, T1, T2...	FOR TENDER	FAC	FOR ACCEPTANCE CONTROL
0, 1, 2...	CONSTRUCTION	IFR	ISSUED FOR REVIEW
Z	AS-BUILT	IFC	ISSUED FOR CONSTRUCTION
		ASB	AS-BUILT

DRAWING REVISION

DATE	INITIAL	NO./CODE	REVISION DESCRIPTION

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CLIENT

KGOTSO PULA

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

LOCALITY PLAN

APPROVED BY BVI

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

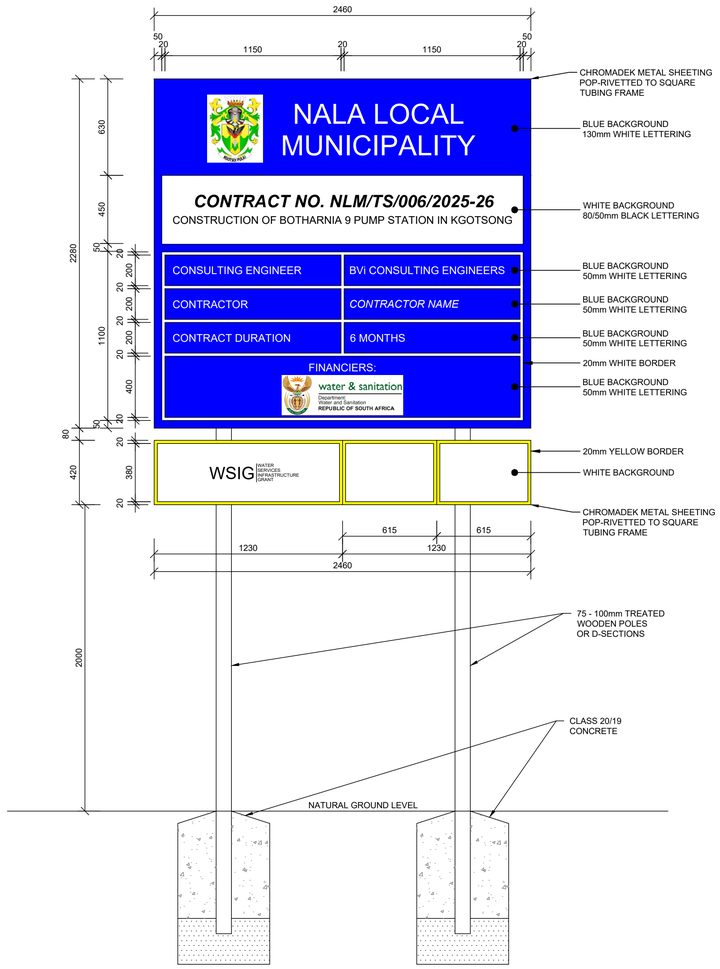
SCALE	1:5000 @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

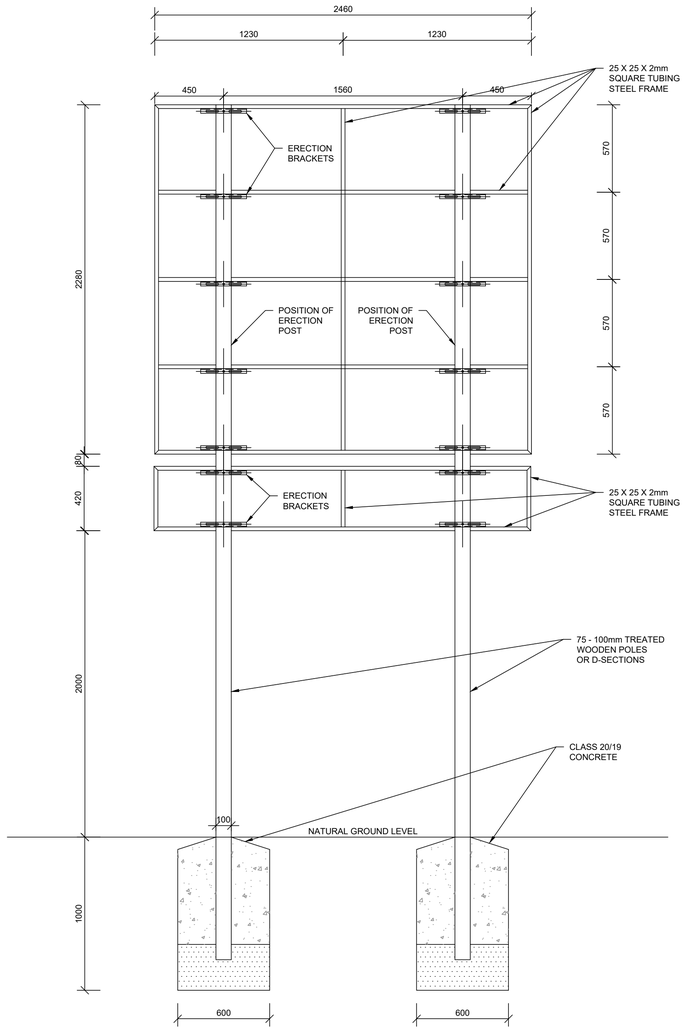
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

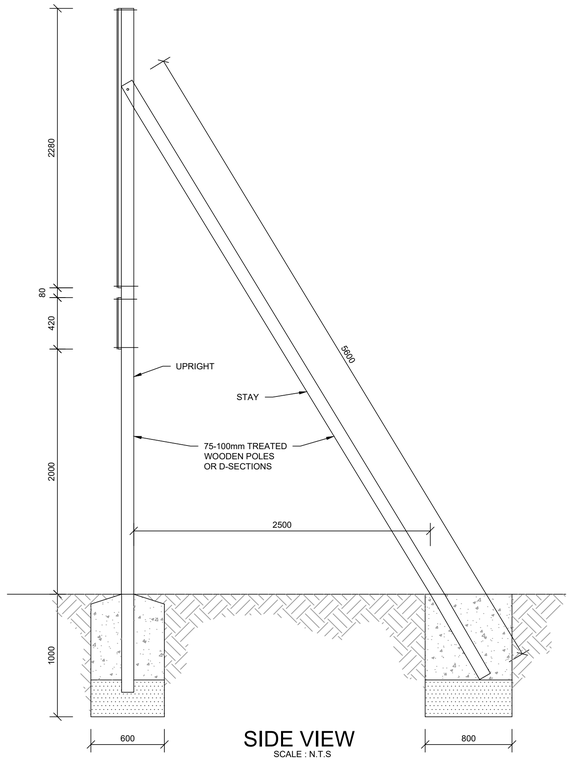
35563-BCN-ZZZ-00-DR-CIV-001-TS-001



CONTRACT BOARD DETAIL
SCALE 1:20

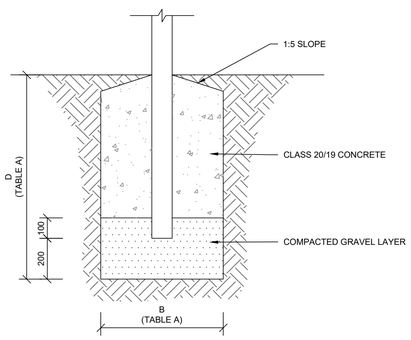


BACK VIEW
SCALE 1:20

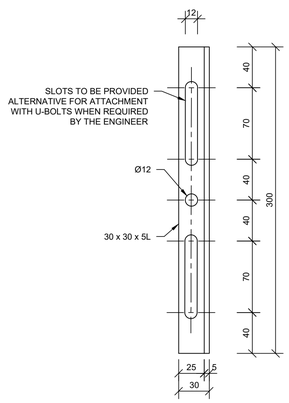


SIDE VIEW
SCALE : N.T.S

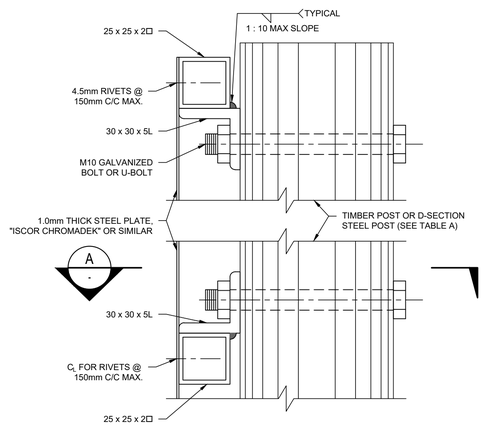
TABLE A				
ERECTION DETAILS				
POST TYPE	UPRIGHT	STAY	D	B
TIMBER POST AND STAY	100mm	80mm	1000mm	800mm
TIMBER POST	180mm	-	1000mm	600mm
D SECTION STEEL POST	100mm x 4mm	-	1000mm	600mm



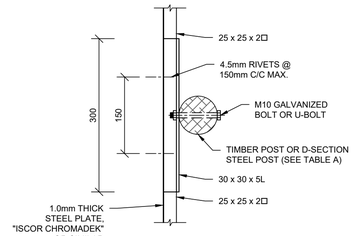
TYPICAL POST FOOTING DETAIL
SCALE N.T.S.



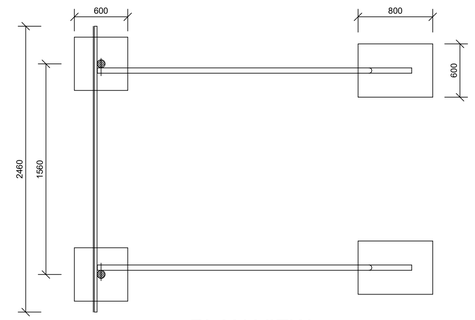
ELEVATION OF ERECTION BRACKET
SCALE N.T.S



SIDE ELEVATION OF ERECTION BRACKET
SCALE N.T.S



SECTION A
SCALE 1:15



PLAN VIEW
SCALE : N.T.S

NOTES / LEGEND

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES			SUITABILITY CODES		
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CLIENT

PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

TYPICAL PROJECT NAMEBOARD DETAILS

APPROVED BY BVi

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

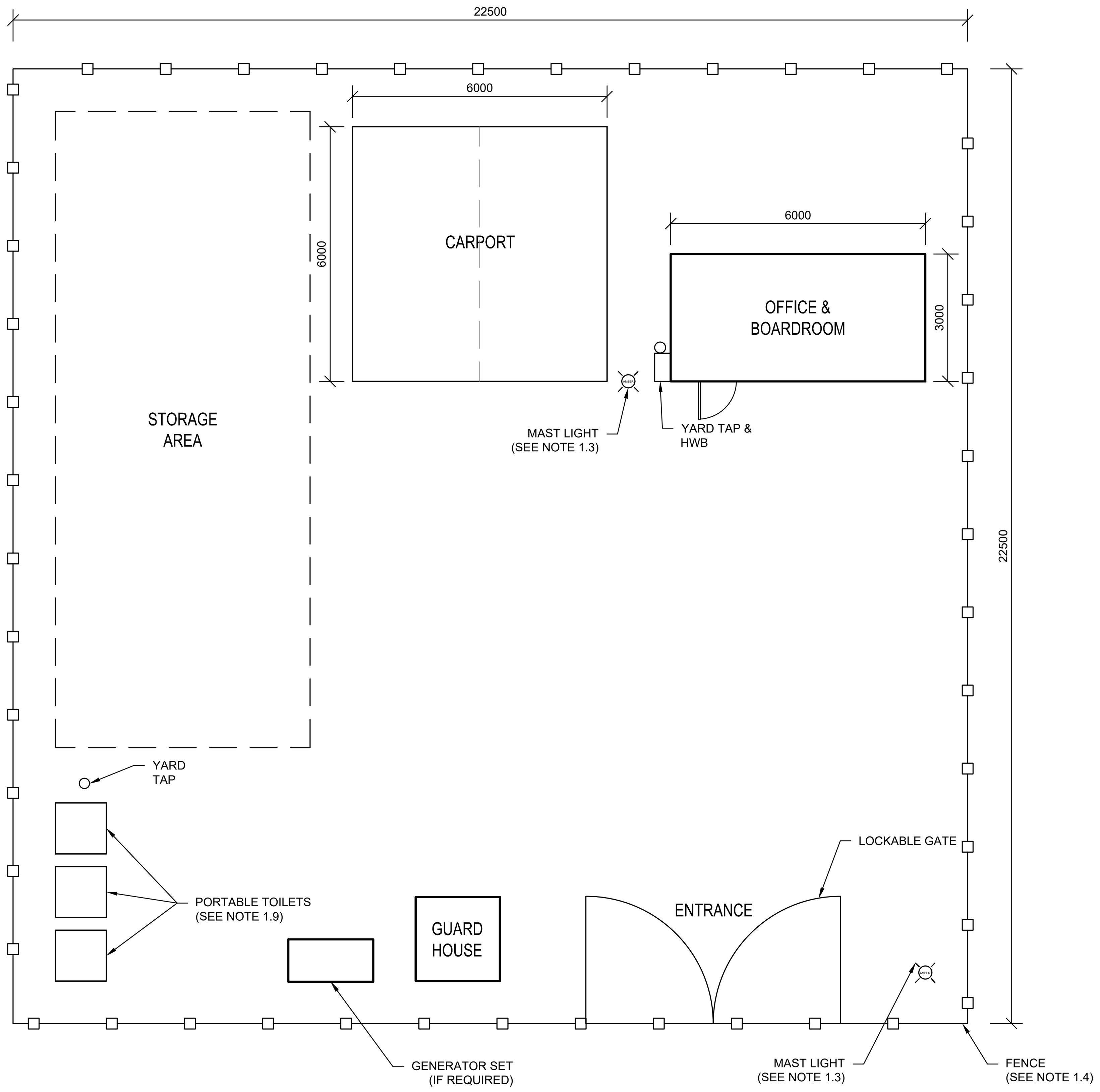
SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

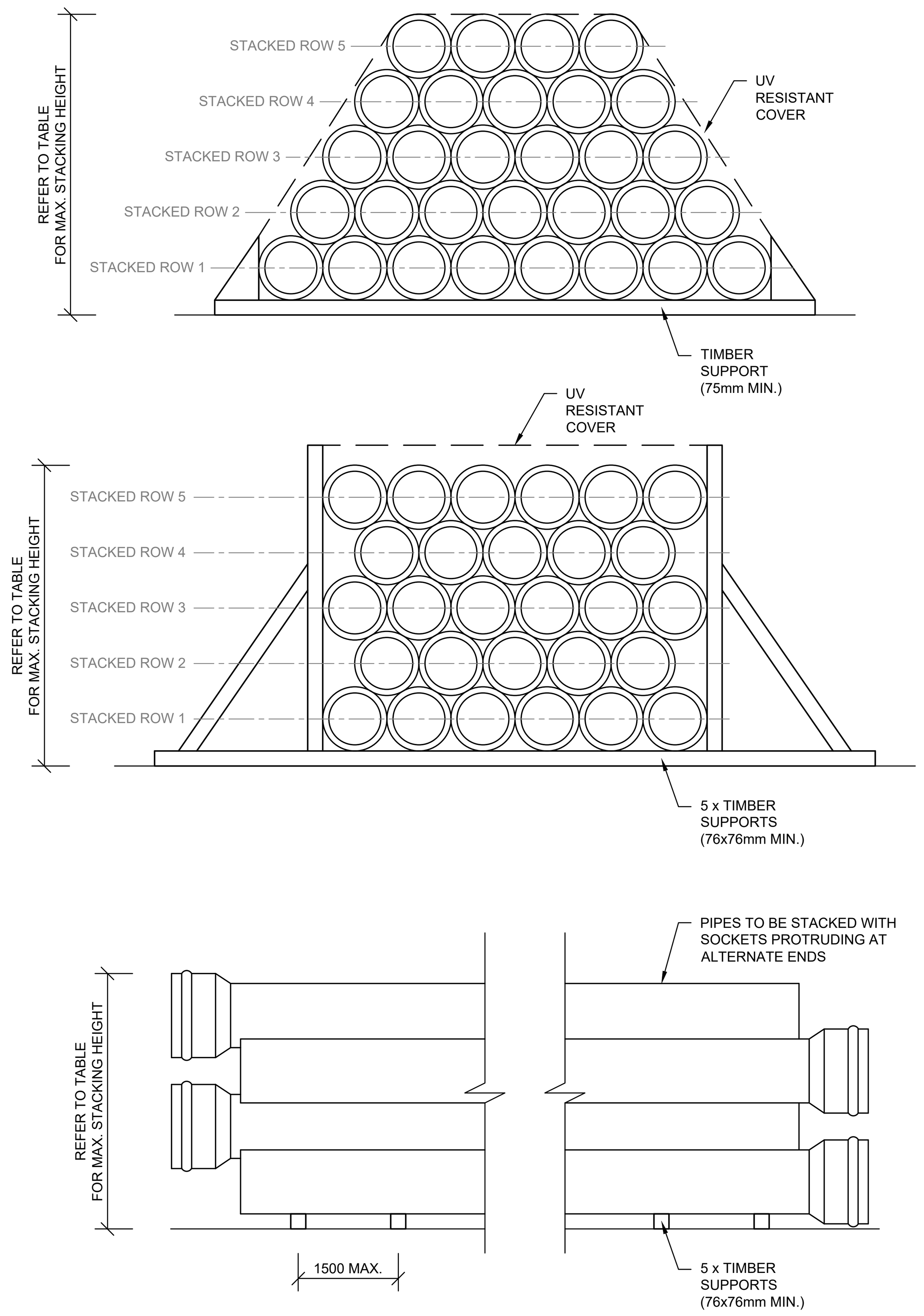
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-002-TS-001



TYPICAL SITE CAMP LAYOUT
SCALE 1:100



PIPE STORAGE GUIDELINES
N.T.S.

PIPE STORAGE
- PIPES SHOULD BE STORED ON LEVEL, FLAT GROUND, FREE OF STONES OR SHARP PROTRUSIONS.
- ALTERNATIVELY, PIPES MAY BE STORED ON TIMBER SUPPORTS OF AT LEAST 76x76mm WIDTH, PLACED MAX. 1.5m APART, WITH SIDE SUPPORTS (±5 SUPPORTS PER 6.0m LENGTH).
- ALL PIPE STACKS AND STORED FITTINGS SHOULD BE COVERED TO AVOID PROLONGED EXPOSURE TO DIRECT SUNLIGHT.
- WHERE THE PIPES ARE FITTED WITH AN INTEGRAL SOCKET, THEY SHOULD BE STACKED WITH SOCKETS PROTRUDING AT ALTERNATE ENDS.
- ALL PLASTIC PIPES MUST BE COVERED WITH UV-RESISTANT SHADE CLOTH OR TARPS DURING STORAGE TO PREVENT SUN EXPOSURE AND HEAT DISTORTION. ENSURE THAT COVERS ALLOW FOR ADEQUATE VENTILATION TO AVOID MOISTURE BUILDUP. PIPES SHOULD BE SECURELY STORED ON RACKS OR SIMILAR STRUCTURES TO MAINTAIN STABILITY.

STORAGE STACKS	
PIPE DIAMETER	MAX. NO. OF ROWS STACKED
200mm OR LESS	5
300 TO 530mm	4
600 TO 760mm	3
840 TO 1220mm	2

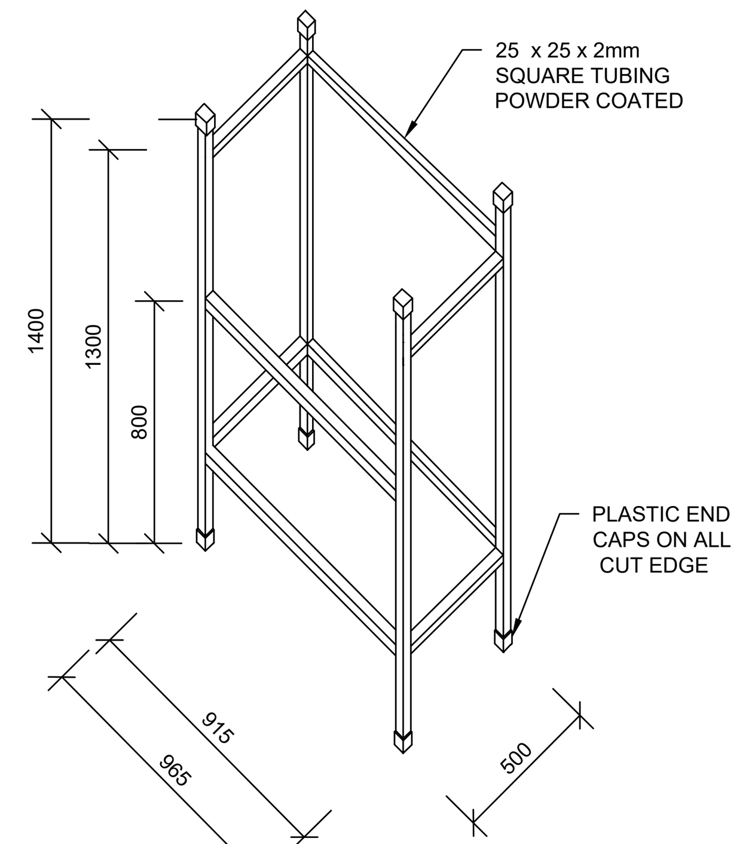
NOTES:

1. CAMP
1.1 CLEAR, GRUB AND GRADE THE SITE TO BE SELF DRAINING.
1.2 SITE TO BE COVERED WITH 75mm THICK 19mm CRUSHED STONE THROUGHOUT TO ALLEVIATE DUST AND MUDDY CONDITIONS.
1.3 MAST LIGHTS TO BE PROVIDED WITH 5m HIGH WOODEN MAST, 500 WATT GLOBE & DAY/NIGHT SWITCH.
1.4 FENCING MUST BE 2.1m HIGH RAZOR WIRE MESH, INCL. RAZOR FLAT WRAP ON TOP.
1.5 A FULL TIME GATE GUARD MUST BE PROVIDED WITH A GUARD HOUSE.
1.6 THE GUARD HOUSE MUST BE A 2.1m x 2.1m MODEL FROM RENT A SHED (WWW.RENTASHED.CO.ZA) OR SIMILAR APPROVED, INCL. A CHAIR.
1.7 STEPS MUST BE PROVIDED AT ALL OFFICE ENTRIES.
1.8 1 x PART TIME CAMP ASSISTANT SHOULD BE PROVIDED FOR CLEANING.
1.9 3 x CHEMICAL TOILETS MUST BE PROVIDED (FLUSHABLE).
1.10 80% SHADE CLOTH TO BE FIXED ON THE INSIDE OF FENCING (IF SPECIFIED).
1.11 THE GALVANISED ROOF SHEETING (0.6mm THICK) CARPORT SHOULD DRAIN TOWARDS THE BACK OF THE STRUCTURE (OPPOSITE THE ACCESS POINT). THE SIDES AND BACK OF CARPORT MUST BE CLOSED WITH SHADE NETTING. THE STRUCTURE OF THE CARPORT MUST BE APPROVED BY A REGISTERED STRUCTURAL ENGINEER.
1.12 A 20m GARDEN HOSE MUST BE PROVIDED.
1.13 THE CLO AND/OR LDO OFFICES NEED TO BE LOCATED OUTSIDE OF THE ENGINEER'S CAMP.

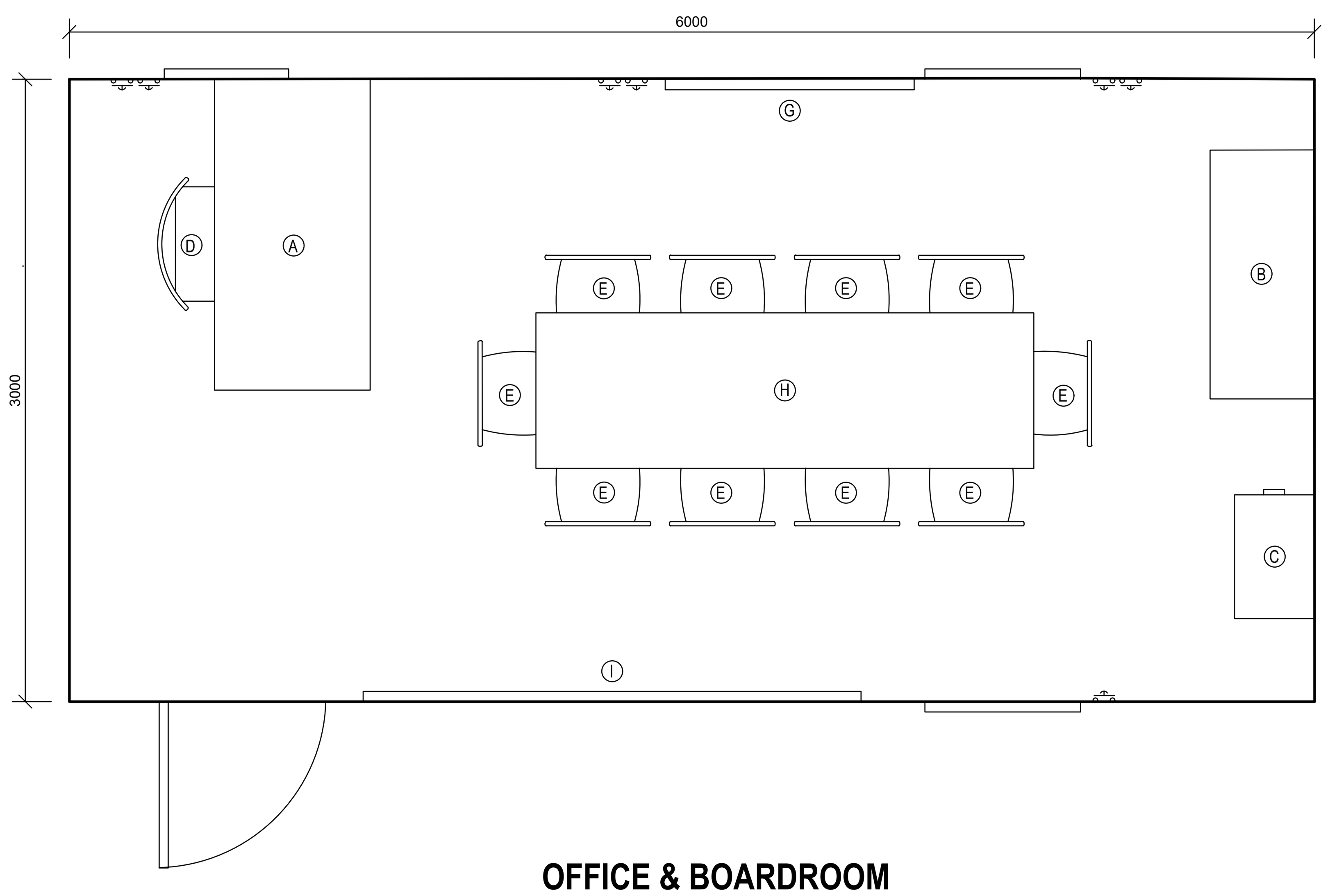
2. OFFICE & BOARDROOM
2.1 OFFICE & BORDROOM MUST BE A KWIKSPACE MODULAR BUILDINGS LTD
2.2 A 12000 BTU SPLIT AIRCONDITIONING UNIT (LG) MUST BE PROVIDED.
2.3 KWIKSPACE BLINDS AND BURGLAR PROOFING MUST BE INSTALLED IN ALL OFFICES.
2.4 OFFICES SHOULD BE CLEANED ON A DAILY BASIS.

OFFICE FURNITURE (ALL FURNITURE TO BE NEW)
A. 1500 x 750mm OAK MELAMINE DESK INCLUDING DRAWERS
B. DRAWING RACK - SEE DETAIL 1
C. HALF FILING CABINET
D. 1 x ROTATING HIGH BACK CHAIR
E. 10 x RICKSTACKER CHAIRS
F. PLASTIC ROUND WASTE BIN
G. 1.5m x 1.2m MAGNETIC WHITE BOARD
H. 2400 x 900mm BOARDROOM TABLE
I. 2.4m x 1.2m SOFT PIN BOARD

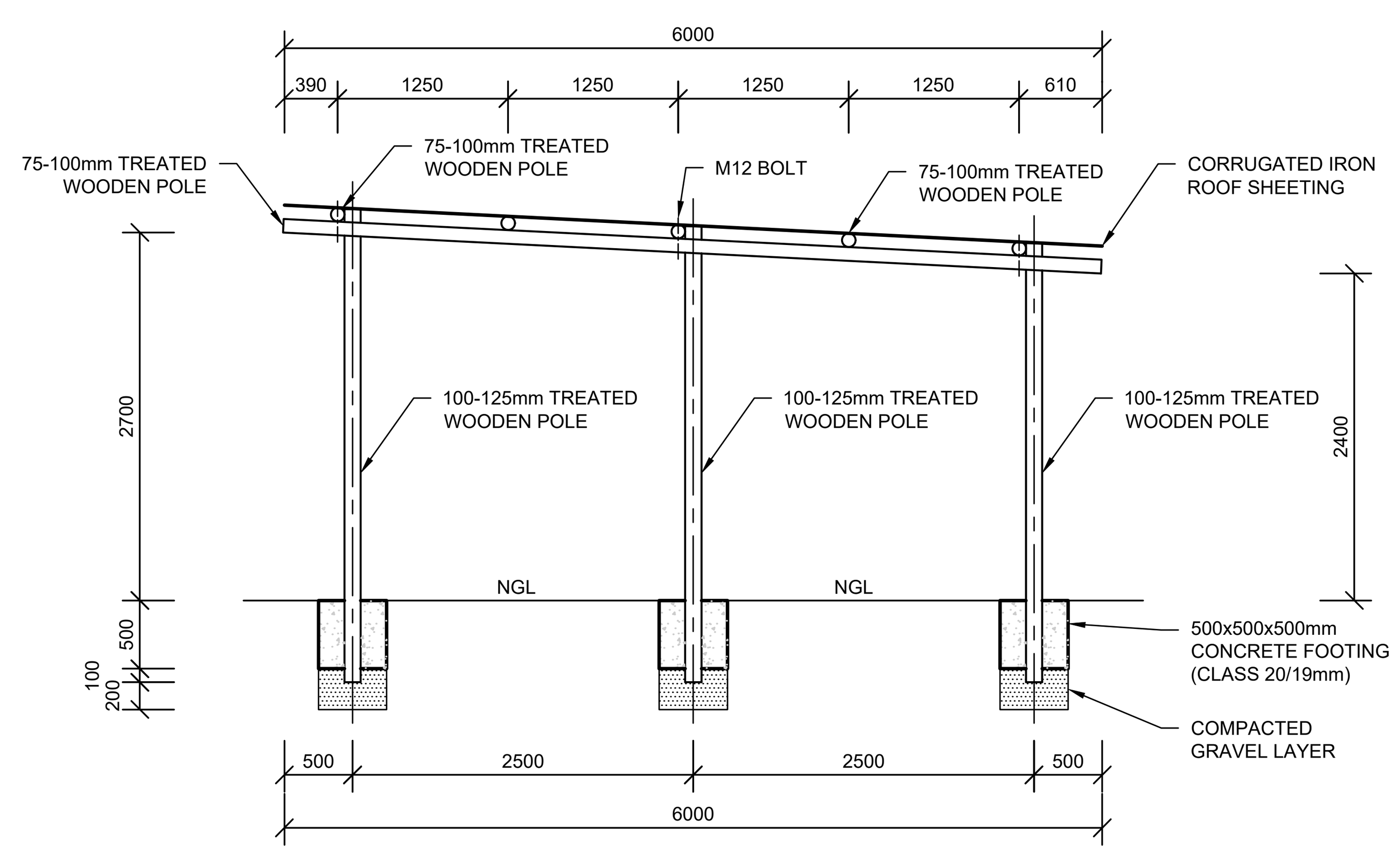
3. CONTRACTS MANAGER COMMUNICATION PACKAGE(S)
3.1 LAPTOP
3.2 DATA (MONTHLY)
3.3 PRINTER, SCANNER, COPIER
3.4 2 x 3m EXTENSION CORDS
3.5 CELLPHONE



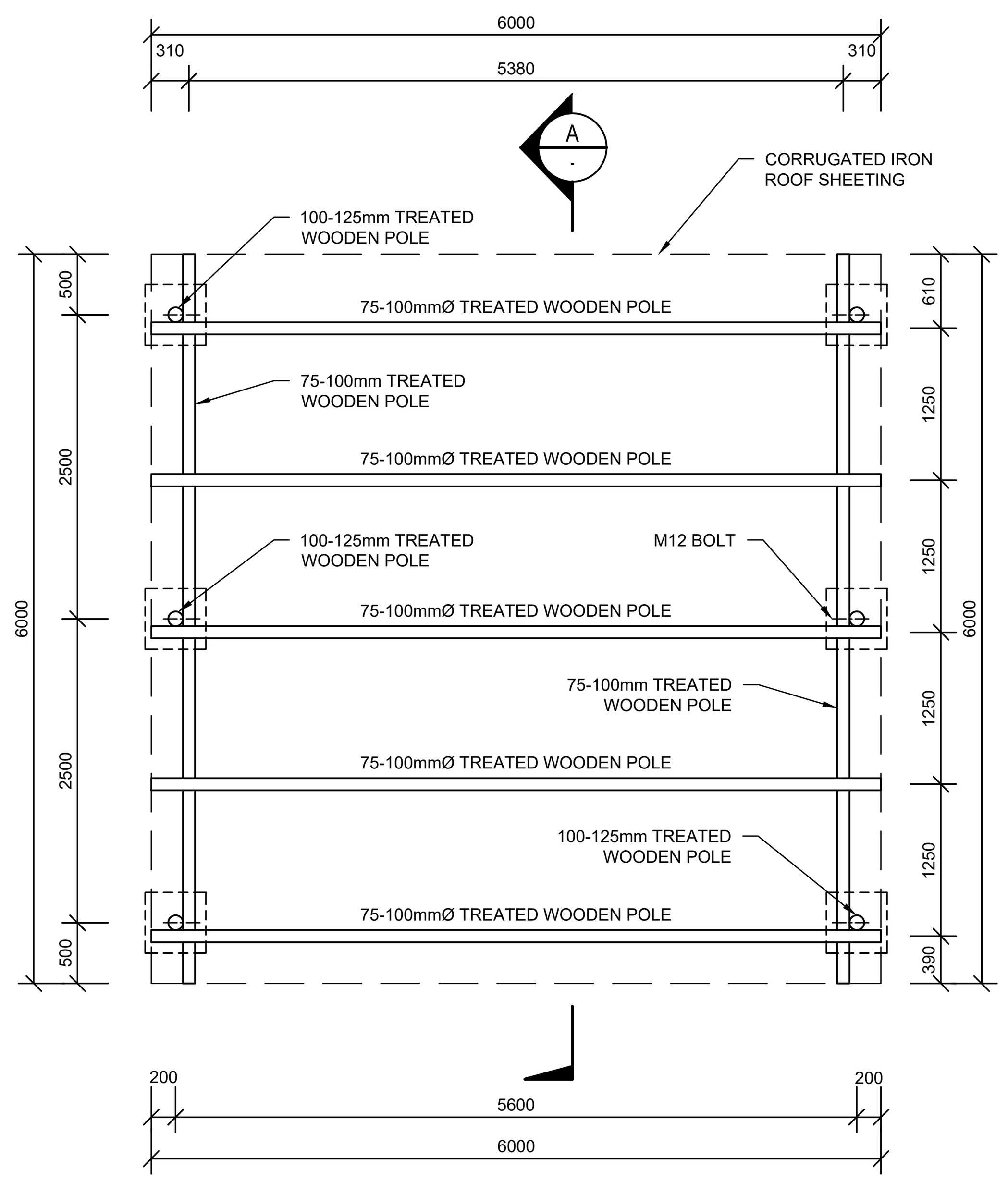
**DETAIL 1
DRAWING RACK**
SCALE 1:25



OFFICE & BOARDROOM
(SEE NOTES FOR FURNITURE)
SCALE 1:25



SECTION A
1:50



**TYPICAL CARPORT
PLAN VIEW**
SCALE 1:50

NOTES / LEGEND

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT	REG. NO.	DATE

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CLIENT

KGOTSO! PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

TYPICAL SITE CAMP LAYOUT

APPROVED BY BVi

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.
35563-BCN-ZZZ-00-DR-CIV-003-TS-001

NOTES / LEGEND

- SEWER PIPE (BY OTHERS)
- NEW SEWER PIPE
- NEW RISING MAIN
- WATERCOURSE
- SEWER MH (BY OTHERS)
- NEW SEWER MANHOLE
- SLEEVE PIPE (HDD)
- SLIPLINING
- ENV. BUFFER ZONE
- TELEPHONE LINE
- POWERLINE

MANHOLE LABELS: MANHOLE NAME / COVER LEVEL (m) / INVERT LEVEL (m) / DEPTH (m)

SEWER PIPE LABELS: PIPE LENGTH x PIPE Ø, MATERIAL / PIPE FLOW/CAPACITY @ SLOPE

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PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

LAYOUT PLAN
SHEET 1

APPROVED BY BVi

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

SCALE	1:1000 @ A1	DRAWN	DJ COETZEE
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PLAN NUMBER

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35563-BCN-ZZZ-00-DR-CIV-130-TS-001

BENCHMARKS (Hartebeesthoek94_Lo27)

NAME	Y	X	INVERT LEVEL
BO7A	35336.132	3031148.351	1259.822
BO7B	36246.454	3030766.638	1256.233
BO7C	36261.542	3030619.148	1259.246
BO7V	35701.126	3030981.225	1260.599

25 m 0 m 25 m 50 m

NOTES / LEGEND

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- NEW RISING MAIN
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CLIENT

KGOTSON PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

LAYOUT PLAN
SHEET 2

APPROVED BY BVI

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DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

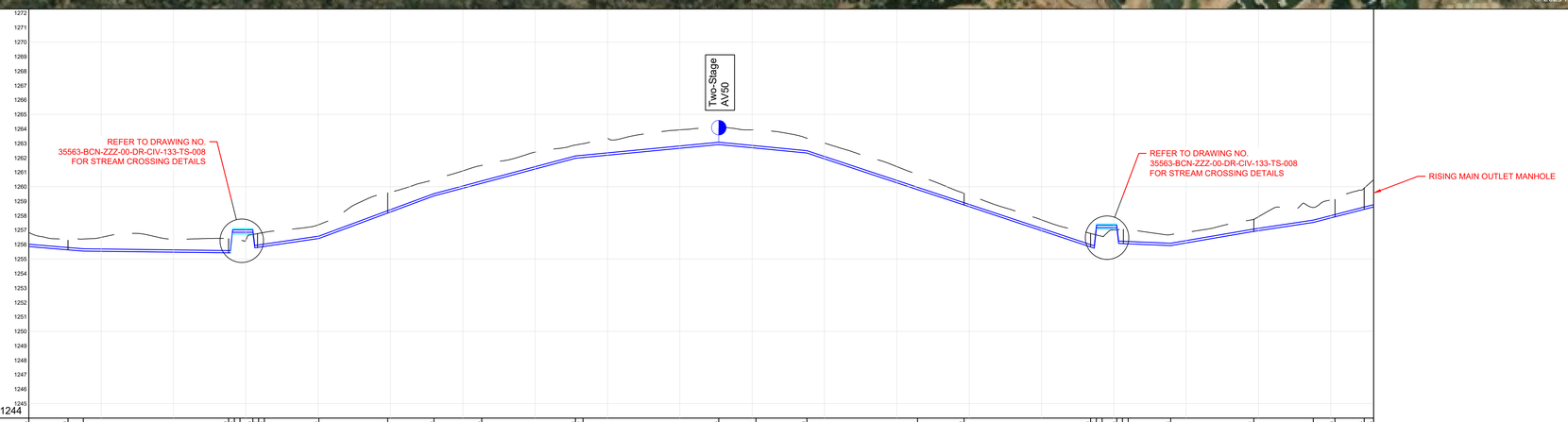
35563-BCN-ZZZ-00-DR-CIV-130-TS-002

Water Schedule

Node	Pipe	Y-Coord	X-Coord	CL	IL	Depth	Length	Slope	Type	Size
[1]		36209.207	3030742.116	1256.845	1255.859	0.985				
	[26]	36194.712	3030764.962	1256.300	1255.634	0.666	27.057	0.832 %	uPVC - SABS 966 Class 9	160
[13]		36194.712	3030764.962	1256.300	1255.634	0.666				
	[32]	36184.444	3030767.480	1256.381	1255.546	0.835	10.573	0.832 %	HDPE PE 100 Class PN 10	160
	[32]	36086.894	3030791.400	1256.399	1255.425	0.974	100.439	0.121 %	HDPE PE 100 Class PN 10	160
[14]		36086.894	3030791.400	1256.399	1255.425	0.974				
	[34]	36085.680	3030791.699	1256.373	1255.423	0.950	1.251	0.145 %	HDPE PE 100 Class PN 10	160
	[34]	36084.159	3030792.073	1256.341	1256.849	-0.508	2.118	91.080 %	HDPE PE 100 Class PN 10	160
	[34]	36070.564	3030795.415	1256.699	1256.849	-0.150	14.000	0.002 %	HDPE PE 100 Class PN 10	160
	[34]	36069.320	3030795.721	1256.722	1255.772	0.950	1.674	84.093 %	HDPE PE 100 Class PN 10	160
	[34]	36067.472	3030796.175	1256.756	1255.799	0.956	1.903	1.461 %	HDPE PE 100 Class PN 10	160
[15]		36067.472	3030796.175	1256.756	1255.799	0.956				
	[35]	36026.247	3030806.308	1257.376	1256.420	0.956	42.457	1.461 %	HDPE PE 100 Class PN 10	160
	[35]	35980.072	3030817.659	1259.574	1258.179	1.395	47.583	3.703 %	HDPE PE 100 Class PN 10	160
[6]		35980.072	3030817.659	1259.574	1258.179	1.395				
	[10]	35949.045	3030825.286	1260.473	1259.362	1.111	31.973	3.703 %	uPVC - SABS 966 Class 9	160
	[10]	35916.928	3030833.181	1261.473	1260.241	1.231	33.084	2.660 %	uPVC - SABS 966 Class 9	160
	[10]	35854.017	3030848.606	1262.883	1261.964	0.919	64.798	2.660 %	uPVC - SABS 966 Class 9	160
	[10]	35848.933	3030849.853	1262.972	1262.015	0.958	5.235	0.962 %	uPVC - SABS 966 Class 9	160
	[10]	35762.108	3030885.441	1264.096	1262.918	1.178	93.840	0.962 %	uPVC - SABS 966 Class 9	160
	[10]	35738.345	3030895.180	1263.941	1262.671	1.270	25.682	0.961 %	uPVC - SABS 966 Class 9	160
	[10]	35706.965	3030911.292	1263.349	1262.332	1.018	35.277	0.961 %	uPVC - SABS 966 Class 9	160
	[10]	35638.973	3030946.203	1260.824	1259.799	1.024	76.473	3.313 %	uPVC - SABS 966 Class 9	160
[7]		35610.382	3030960.850	1259.540	1258.735	0.805	32.141	3.313 %	uPVC - SABS 966 Class 9	160
[8]	[12]	35532.511	3031000.791	1256.766	1255.836	0.930	87.565	3.313 %	HDPE PE 100 Class PN 10	160
	[36]	35530.266	3031001.936	1256.702	1255.752	0.950	2.521	3.313 %	HDPE PE 100 Class PN 10	160
	[36]	35528.897	3031002.634	1256.664	1257.173	-0.509	2.093	92.439 %	HDPE PE 100 Class PN 10	160
	[36]	35516.424	3031008.993	1257.023	1257.173	-0.150	14.000	0.003 %	HDPE PE 100 Class PN 10	160
	[36]	35515.281	3031009.576	1257.031	1256.080	0.950	1.685	85.129 %	HDPE PE 100 Class PN 10	160
	[36]	35512.331	3031011.081	1257.051	1256.066	0.985	3.312	0.432 %	HDPE PE 100 Class PN 10	160
[9]	[16]	35483.251	3031025.978	1256.688	1255.925	0.764	32.674	0.432 %	HDPE PE 100 Class PN 10	160
	[16]	35432.107	3031052.179	1257.742	1256.912	0.830	57.473	1.720 %	HDPE PE 100 Class PN 10	160
[10]	[18]	35395.561	3031070.902	1258.441	1257.529	0.912	41.068	1.503 %	uPVC - SABS 966 Class 9	160
	[18]	35382.202	3031077.745	1259.120	1257.914	1.206	15.014	2.561 %	uPVC - SABS 966 Class 9	160
[11]	[20]	35362.962	3031071.524	1259.916	1258.432	1.484	20.228	2.561 %	uPVC - SABS 966 Class 9	160
[12]	[21]	35357.111	3031074.506	1260.475	1258.600	1.875	6.569	2.561 %	uPVC - SABS 966 Class 9	160
[2]										

BENCHMARKS (Hartebeesthoek94_Lo27)

NAME	Y	X	INVERT LEVEL
BO7A	35336.132	3031148.351	1259.822
BO7B	36246.454	3030766.638	1256.233
BO7C	36261.542	3030619.148	1259.246
BO7V	35701.126	3030981.225	1260.599



NOTES:
1. THE CONTRACTOR SHOULD VERIFY ALL INFORMATION DISPLAYED E.G., PIPE MATERIAL, PIPE DIAMETER, AND MANHOLE DIAMETER. IT IS CRUCIAL TO CARRY OUT A THOROUGH SURVEY OF THE CURRENT AS-BUILT LEVELS AND EMPLOY VISUAL INSPECTION TECHNIQUES, INCLUDING CCTV CAMERA INSPECTION,TO ACCURATELY ASSESS THE PROPERTIES AND CONDITION OF ALL ELEMENTS E.G. PIPES AND MANHOLES. ONCE THE NECESSARY INFORMATION HAS BEEN OBTAINED, IT SHOULD BE PROMPTLY SUBMITTED TO THE ENGINEER FOR EVALUATION.
2. THE ENGINEER WILL REVIEW THE FINDINGS AND PROVIDE FORMAL INSTRUCTIONS OUTLINING THE PROPOSED WORKS TO BE UNDERTAKEN.
3. ALL BLOCKED MANHOLES MUST BE CLEANED AND SURVEYED AS SOON AS POSSIBLE TO ENSURE ANY NECESSARY REMEDIAL WORK CAN BE IDENTIFIED PROMPTLY AND EXPEDITED.

NOTES / LEGEND

SEWER PIPE (BY OTHERS) — SEWER MH (BY OTHERS)
NEW SEWER PIPE — NEW SEWER MANHOLE
NEW RISING MAIN — SLEEVE PIPE (HDD)
WATERCOURSE — SLIPLINING
ENV. BUFFER ZONE
MANHOLE LABELS: MANHOLE NAME / COVER LEVEL (m) / INVERT LEVEL (m) / DEPTH (m)
TELEPHONE LINE
POWERLINE
SEWER PIPE LABELS: PIPE LENGTH x PIPE Ø, MATERIAL / PIPE FLOW/CAPACITY @ SLOPE

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT — REG. NO. — DATE

REVISION CODES

A,B,C... : BEFORE TENDER
T0, T1, T2... : FOR TENDER
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IFC : ISSUED FOR CONSTRUCTION
ASB : AS-BUILT

DATE	INITIAL	NO./CODE	REVISION DESCRIPTION

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JL REYNDERS — 2020300701 — 20/10/2025
ENGINEER/TECHNOLOGIST — REG. NO. — DATE

SCALE	1:2000 HOR / 1:200 VER @ A1	DRAWN	D COETZEE
DESIGNED	D COETZEE	CHECKED	JL REYNDERS

PROJECT NAME

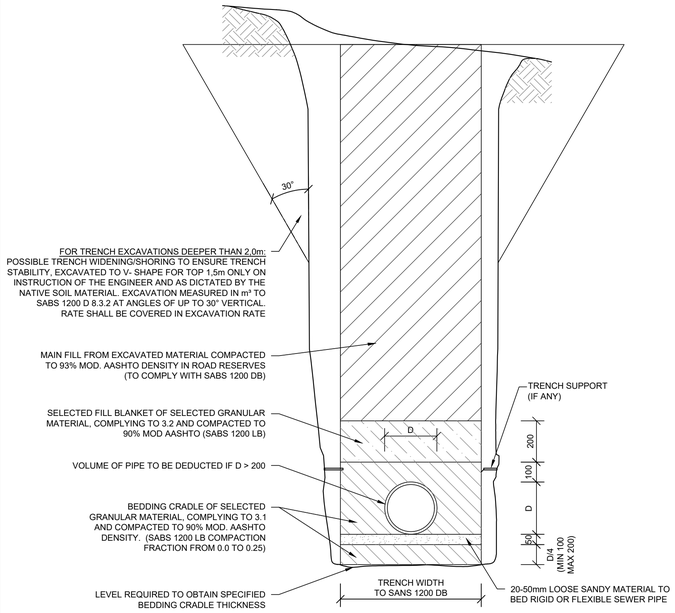
NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE	SUITABILITY STATUS	REV. NO.
SEWER RISING MAIN LAYOUT & LONGITUDINAL SECTION	ISSUED FOR TENDER	T0

PLAN NUMBER

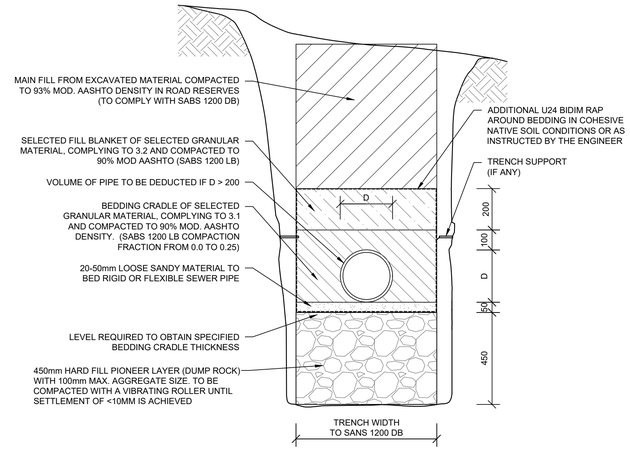
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-131-TS-001



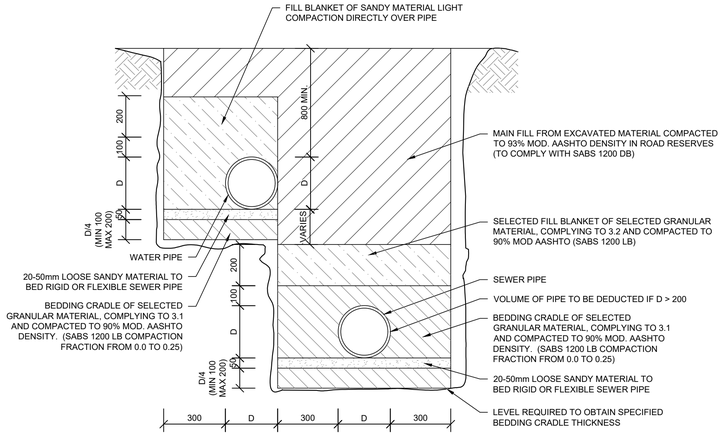
DETAIL F1:
BEDDING FOR FLEXIBLE SEWER PIPES

SCALE 1:15



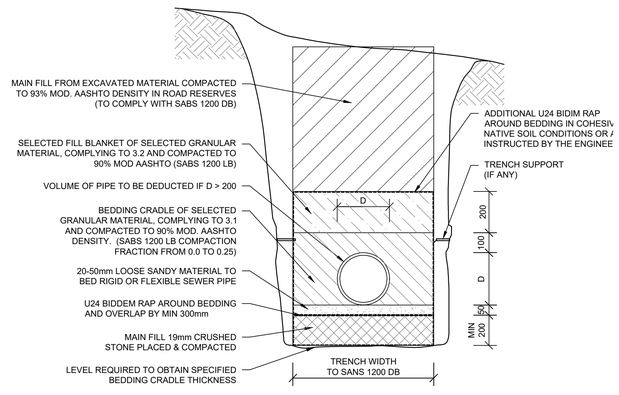
DETAIL F2:
BEDDING FOR POOR NATIVE SOIL FOUNDING CONDITIONS

SCALE 1:15



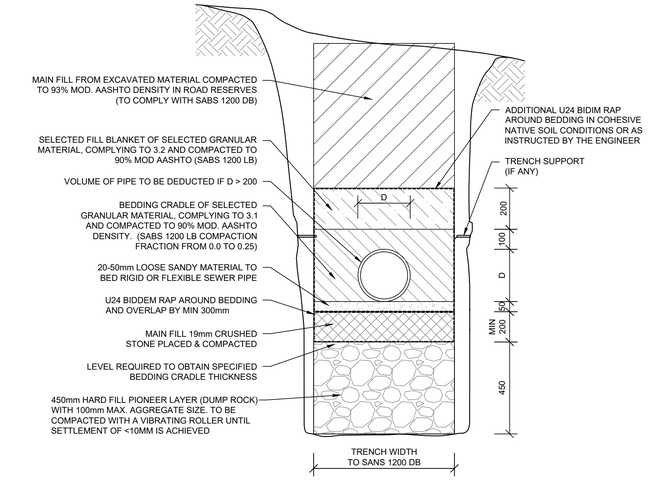
DETAIL CT1:
COMBINED TRENCHES

SCALE 1:15



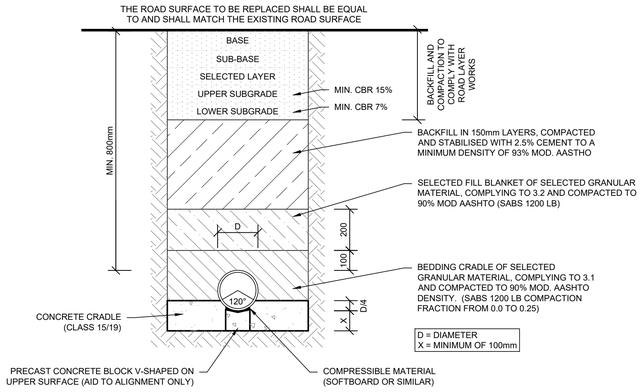
DETAIL U1:
UNDERDRAIN BEDDING

SCALE 1:15



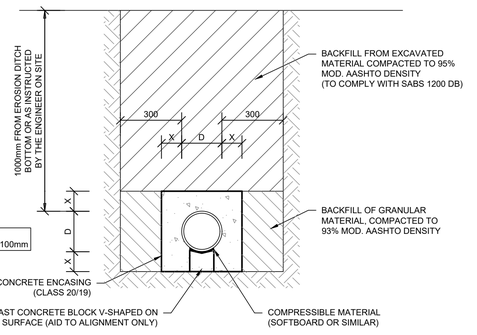
DETAIL F3:
BEDDING FOR POOR NATIVE SOIL FOUNDING CONDITIONS: PIPES LOCATED BELOW THE WATER TABLE / IN WATERCOURSES

SCALE 1:15



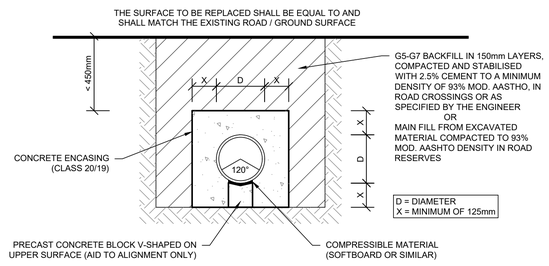
DETAIL C3:
ROAD CROSSING: COVER > 800mm

SCALE 1:15



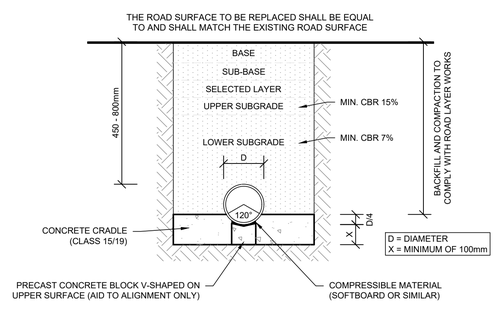
DETAIL E1:
EROSION DITCH CROSSING

SCALE 1:15



DETAIL C1:
CONCRETE ENCASEMENT / ROAD CROSSING: COVER < 450mm

SCALE 1:15



DETAIL C2:
ROAD CROSSING: COVER 450 - 800mm

SCALE 1:15

NOTES / LEGEND

COVER ON SEWER PIPES SHALL BE:
1) UNDER WALKWAYS = 800
2) UNDER PERMANENT SURFACED ROADWAYS = 1000
3) UNDER GRAVEL SURFACED ROADWAYS = 1150 PIPE

BEDDING AND BLANKET MATERIAL SHALL CONFORM TO SABS 1200 LB.

3.1 SELECTED GRANULAR MATERIAL FOR BEDDING CRADLE
a) GRADING 0,6 - 19mm
b) NON CORROSIVE , FREE DRAINING
c) COMPACTABILITY FACTOR MAX. 0,25
d) PI MAX. 6

3.2 SELECTED FILL MATERIAL FOR SELECTED FILL BLANKET:
a) MAXIMUM PARTICLE SIZE 30mm
b) PI MAX. 6

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

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		ASB	: AS-BUILT

DRAWING REVISION

DATE	*INITIAL*	*NO./CODE*	*REVISION DESCRIPTION*

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CLIENT

MOFOSI PULA

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL SEWER
TRENCH DETAILS

APPROVED BY BVI

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

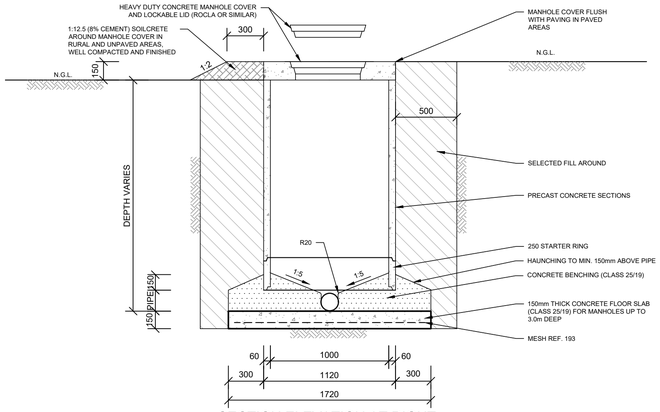
SCALE	AS SHOWN @ A1	*DRAWN*	DJ COETZEE
DESIGNED	DJ COETZEE	*CHECKED*	JL REYNDERS

SUITABILITY STATUS	*REV. NO.*
ISSUED FOR TENDER	T0

PLAN NUMBER

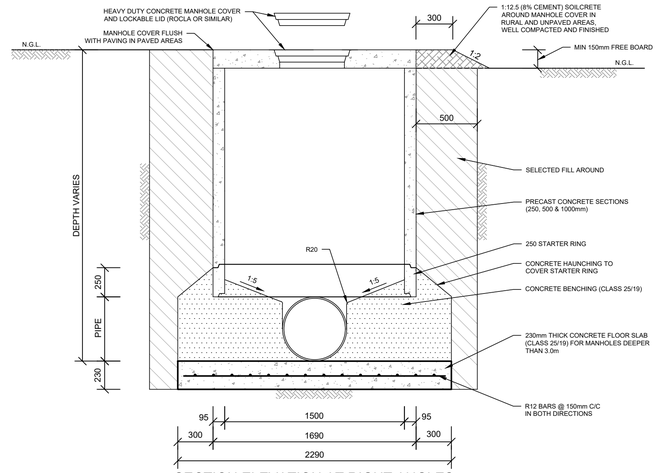
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-001



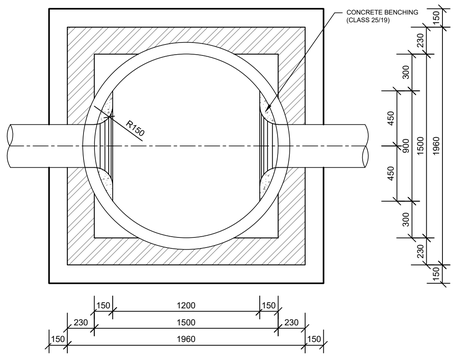
SECTION ELEVATION AT RIGHT ANGLES TO INTERNAL SEWER

SCALE 1:25



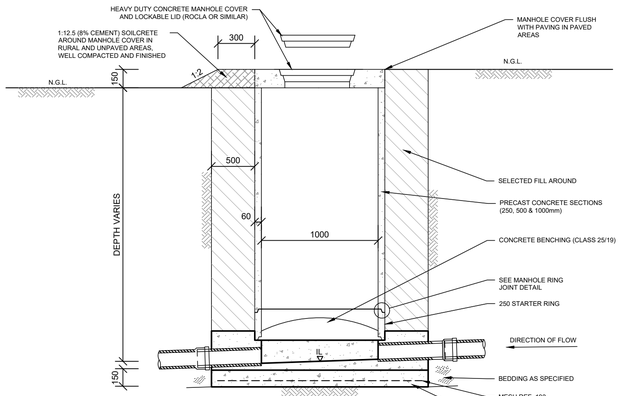
SECTION ELEVATION AT RIGHT ANGLES TO OUTFALL SEWER

SCALE 1:25



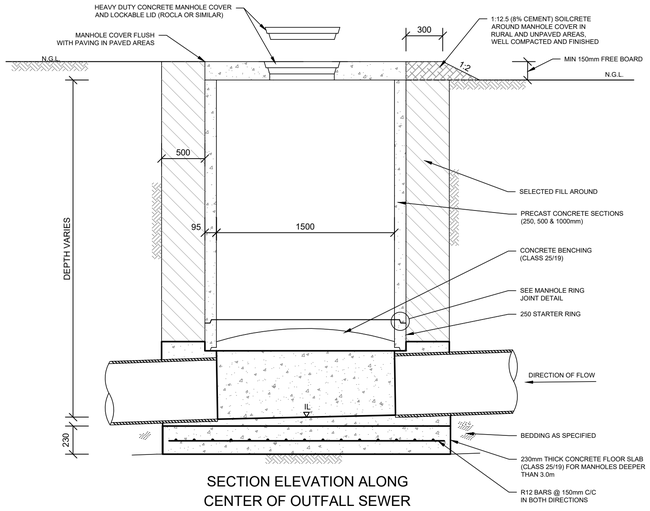
DETAIL M3:
TYPICAL PLAN VIEW OF A GRIT-TRAP MANHOLE

SCALE 1:25



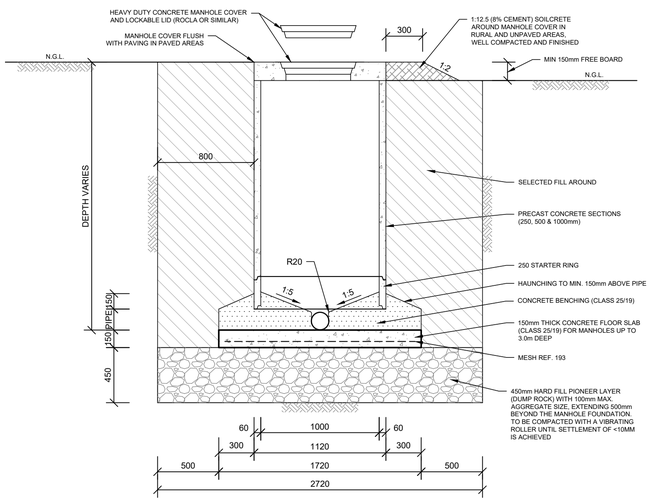
SECTION ELEVATION ALONG CENTER OF INTERNAL SEWER

SCALE 1:25



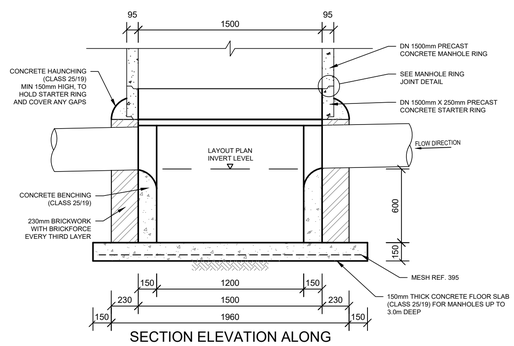
SECTION ELEVATION ALONG CENTER OF OUTFALL SEWER

SCALE 1:25



DETAIL M2:
TYPICAL DETAIL OF HARD FILL (DUMP ROCK)
PIONEER LAYER UNDER MANHOLE FOUNDATION

SCALE 1:25

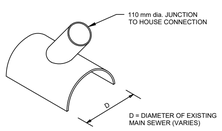


SECTION ELEVATION ALONG CENTER OF A GRIT-TRAP MANHOLE

SCALE 1:25

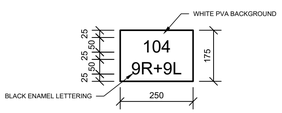
FIXING DETAILS FOR SADDLES

a) CUT 100mm dia. HOLE THROUGH EXISTING PIPE. SPECIAL CARE MUST BE TAKEN TO PREVENT DEBRIS FROM FALLING INTO THE EXISTING PIPE.
b) FIX SADDLE TO EXISTING PIPE WITH PROSTRUCT 617 EPOXY, OR OTHER SIMILAR APPROVED + STRAPPING



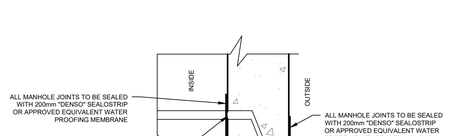
FIXING DETAILS OF SADDLE ON EXISTING MAIN SEWER

N.T.S.



PAINT MARKER ON COVER SLAB OF MAIN SEWER

SCALE 1:10



DETAIL OF MANHOLE PRECAST RING JOINT

N.T.S.

RECOMMENDED MANHOLE SIZES

MANHOLE SIZE	RECOMMENDED PIPE SIZE RANGE	RECOMMENDED MANHOLE DEPTH RANGE
1000mm Ø	100 - 350mm	UP TO 2.0m
1200mm Ø	350 - 500mm	2.1 - 3.0m
1500mm Ø	500 - 800mm	3.1 - 4.0m
1800mm Ø	>800mm	>4.0m

NOTES:

1. CONCRETE FOR MANHOLES MUST BE OF DOLOMITIC ORIGIN.
2. FLEXIBLE uPVC PIPES TO SANS 1601 1994: PIPES TO BE CLASS 34, HEAVY DUTY STRUCTURED WALL IN LENGTHS OF 6m MAX. AND EACH PIPE FITTED WITH INTEGRAL CUFF JOINTS. CUFF JOINTS TO USE A RUBBER COMPRESSION SEAL IN THE 2nd TROUGH FROM THE SPIGOT END.
3. FLEXIBLE JOINTS TO SANS 1601: 1994 AMENDED: ALL NON STANDARD PIPE SECTIONS TO BE JOINED WITH DOUBLE & KIMBERLEY/REPAIR COUPLINGS
4. FIELD TESTS:
   a) AIR TESTS ACCORDING TO CLAUSE 7.2 OF SANS 1200 LD MUST BE CARRIED OUT BETWEEN MANHOLES DURING THE FOLLOWING PHASES OF CONSTRUCTION:
      i) AFTER THE PIPES HAVE BEEN LAID.
      ii) AFTER THE INITIAL BACKFILLING HAS BEEN COMPLETED.
   b) THE AIR TEST IS ONLY AN INDICATION OF ACCEPTANCE OF A COMPLETED PORTION OF THE LINE AND IN ANY DISPUTE ARISING THE OUTCOME OF A WATER TEST WILL BE BINDING.
4. TRENCHES:
   a) EXCAVATION AND BACKFILLING OF TRENCHES TO COMPLY WITH SANS 1200 DB.
   b) BEDDING OF PIPES TO COMPLY WITH SANS 1200 LB FOR FLEXIBLE PIPES.
   c) TRENCHES DEEPER THAN 2.0m TO BE EXCAVATED IN V-SHAPE FOR TOP 1.5m AS SAFETY PRECAUTION, ONLY ON INSTRUCTION OF THE ENGINEER AS DETERMINED ON SITE AND BY THE IN-SITU MATERIAL.
   d) SEWERS TO BE PROTECTED AT ROAD CROSSINGS AS SHOWN ON THE TYPICAL PLAN FOR PIPE BEDDING.
   e) TRENCHES TO BE PROTECTED FROM STORMWATER INFLOW.
   f) OVER EXCAVATION MAY ONLY BE FILLED AFTER APPROVAL BY THE ENGINEER WITH GRADE 20/19 CONCRETE OR SUITABLE MATERIAL AS DIRECTED BY THE ENGINEER.
5. MANHOLES AND FITTINGS:
   a) ALL CONCRETE, BENCHING AND SEALERS SHALL COMPLY WITH SANS 1200 GA OR SANS 1200 LD AS APPLICABLE.
   b) PRECAST CONCRETE SECTIONS TO COMPLY WITH SANS 1294.
   c) CONCRETE MANHOLE SECTIONS MUST BE FIXED WITH AN EPOXY SEALER SUCH AS EPIDERMIX 344 OR PRO-STRUCT 687 OR SIMILAR APPROVED.
   d) CLASSES OF CONCRETE:
      i) PRECAST CONCRETE SECTIONS - 30/19.
      ii) BEDDING CRADLE - 15/19.
      iii) ALL OTHER CONCRETE - 25/19.
   e) CHANNELING:
      Ø ≤ 300mm: CLAY / DOLOMITIC CONCRETE / NUTEC CEMENT
      Ø > 300mm: IN-SITU CAST DOLOMITIC CONCRETE
   f) STEP IRONS SHALL NOT BE INSTALLED IN MANHOLES.
   g) FREEBOARD: MIN. 150mm FOR OUTFALL SEWERS OR IN RURAL AREAS.
   h) BENCHING: BENCHING TO BE SEALED WITH A 20mm CHEMICAL RESISTANT MORTAR SUCH AS FONDU CEMENT OR SIMILAR APPROVED.
6. CLEANING: THE MANHOLE IN TOTAL, BUT THE CHANNELS IN PARTICULAR, MUST BE RUBBED AND CLEANED OUT PROPERLY TO A SMOOTH FINISH BEFORE THE MANHOLE WILL BE INSPECTED FOR APPROVAL.

NOTES / LEGEND

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES			SUITABILITY CODES		
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DRAWING REVISION

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CLIENT

KGOTSOI PULAI

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

TYPICAL SEWER MANHOLE DETAILS

APPROVED BY BVi

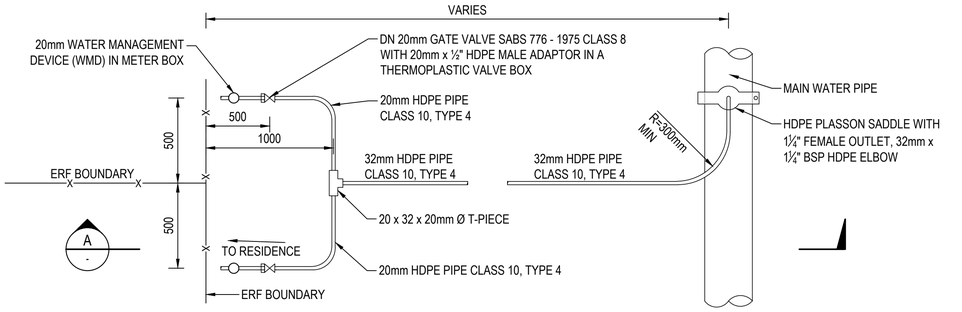
JL REYNDERS	2020300701		20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.		DATE
SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER

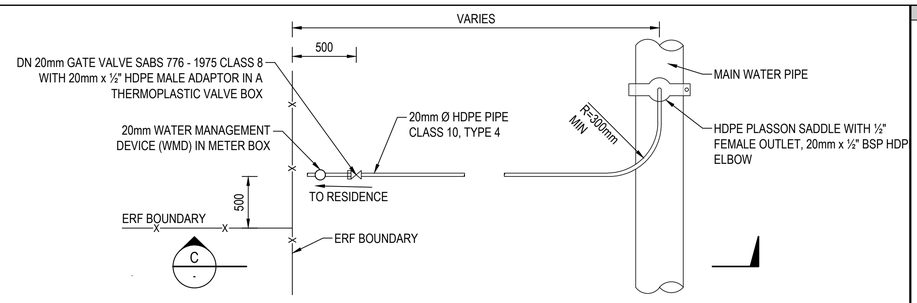
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-002



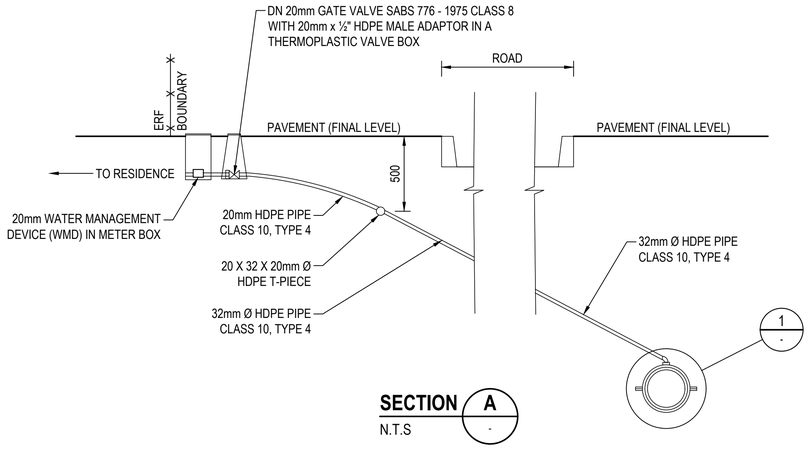
STANDARD WATER CONNECTION (LONG DOUBLE)

N.T.S



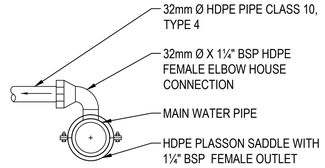
STANDARD WATER CONNECTION (LONG SINGLE)

N.T.S



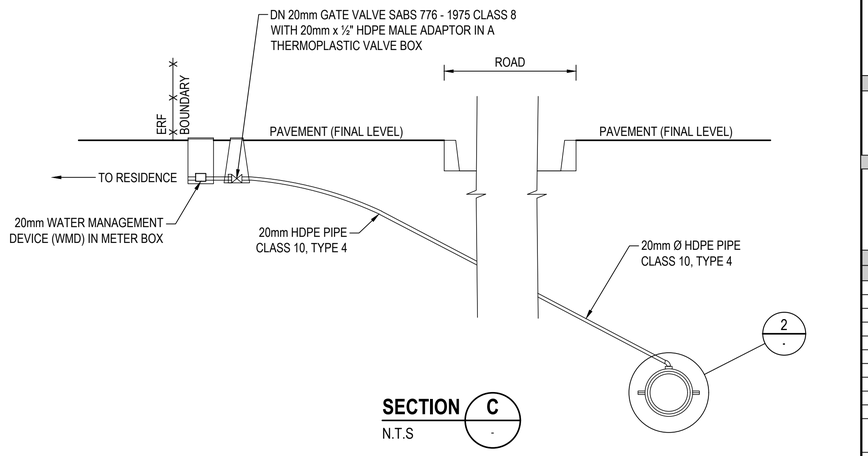
SECTION A

N.T.S



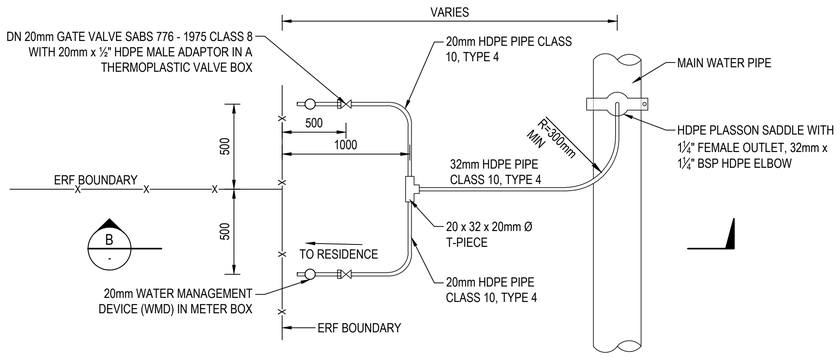
DETAIL 1

N.T.S



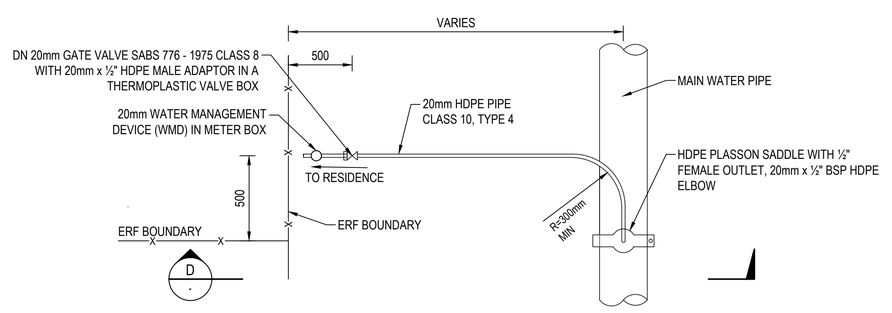
SECTION C

N.T.S



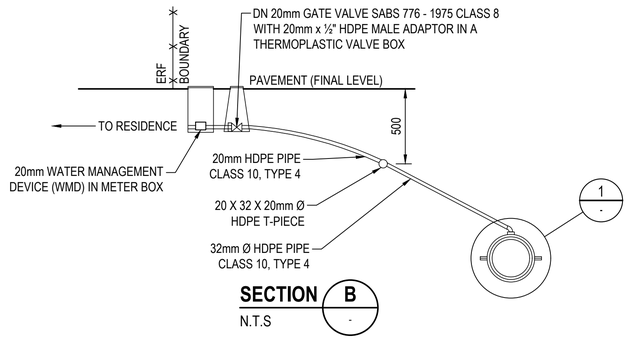
STANDARD WATER CONNECTION (SHORT DOUBLE)

N.T.S



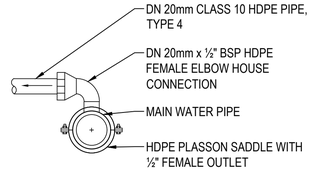
STANDARD WATER CONNECTION (SHORT SINGLE)

N.T.S



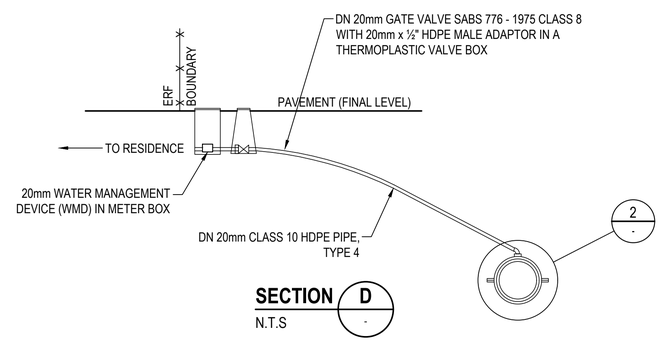
SECTION B

N.T.S



DETAIL 2

N.T.S



SECTION D

N.T.S

NOTES / LEGEND

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CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES			SUITABILITY CODES		
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0, 1, 2...	:	CONSTRUCTION	IFR	:	ISSUED FOR REVIEW
Z	:	AS-BUILT	IFC	:	ISSUED FOR CONSTRUCTION
			ASB	:	AS-BUILT

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CLIENT

KGOTSOI PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL WATER
CONNECTION DETAILS

APPROVED BY BVI

JL REYNDERS | 2020300701 | 20/10/2025

ENGINEER/TECHNOLOGIST | REG. NO. | DATE

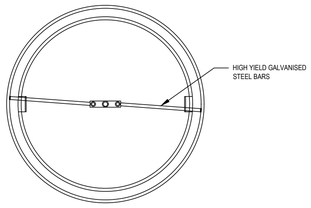
SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER

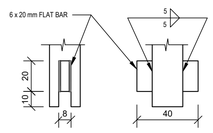
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-003



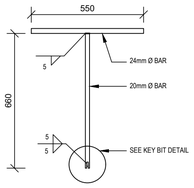
BOTTOM VIEW OF MANHOLE LID
WITH LOCKING DEVICE

SCALE 1:10



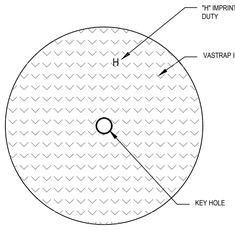
KEY BIT DETAIL

SCALE 1:2



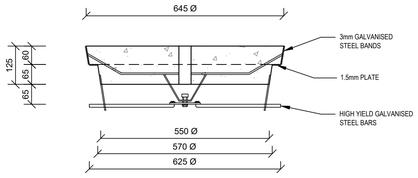
LOCKING AND LIFTING KEY DETAIL

SCALE 1:15



TOP VIEW OF MANHOLE LID

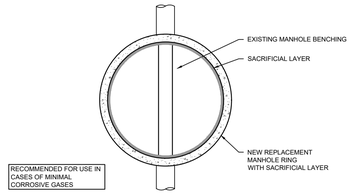
SCALE 1:10



SECTION THROUGH MANHOLE LID

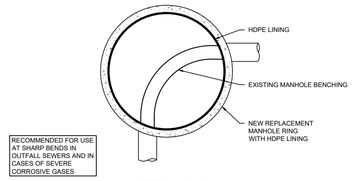
SCALE 1:10

DETAIL R6:
DETAIL OF MANHOLE LID WITH LOCKING DEVICE



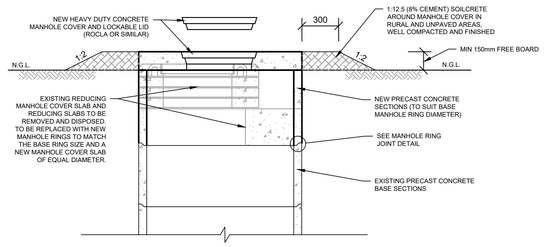
DETAIL R3
TYPICAL DETAIL OF MANHOLE USING
COMPONENTS WITH A SACRIFICIAL LAYER

SCALE 1:25



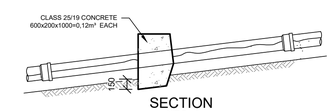
DETAIL R4:
TYPICAL DETAIL OF MANHOLE USING
HDPE LINED MANHOLE COMPONENTS

SCALE 1:25



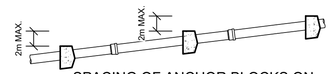
DETAIL R7:
TYPICAL DETAIL FOR REPLACEMENT OF
REDUCING MANHOLES

SCALE 1:25



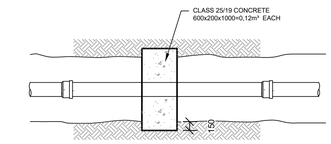
SECTION

N.T.S.



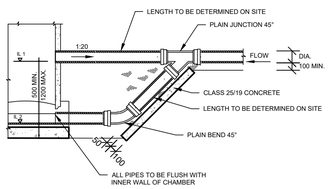
SPACING OF ANCHOR BLOCKS ON
SLOPES STEEPER THAN 1:10

N.T.S.



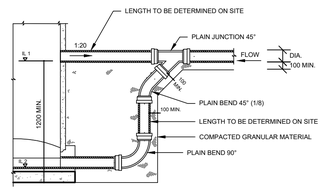
PLAN

SCALE 1:50



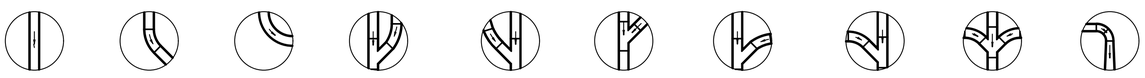
MANHOLE WITH HIGH INLET RAMP TYPE

N.T.S.



MANHOLE WITH HIGH INLET VERTICAL DROP TYPE

N.T.S.



TYPE S
0-10 STRAIGHT

TYPE 2L OR 2R
35-56 BEND

TYPE 4L OR 4R
80-90 BEND

TYPE 5R
0-10 JUNCTION

TYPE 6L
11-34 JUNCTION

TYPE 7R
35-56 JUNCTION

TYPE 8R
57-79 JUNCTION

TYPE 9L
80-90 JUNCTION

TYPE 9R + 9L
90 DOUBLE JUNCTION

TYPE 4Lc
90 SINGLE HOUSE CONNECTION

TYPE 1L OR 1R
11-34 BEND

TYPE 3L OR 3R
57-79 BEND

TYPE 5L
0-10 JUNCTION

TYPE 6R
11-34 JUNCTION

TYPE 7L
35-56 JUNCTION

TYPE 8L
57-79 JUNCTION

TYPE 9R
80-90 JUNCTION

TYPE 4L + 4R
90 DOUBLE JUNCTION

TYPE 4Rc + 4Lc
90 DOUBLE HOUSE CONNECTION

TYPE 4Rc
90 SINGLE HOUSE CONNECTION

TYPICAL MANHOLE CHANNEL DETAILS

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 35563-BCN-ZZZ-00-DR-CIV-133-TS-002

NOTES / LEGEND

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0, 1, 2...	:	CONSTRUCTION	IFR	:	ISSUED FOR REVIEW
Z	:	AS-BUILT	IFC	:	ISSUED FOR CONSTRUCTION
			ASB	:	AS-BUILT

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CLIENT

KGOTSOI PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

ADDITIONAL SEWER
MANHOLE DETAILS

APPROVED BY BVI

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

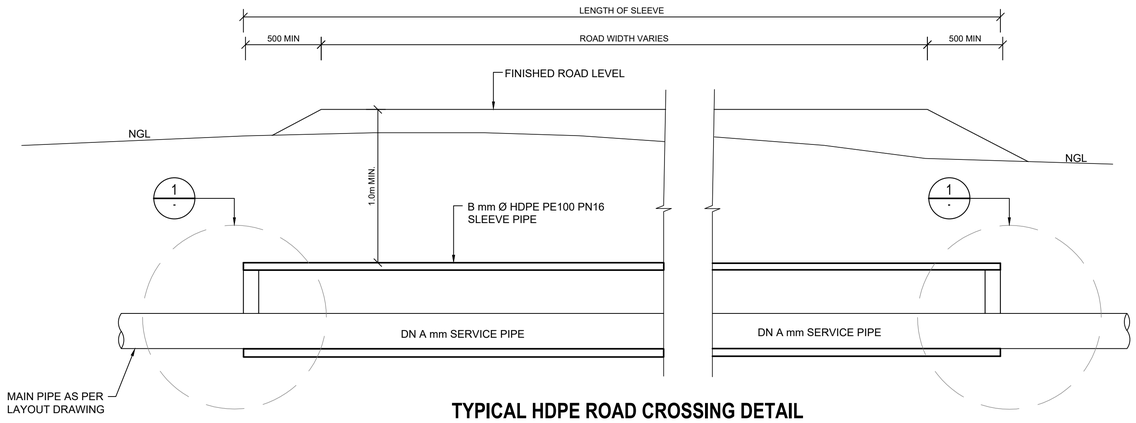
SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER

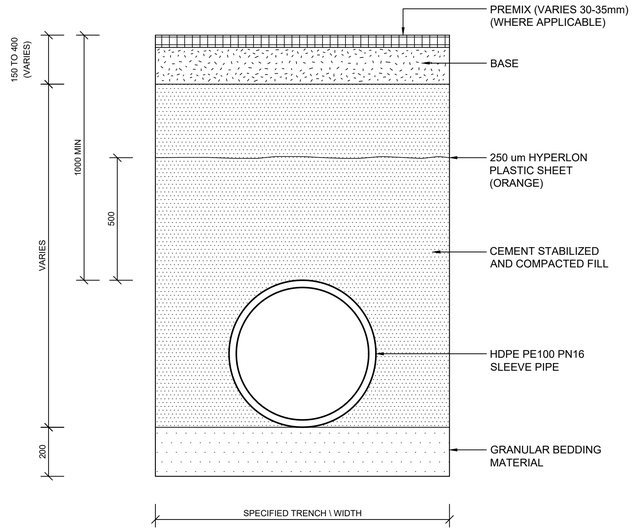
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-004



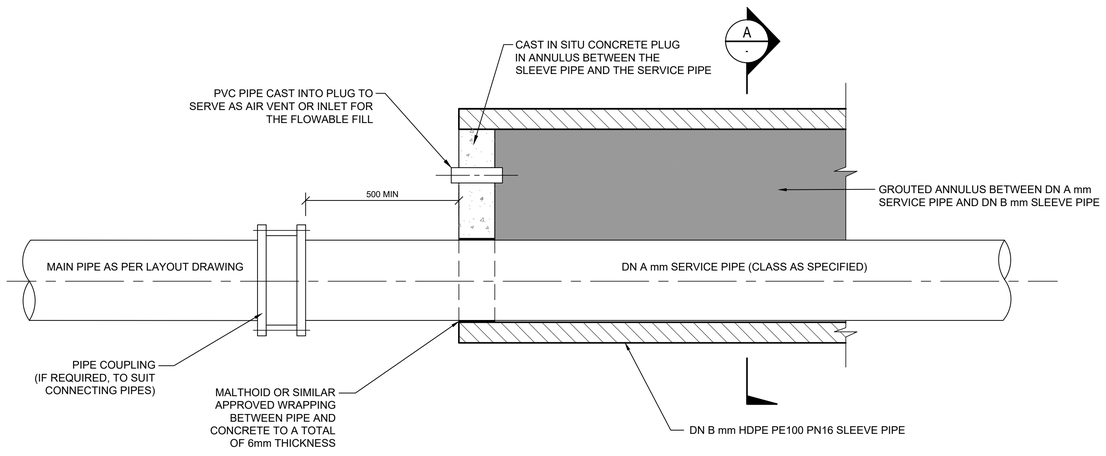
TYPICAL HDPE ROAD CROSSING DETAIL

N.T.S.



TYPICAL CROSS SECTION OF ROAD CROSSING HDPE SLEEVE PIPE

N.T.S.

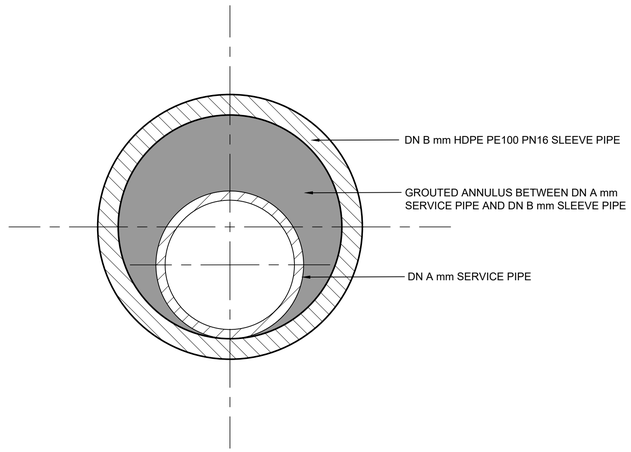


PIPE TRANSITION DETAIL 1 / -

N.T.S.

CONVENTIONAL CONSTRUCTION METHOD	
HDPE PE 100 / PVC-U (SANS 966-1) SERVICE PIPE DN A mm	RECOMMENDED HDPE PE 100 PN16 SLEEVE PIPE DN B mm
110	315
160	355
200	400
250	450
315	560
355	560

HORIZONTAL DRILLING PIPE SLEEVE METHOD	
HDPE PE 100 / PVC-U (SANS 966-1) SERVICE PIPE DN A mm	RECOMMENDED HDPE PE 100 PN16 SLEEVE PIPE DN B mm
110 - 200	400
250 - 355	560



SECTION A / -

N.T.S.

TYPICAL ELEVATION OF ANNULAR SPACE GROUTING PLUG

N.T.S.

NOTES / LEGEND

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0, 1, 2... : CONSTRUCTION
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SUITABILITY CODES

IFI : ISSUED FOR INFORMATION
FAC : FOR ACCEPTANCE CONTROL
IFR : ISSUED FOR REVIEW
IFC : ISSUED FOR CONSTRUCTION
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PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL ROAD CROSSING
PIPE SLEEVE DETAILS

APPROVED BY BVi

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

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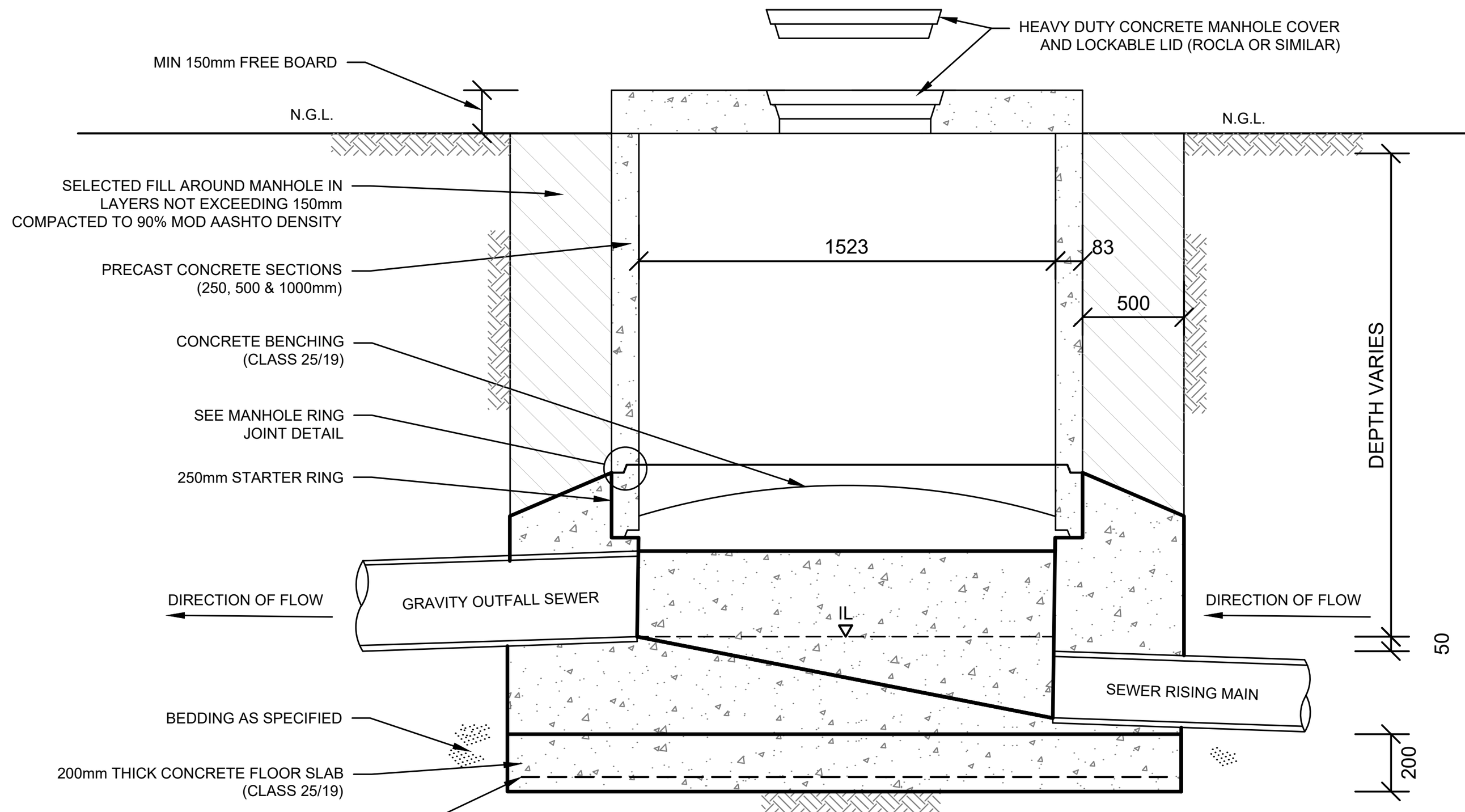
DESIGNED	DJ COETZEE	***CHECKED***	JL REYNDERS

SUITABILITY STATUS | ***REV. NO.***
ISSUED FOR TENDER | T0

PLAN NUMBER

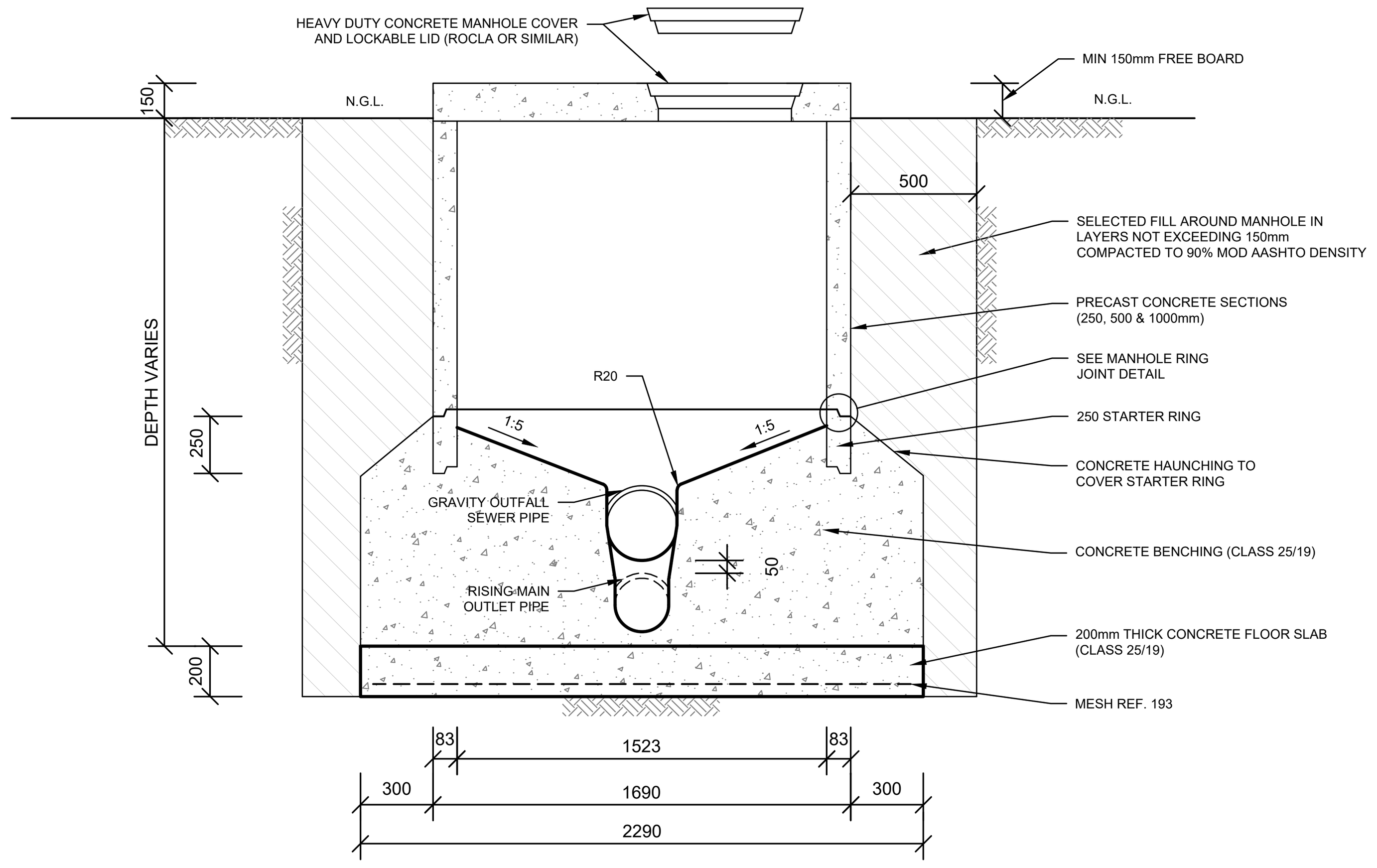
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-005


HEAVY DUTY CONCRETE MANHOLE COVER AND LOCKABLE LID (ROCLA OR SIMILAR)
MIN 150mm FREE BOARD
N.G.L.
N.G.L.
SELECTED FILL AROUND MANHOLE IN LAYERS NOT EXCEEDING 150mm COMPACTED TO 90% MOD AASHTO DENSITY
PRECAST CONCRETE SECTIONS (250, 500 & 1000mm)
CONCRETE BENCHING (CLASS 25/19)
SEE MANHOLE RING JOINT DETAIL
250mm STARTER RING
DIRECTION OF FLOW
GRAVITY OUTFALL SEWER
IL
DIRECTION OF FLOW
SEWER RISING MAIN
BEDDING AS SPECIFIED
200mm THICK CONCRETE FLOOR SLAB (CLASS 25/19)
MESH REF. 193
1523
83
500
DEPTH VARIES
50
200

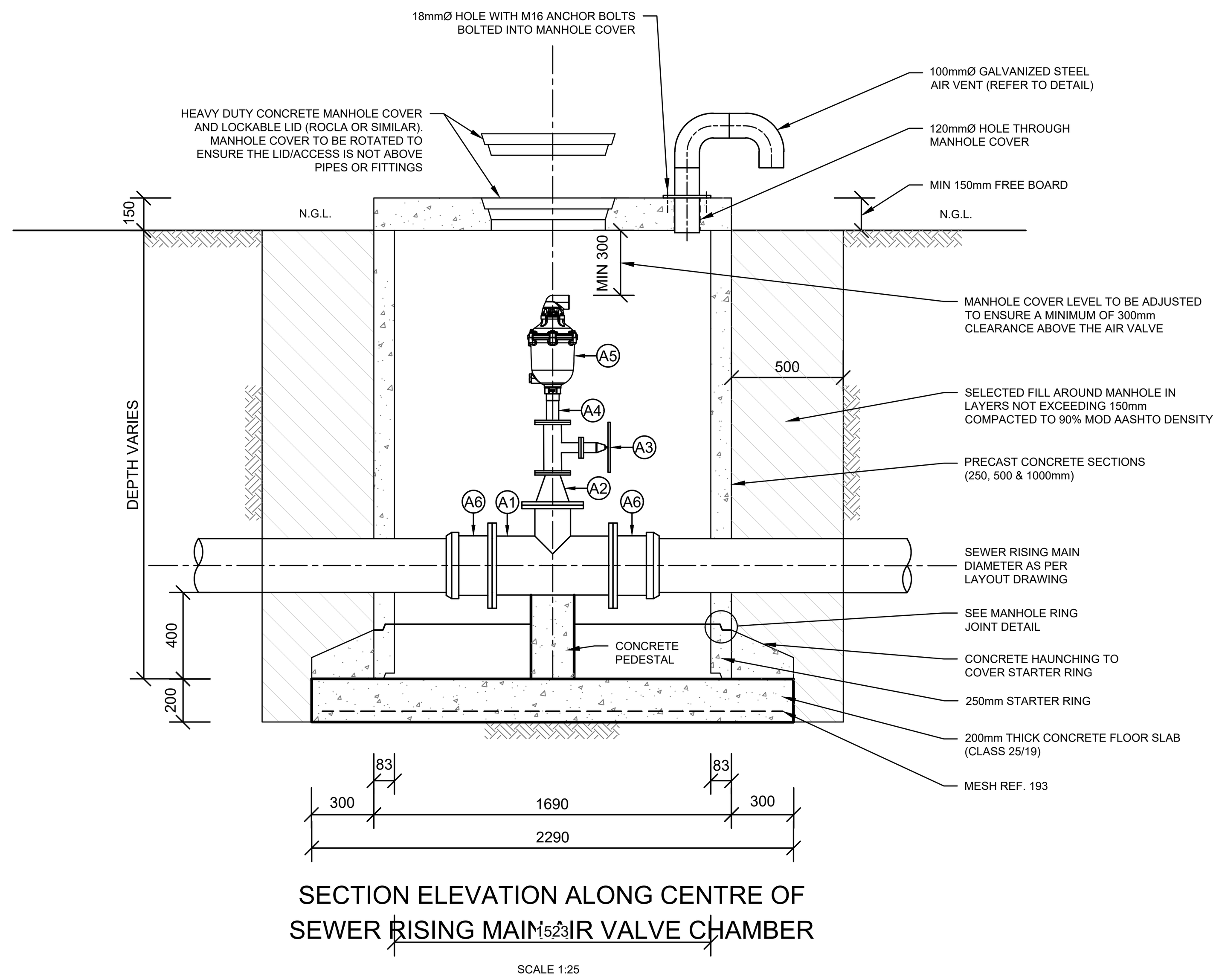
SECTION ELEVATION ALONG CENTER OF RISING MAIN OUTLET INTO GRAVITY SEWER

SCALE 1:25


HEAVY DUTY CONCRETE MANHOLE COVER AND LOCKABLE LID (ROCLA OR SIMILAR)
MIN 150mm FREE BOARD
150
N.G.L.
N.G.L.
500
SELECTED FILL AROUND MANHOLE IN LAYERS NOT EXCEEDING 150mm COMPACTED TO 90% MOD AASHTO DENSITY
PRECAST CONCRETE SECTIONS (250, 500 & 1000mm)
SEE MANHOLE RING JOINT DETAIL
R20
250 STARTER RING
1:5
1:5
CONCRETE HAUNCHING TO COVER STARTER RING
GRAVITY OUTFALL SEWER PIPE
CONCRETE BENCHING (CLASS 25/19)
RISING MAIN OUTLET PIPE
50
200mm THICK CONCRETE FLOOR SLAB (CLASS 25/19)
MESH REF. 193
DEPTH VARIES
250
200
83
1523
83
300
1690
300
2290

SECTION ELEVATION AT RIGHT ANGLES TO SEWER RISING MAIN OUTLET INTO GRAVITY SEWER

SCALE 1:25


18mmØ HOLE WITH M16 ANCHOR BOLTS BOLTED INTO MANHOLE COVER
100mmØ GALVANIZED STEEL AIR VENT (REFER TO DETAIL)
HEAVY DUTY CONCRETE MANHOLE COVER AND LOCKABLE LID (ROCLA OR SIMILAR). MANHOLE COVER TO BE ROTATED TO ENSURE THE LID/ACCESS IS NOT ABOVE PIPES OR FITTINGS
120mmØ HOLE THROUGH MANHOLE COVER
MIN 150mm FREE BOARD
150
N.G.L.
N.G.L.
MIN 300
MANHOLE COVER LEVEL TO BE ADJUSTED TO ENSURE A MINIMUM OF 300mm CLEARANCE ABOVE THE AIR VALVE
A5
A4
A3
A2
A6
A1
A6
500
SELECTED FILL AROUND MANHOLE IN LAYERS NOT EXCEEDING 150mm COMPACTED TO 90% MOD AASHTO DENSITY
PRECAST CONCRETE SECTIONS (250, 500 & 1000mm)
DEPTH VARIES
SEWER RISING MAIN DIAMETER AS PER LAYOUT DRAWING
SEE MANHOLE RING JOINT DETAIL
CONCRETE PEDESTAL
CONCRETE HAUNCHING TO COVER STARTER RING
250mm STARTER RING
200mm THICK CONCRETE FLOOR SLAB (CLASS 25/19)
MESH REF. 193
400
200
83
83
300
1690
300
2290
1523

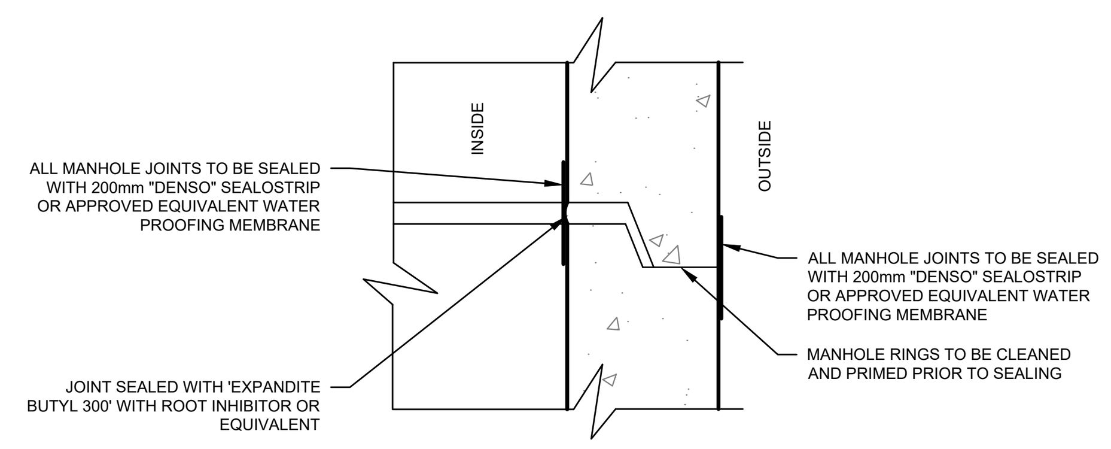
SECTION ELEVATION ALONG CENTRE OF SEWER RISING MAIN AIR VALVE CHAMBER

SCALE 1:25

AIR VALVE CHAMBER - PIPEWORK AND FITTING SCHEDULE (PN10)		
ITEM NO.	DESCRIPTION	NO. OF
A1	INLINE FLANGED HYDRANT TEE. DIAMETER TO SUIT PIPE DIAMETER. (SEE FITTINGS TABLE ON THIS DRAWING)	1
A2	FLANGED REDUCING SPECIAL, ONE END FLANGED TO SUIT REDUCING TEE, OTHER END FLANGED TO SUIT VALVE (SEE FITTINGS TABLE)	1
A3	DN50mm FLANGED WATERWORKS PATTERNS RESILIENT SEAL GATE VALVE TO SANS 664 WITH HAND WHEEL, NON-RISING SPINDLE AND CLOCKWISE CLOSING, CLASS 10	1
A4	DN50mm GMS SCREWED BOSS FLANGE DRILLED TO SANS 1123: 1000/3	1
A5	DN50mm BERMAD MODEL C50-C, VENT-O-MAT MODEL RGXII OR EQUIVALENT APPROVED COMBINATION AIR VALVE (SEE QR-CODE TABLE)	1
A6	FLANGE ADAPTOR TO SUIT PIPE MATERIAL AND DIAMETER	2

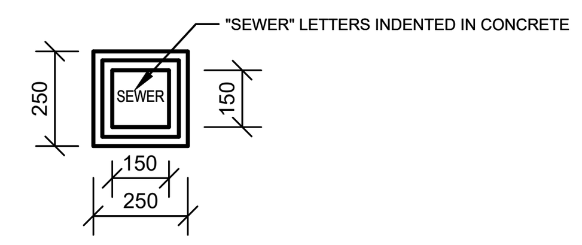
AIR VALVE CHAMBER FITTINGS TABLE		
NOMINAL PIPE DIAMETER	TEE DESCRIPTION	REDUCER
50	50x50 FLANGED TEE	
65	65x65 FLANGED TEE	65x50
80	80x80 FLANGED TEE	80x50
100	100x65 FLANGED TEE	65x50
150	150x100 FLANGED TEE	100x50
200	200x150 FLANGED TEE	150x50
250	250x150 FLANGED TEE	150x50
300	300x200 FLANGED TEE	200x50
350	350x250 FLANGED TEE	250x50
400	400x250 FLANGED TEE	250x50
450	450x300 FLANGED TEE	300x50

QR-CODE TABLE (SCAN QR-CODE WITH YOUR MOBILE PHONE)	
ITEM DESCRIPTION	QR-CODE
BERMAD MODEL C50 COMBINATION AIR VALVE	
VENT-O-MAT MODEL RGXII COMBINATION AIR VALVE	


INSIDE
OUTSIDE
ALL MANHOLE JOINTS TO BE SEALED WITH 200mm "DENSO" SEALOSTRIP OR APPROVED EQUIVALENT WATER PROOFING MEMBRANE
ALL MANHOLE JOINTS TO BE SEALED WITH 200mm "DENSO" SEALOSTRIP OR APPROVED EQUIVALENT WATER PROOFING MEMBRANE
MANHOLE RINGS TO BE CLEANED AND PRIMED PRIOR TO SEALING
JOINT SEALED WITH 'EXPANDITE BUTYL 300' WITH ROOT INHIBITOR OR EQUIVALENT

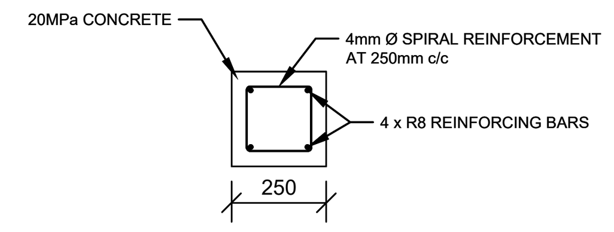
DETAIL OF MANHOLE PRECAST RING JOINT

N.T.S.



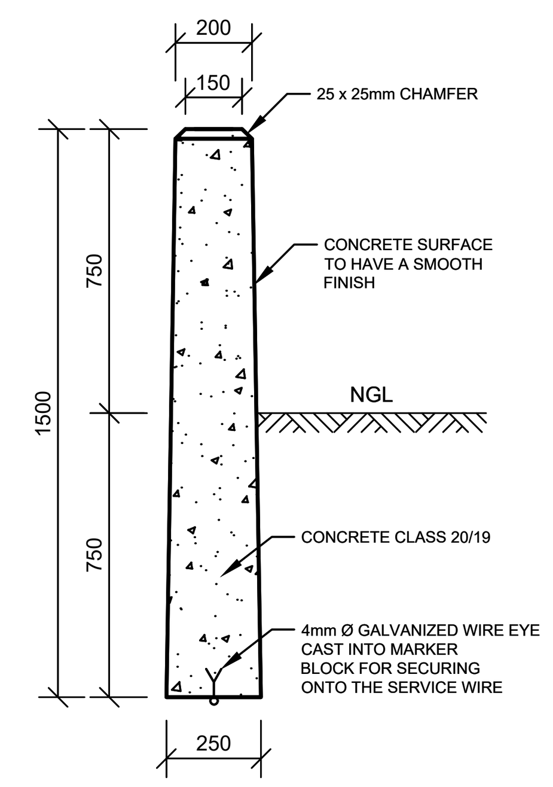
MARKER POST PLAN VIEW

SCALE 1:20



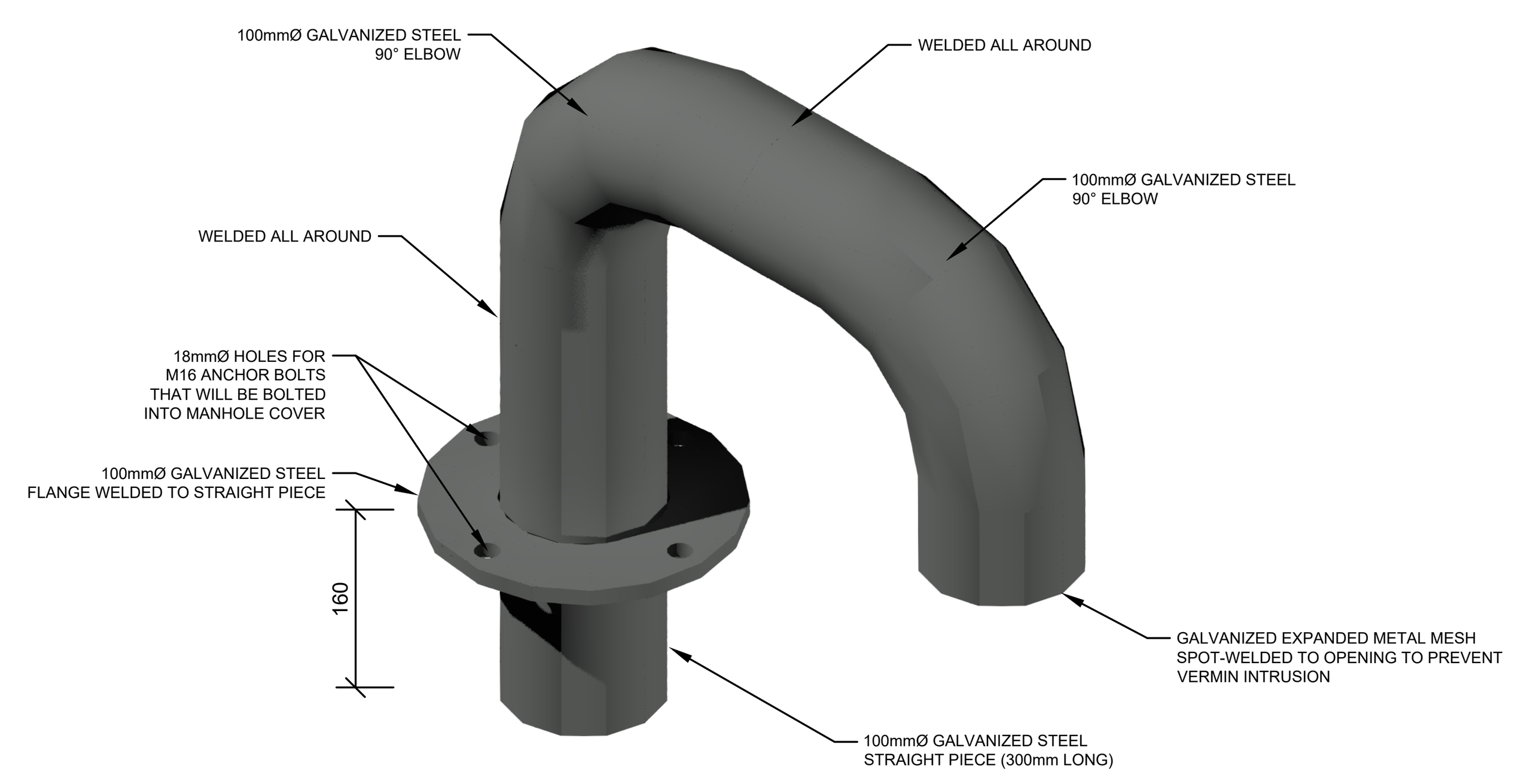
MARKER POST REINFORCEMENT DETAILS

SCALE 1:20



MARKER POST ELEVATION

SCALE 1:20


100mmØ GALVANIZED STEEL 90° ELBOW
WELDED ALL AROUND
100mmØ GALVANIZED STEEL 90° ELBOW
WELDED ALL AROUND
18mmØ HOLES FOR M16 ANCHOR BOLTS THAT WILL BE BOLTED INTO MANHOLE COVER
100mmØ GALVANIZED STEEL FLANGE WELDED TO STRAIGHT PIECE
160
GALVANIZED EXPANDED METAL MESH SPOT-WELDED TO OPENING TO PREVENT VERMIN INTRUSION
100mmØ GALVANIZED STEEL STRAIGHT PIECE (300mm LONG)

GALVANIZED STEEL AIR VENT DETAIL

SCALE 1:5

NOTES:

1. CONCRETE FOR MANHOLES MUST BE OF DOLOMITIC ORIGIN.
2. FLEXIBLE uPVC PIPES TO SANS 1601 1994: PIPES TO BE CLASS 400, HEAVY DUTY STRUCTURED WALL IN LENGTHS OF 6m MAX. AND EACH PIPE FITTED WITH INTEGRAL CUFF JOINTS. CUFF JOINTS TO USE A RUBBER COMPRESSION SEAL IN THE 2 nd TROUGH FROM THE SPIGOT END.
3. FLEXIBLE JOINTS TO SANS 1601: 1994 AMENDED: ALL NON STANDARD PIPE SECTIONS TO BE JOINED WITH DOUBLE & KIMBERLEY/REPAIR COUPLINGS
4. FIELD TESTS:
   a) AIR TESTS ACCORDING TO CLAUSE 7.2 OF SANS 1200 LD MUST BE CARRIED OUT BETWEEN MANHOLES DURING THE FOLLOWING PHASES OF CONSTRUCTION:
      i) AFTER THE PIPES HAVE BEEN LAID.
      ii) AFTER THE INITIAL BACKFILLING HAS BEEN COMPLETED.
   b) THE AIR TEST IS ONLY AN INDICATION OF ACCEPTANCE OF A COMPLETED PORTION OF THE LINE AND IN ANY DISPUTE ARISING THE OUTCOME OF A WATER TEST WILL BE BINDING.
4. TRENCHES:
   a) EXCAVATION AND BACKFILLING OF TRENCHES TO COMPLY WITH SANS 1200 DB.
   b) BEDDING OF PIPES TO COMPLY WITH SANS 1200 LB FOR FLEXIBLE PIPES.
   c) TRENCHES DEEPER THAN 2.0m TO BE EXCAVATED IN V-SHAPE FOR TOP 1.5m AS SAFETY PRECAUTION, ONLY ON INSTRUCTION OF THE ENGINEER AS DETERMINED ON SITE AND BY THE IN-SITU MATERIAL.
   d) SEWERS TO BE PROTECTED AT ROAD CROSSINGS AS SHOWN ON THE TYPICAL PLAN FOR PIPE BEDDING.
   e) TRENCHES TO BE PROTECTED FROM STORMWATER INFLOW.
   f) OVER EXCAVATION MAY ONLY BE FILLED AFTER APPROVAL BY THE ENGINEER WITH GRADE 20/19 CONCRETE OR SUITABLE MATERIAL AS DIRECTED BY THE ENGINEER.
5. MANHOLES AND FITTINGS:
   a) ALL CONCRETE, BENCHING AND SEALERS SHALL COMPLY WITH SANS 1200 GA OR SANS 1200 LD AS APPLICABLE.
   b) PRECAST CONCRETE SECTIONS TO COMPLY WITH SANS 1294.
   c) CONCRETE MANHOLE SECTIONS MUST BE FIXED WITH AN EPOXY SEALER SUCH AS EPIDERMIX 344 OR PRO-STRUCT 687 OR SIMILAR APPROVED.
   d) CLASSES OF CONCRETE:
      i) PRECAST CONCRETE SECTIONS - 30/19.
      ii) BEDDING CRADLE - 15/19.
      iii) ALL OTHER CONCRETE - 25/19.
   e) CHANNELING:
      Ø ≤ 300mm: CLAY / DOLOMITIC CONCRETE / NUTEC CEMENT
      Ø > 300mm: IN-SITU CAST DOLOMITIC CONCRETE
   f) STEP IRONS SHALL NOT BE INSTALLED IN MANHOLES.
   g) FREEBOARD: MIN. 150mm FOR OUTFALL SEWERS OR IN RURAL AREAS.
   h) BENCHING: BENCHING TO BE SEALED WITH A 20mm CHEMICAL RESISTANT MORTAR SUCH AS FONDU CEMENT OR SIMILAR APPROVED.
6. CLEANING: THE MANHOLE IN TOTAL, BUT THE CHANNELS IN PARTICULAR, MUST BE RUBBED AND CLEANED OUT PROPERLY TO A SMOOTH FINISH BEFORE THE MANHOLE WILL BE INSPECTED FOR APPROVAL.
7. MINIMUM COVER TO MESH REINFORCEMENT = 50mm

NOTES / LEGEND

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CLIENT

PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

TYPICAL SEWER RISING MAIN CHAMBER DETAILS

APPROVED BY BVi

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

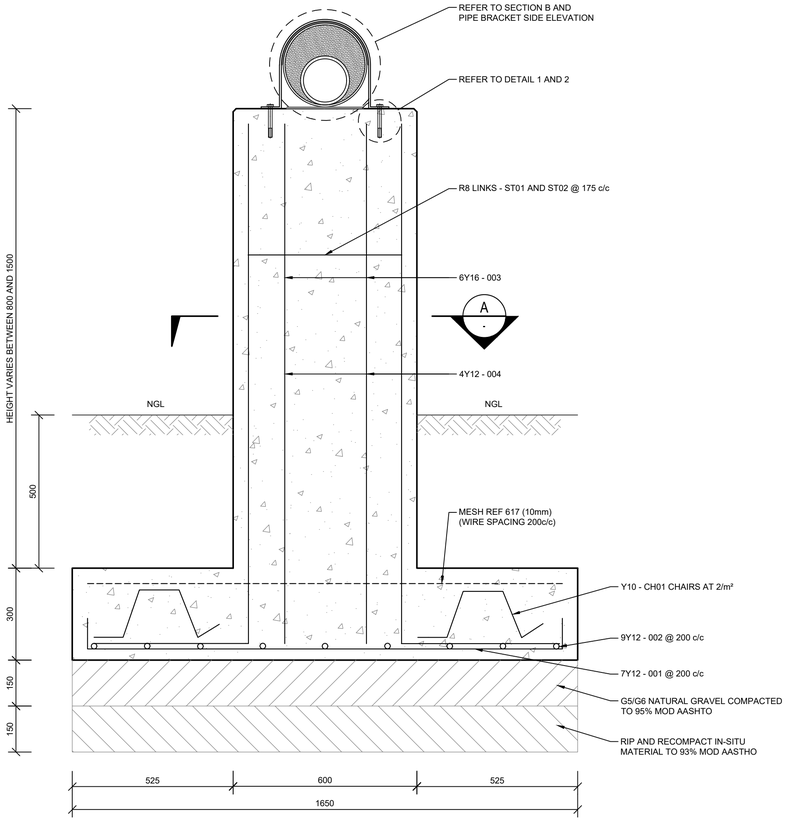
SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

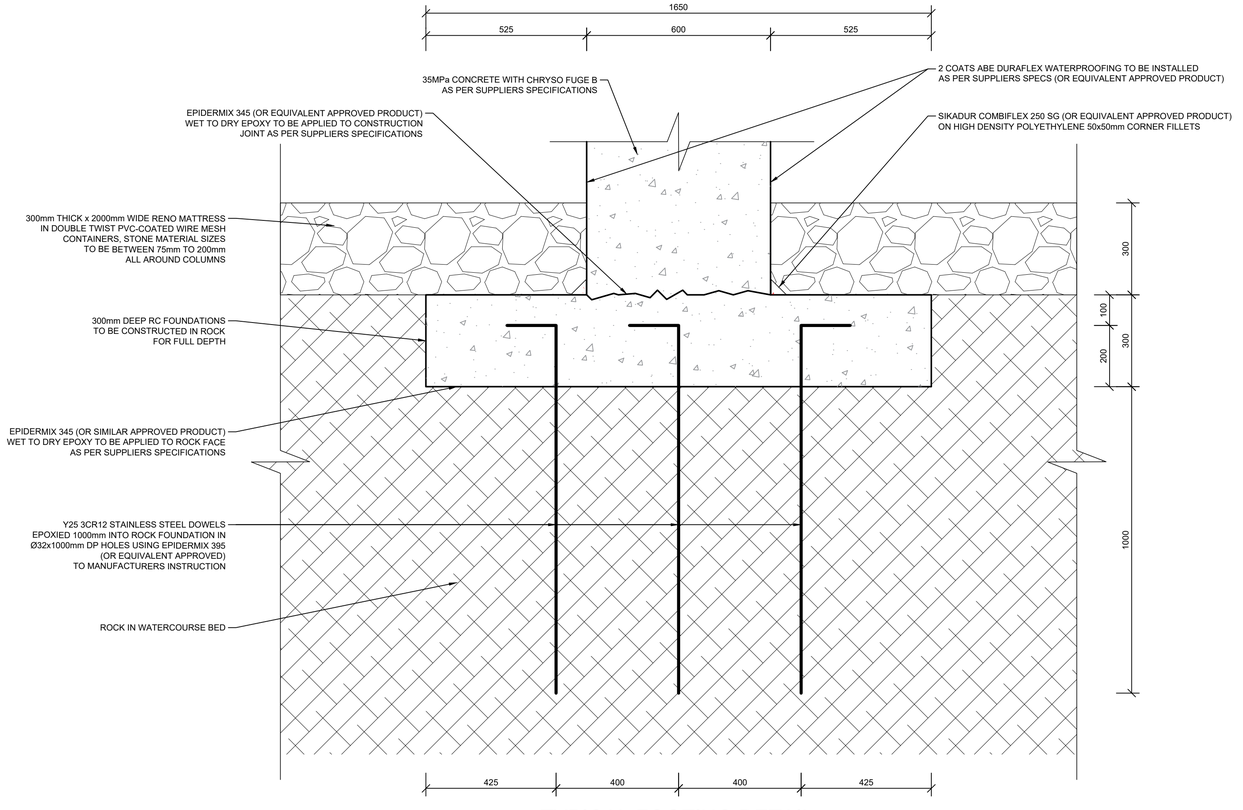
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

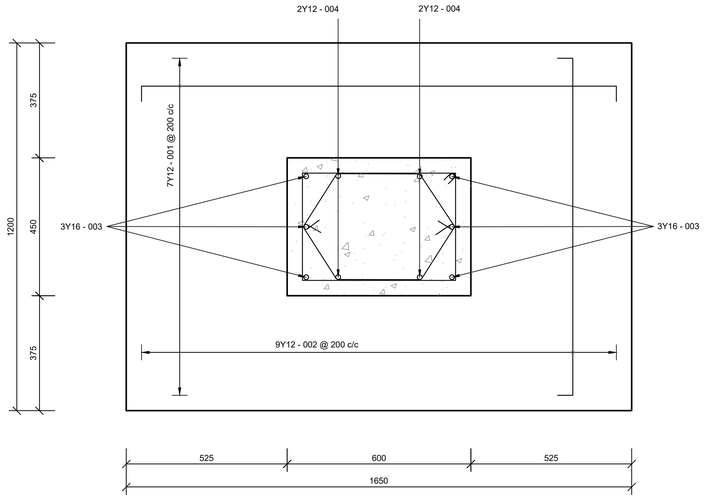
35563-BCN-ZZZ-00-DR-CIV-133-TS-006



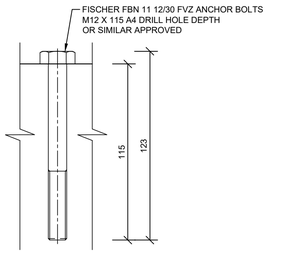
TYPICAL PIPE SUPPORT
FRONT ELEVATION/SECTION
SCALE 1:10



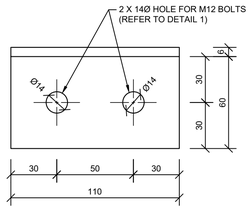
TYPICAL FOOTING DETAIL
FOR PIPE SUPPORTS IN WATERCOURSES
SCALE 1:10



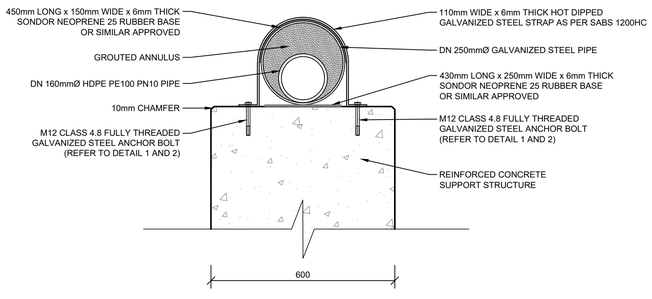
SECTION A
SCALE 1:10



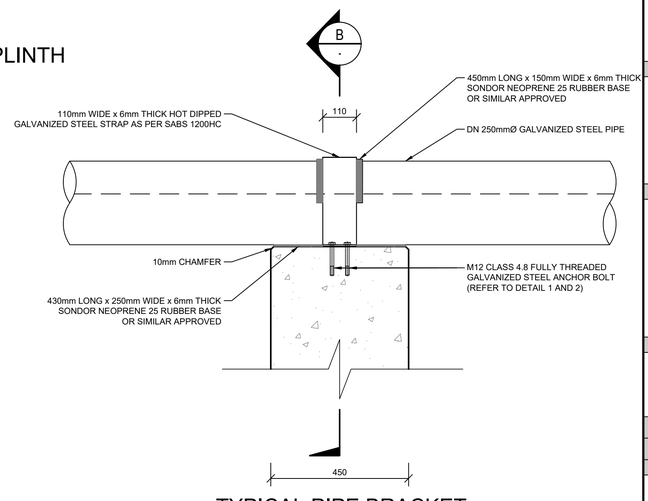
DETAIL 1:
FISHER BOLT
SCALE 1:2



DETAIL 2:
HOOP CONNECTION TO CONCRETE PLINTH
SCALE 1:2



SECTION B
SCALE 1:10



TYPICAL PIPE BRACKET
SIDE ELEVATION/SECTION
SCALE 1:10

NOTES / LEGEND

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KGOTSOI PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL
PIPE SUPPORT
DETAILS

APPROVED BY BVi

JL REYNDERS | 2020300701 | 20/10/2025
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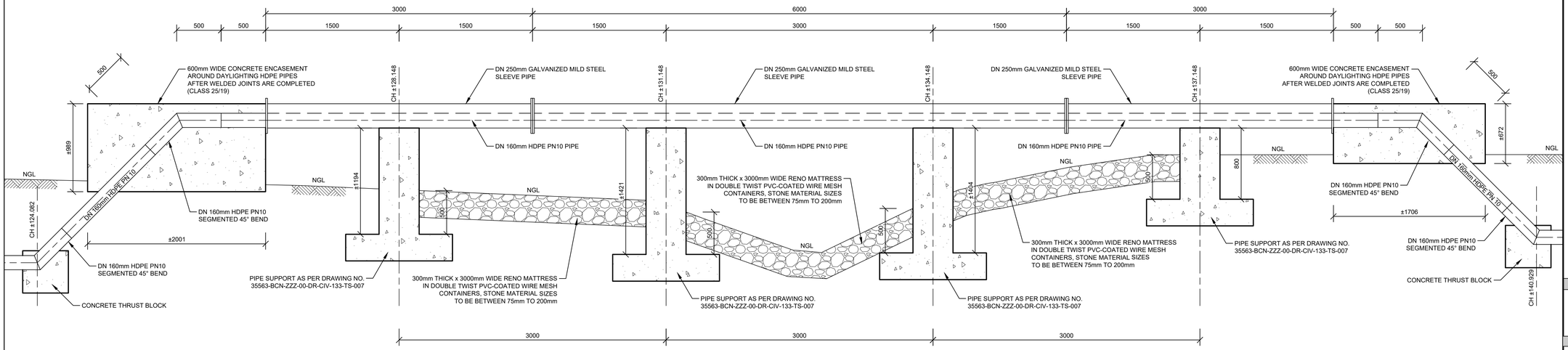
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

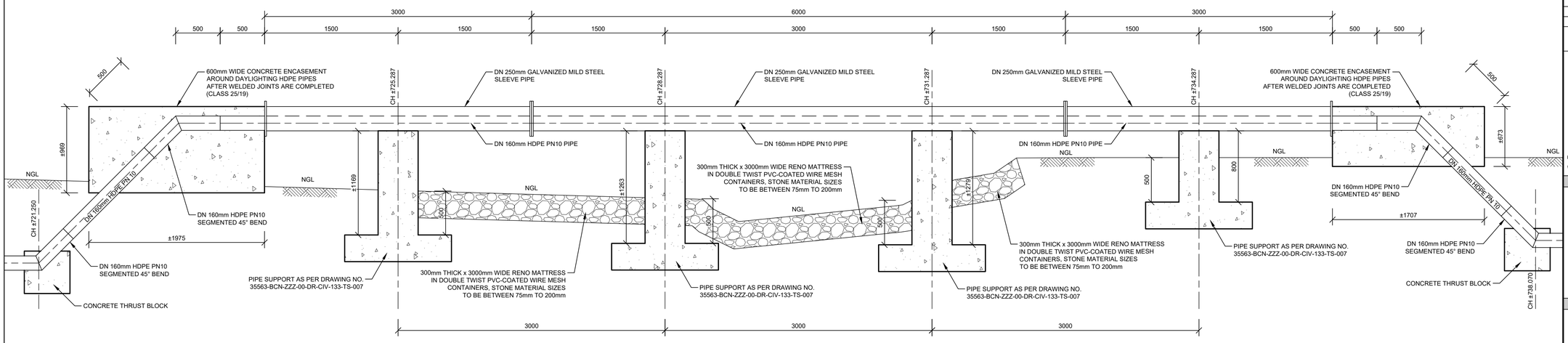
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-007



ELEVATION VIEW OF
STREAM CROSSING 1
SCALE 1:25



ELEVATION VIEW OF
STREAM CROSSING 2
SCALE 1:25

WELDING OF HDPE PIPES:

THE FOLLOWING WELDING STANDARDS MUST BE MET AND DOCUMENTED ACCORDINGLY, THROUGHOUT THE PROJECT:

- **WELDING EQUIPMENT AND PROCESSES:** WELDING EQUIPMENT AND PROCESSES SHALL COMPLY WITH SANS 1671 FOR EQUIPMENT, SANS 10268 FOR WELDING PROCESSES, AND SANS 10270 FOR THE APPROVAL OF WELDING PROCEDURES AND WELDS.
- **WELDER CERTIFICATION AND TRACEABILITY:** EACH WELDER MUST BE CERTIFIED BY PLASTICS SA, WITH CREDENTIALS RECORDED PER SANS 10269. WELDS MUST BEAR THE UNIQUE WELDER ID AND IFPA MEMBERSHIP FOR FULL TRACEABILITY.
- **WELDING PROCEDURE AND QUALITY CONTROL:** APPROVAL PER SANS 10269 MUST BE OBTAINED, WITH THE QUALIFICATION WELDS CONDUCTED UNDER CERTIFIED INSPECTOR OVERSIGHT. BOTH VISUAL AND DESTRUCTIVE TESTING (BEND, TENSILE, AND TENSILE-CREEP TESTS AS PER SANS 6269:2005) SHOULD BE REGULARLY ADMINISTERED TO CONFIRM STANDARD ADHERENCE.
- **DOCUMENTATION AND RECORD-KEEPING:** ENSURE COMPLETE DOCUMENTATION FOR EACH WELD, INCLUDING PROTOCOLS, PROCESS CONDITIONS, AND INSPECTION RECORDS, WHICH MUST BE AVAILABLE ON REQUEST. THE WELDING PROCEDURE SPECIFICATION QUALIFICATION REPORT (WPS-QR), COMPLIANCE CERTIFICATES, AND A RECORD OF TESTED SPECIMENS SHOULD BE ORGANIZED AND MAINTAINED IN THE PROJECT'S QUALIFICATION FILE FOR SUBMISSION AT PROJECT COMPLETION.
- **RANDOM WELD INSPECTIONS:** THE ENGINEER RESERVES THE RIGHT TO CONDUCT ADDITIONAL INSPECTIONS TO VERIFY QUALITY ADHERENCE. SHOULD THIRD-PARTY TESTING BE REQUIRED TO MEET PROJECT STANDARDS, THIS WILL BE ARRANGED AND CHARGED TO THE CONTRACTOR AS NECESSARY.

NOTES / LEGEND

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PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

STREAM CROSSING DETAILS

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PLAN NUMBER

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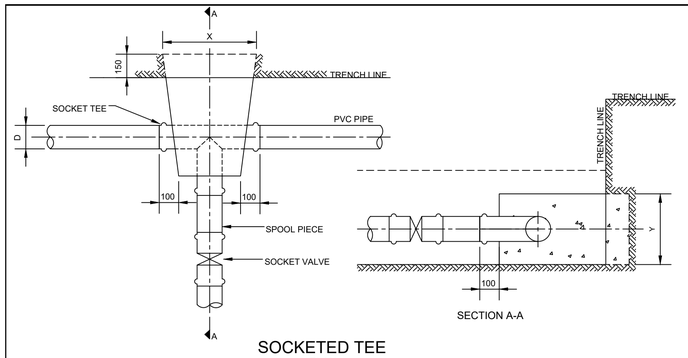
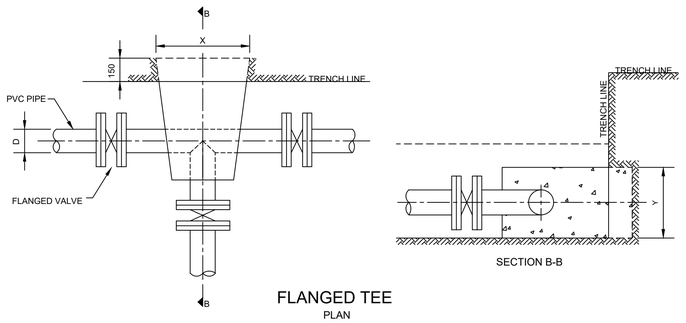
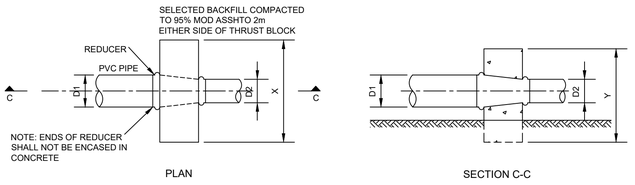


SOCKETED TEE
PLAN

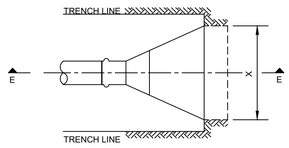


FLANGED TEE
PLAN



PLAN SECTION C-C

TYPICAL THRUST BLOCKS FOR REDUCERS



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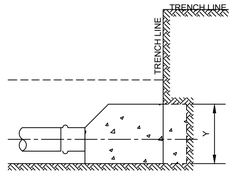
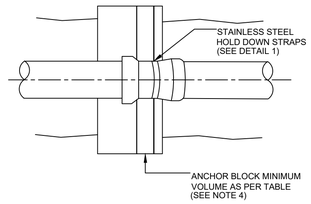


SECTION D-D

END CAP



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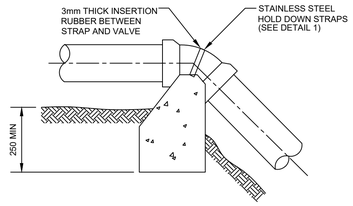


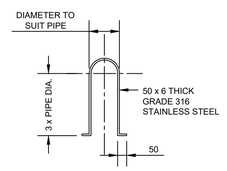
ELEVATION

VERTICAL BENDS

ANCHOR BLOCK CONSTRUCTION NOTES
FOR VERTICAL BENDS:
1. LOCATE ANCHOR BLOCK CENTRALLY AROUND BEND.
2. KEY ANCHOR BLOCK INTO BASE OF TRENCH A MINIMUM DEPTH OF 250
3. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.

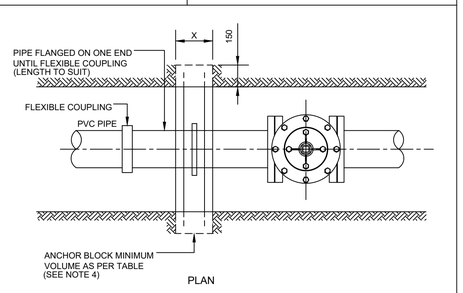
THRUST BLOCK SIZES (mm) IN NORMAL EARTH FOR HEADS OF 120m							
PIPE SIZE (D)	CAP X Y	TEE (BRANCH) X Y	90° 1/4 BEND X Y	45° 1/8 BEND X Y	22.5° 1/16 BEND X Y	11.25° 1/32 BEND X Y	VALVE X Y
50mm	200 x 100	200 x 100	300 x 100	200 x 100	100 x 100	100 x 100	200 x 100
75mm	200 x 200	200 x 200	300 x 250	250 x 200	200 x 200	200 x 200	200 x 200
110mm	400 x 200	400 x 200	500 x 300	300 x 250	200 x 200	200 x 200	400 x 200
160mm	600 x 300	600 x 300	600 x 500	500 x 350	300 x 300	250 x 200	600 x 300
200mm	800 x 400	800 x 400	900 x 600	800 x 400	500 x 300	300 x 250	800 x 400
250mm	800 x 600	800 x 600	900 x 900	800 x 600	600 x 400	300 x 300	800 x 600
315mm	1000 x 700	1000 x 700	1300 x 1000	1000 x 700	600 x 600	500 x 300	1000 x 700
355mm	1200 x 800	1200 x 800	1700 x 800	900 x 800	800 x 500	800 x 300	1200 x 800

NOTE: FOR THRUST BLOCK SIZES FOR REDUCERS
REFER TO NOTE 12.

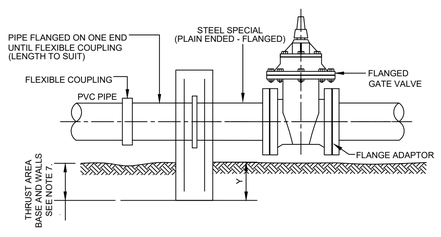


DETAIL 1
TYPICAL SS STRAP

MINIMUM BLOCK VOLUME FOR ANCHORAGE VERTICAL BENDS FOR TEST PRESSURE OF 1200 kPa (SEE NOTE 4)			
PIPE DN	CONCRETE VOLUME (m3) 11.25° BEND	22.5° BEND	45° BEND
100	N	N	0.3
150	N	0.3	0.6
200	0.2	0.5	1.1
225	0.3	0.6	1.4
250	0.3	0.7	2.5
300	0.4	1.1	3.8
375	0.7	1.8	5.8



PLAN



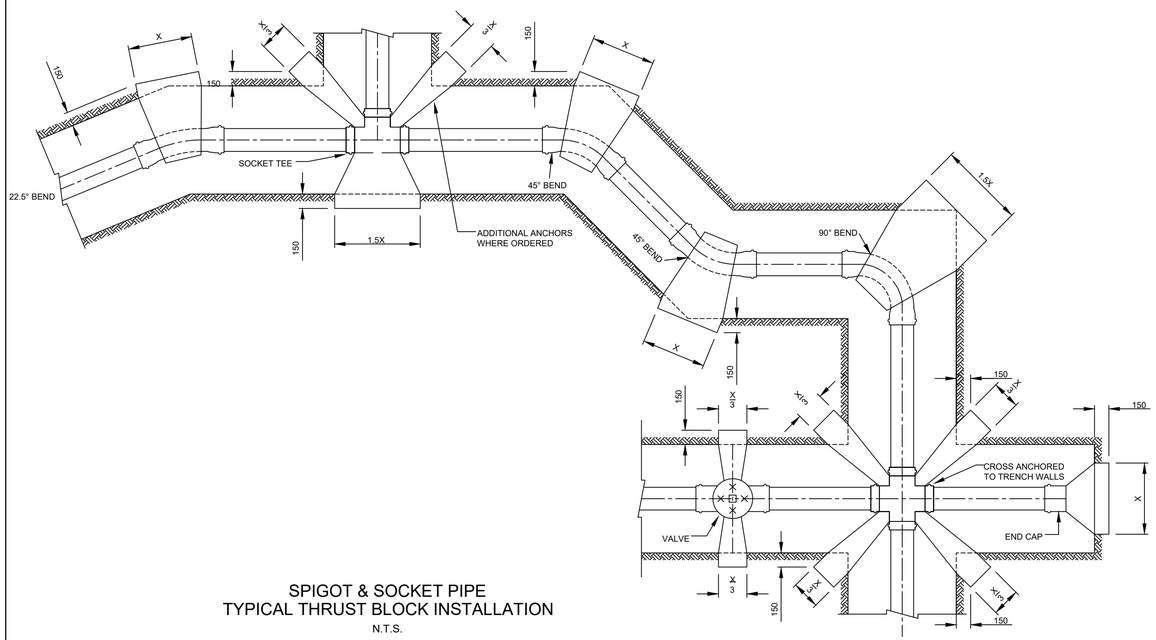
ELEVATION

FLANGED VALVES

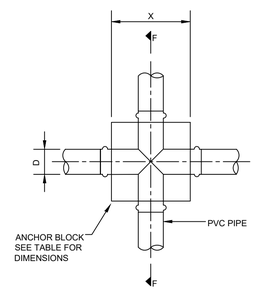
GENERAL NOTES:

1. CONCRETE IN ANCHOR BLOCKS TO BE CLASS 15/20.
2. CONCRETE ANCHOR BLOCKS SHALL BE CAST AGAINST UNDISTURBED NATURAL GROUND AS APPROVED BY THE ENGINEER OR IMPROVED GROUND USING SOILCRETE.
3. CONCRETE ANCHOR BLOCKS HAVE BEEN SIZED ON THE BASIS OF A PERMISSIBLE PASSING BEARING PRESSURE OF 146 kN/m2. IN THE EVENT THAT THIS BEARING PRESSURE IS CONSIDERED BY THE ENGINEER TO BE UNACHIEVABLE, THE DIMENSIONS OF X AND Y OF THE DIFFERENT THRUST BLOCK TYPES SHALL BE ADJUSTED ACCORDINGLY, WITH OR WITHOUT SOIL IMPROVEMENT USING SOILCRETE.
4. ANCHOR BLOCKS IN THE TABLE ARE DESIGNED FOR A TEST PRESSURE OF 1200 kPa (120m HEAD). ADJUST CONCRETE VOLUME TO SUIT ACTUAL TEST PRESSURE.
5. THE FOLLOWING BEARING PRESSURES ARE RECOMMENDED IN THE ABSENCE OF MORE RELIABLE GEOTECHNICAL DATA:

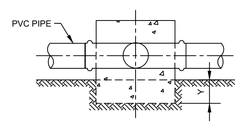
   SOFT CLAY: 55 kN/m2
   HARD CLAY: 100 kN/m2
   FINE SAND: 150kN/m2
   GRAVEL: 200kN/m2
   ROCK: 500kN/m2
6. THE SHAPE AND DIMENSIONS OF CONCRETE BLOCKS SHOWN ARE DIAGRAMMATIC ONLY.
7. CONCRETE ANCHOR BLOCKS MUST BE PROVIDED FOR ALL SOCKET VALVES.
8. WHERE A GROUP OF PIPES AND FITTINGS WITH RESTRAINED JOINTS ARE USED, ANCHOR BLOCKS ARE REQUIRED ONLY ON ONE COMPONENT IN THE GROUP.
9. WHERE mPVC RUBBER RING JOINTED PIPES ARE USED, THE NORMAL PRACTICE OF ANCHORING BENDS, TEES, END CAPS AND REDUCERS SHALL BE FOLLOWED.
10. UNLESS OTHERWISE SPECIFIED, CONCRETE ANCHORAGES ARE REQUIRED FOR ALL VALVES Ø200 AND ABOVE. THRUST AREA SHALL BE AS FOR END CAPS.
11. VALVES Ø350 OR LARGER SHALL BE INSTALLED IN A VALVE CHAMBER.
12. REDUCERS TO HAVE A MINIMUM AREA FOR ANCHORS EQUAL TO DIFFERENCE IN CORRESPONDING AREA FOR END CAPS OF EACH DIAMETER OF REDUCER.
13. ANCHOR BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS.
14. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.



SPIGOT & SOCKET PIPE
TYPICAL THRUST BLOCK INSTALLATION
N.T.S.



PLAN



SECTION F-F

TYPICAL CROSS ANCHORED TO FOUNDATION

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CLIENT

KGOTSOI PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL SEWER
RISING MAIN DETAILS:
THRUST BLOCKS

APPROVED BY BVI

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

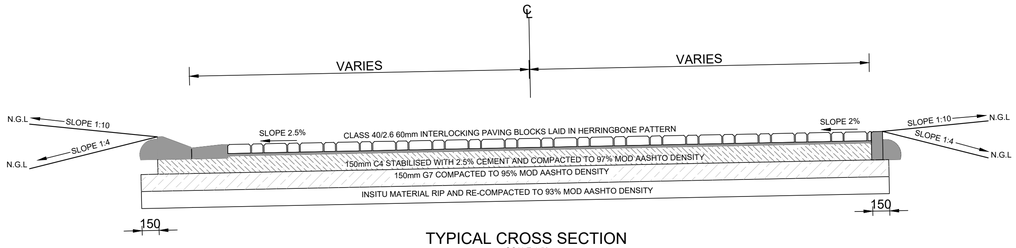
SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

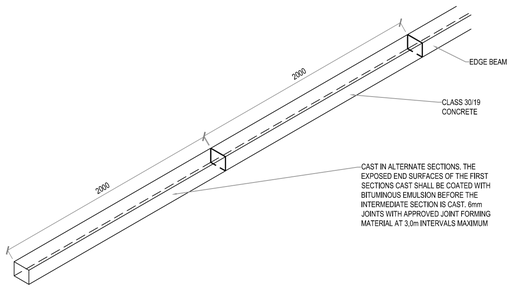
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

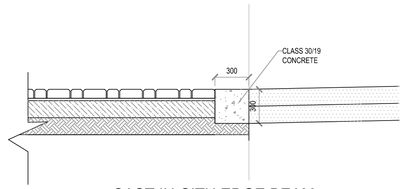
35563-BCN-ZZZ-00-DR-CIV-133-TS-009



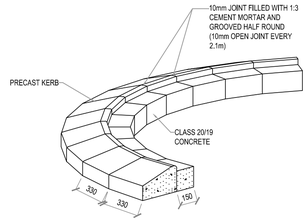
TYPICAL CROSS SECTION
SCALE 1:50



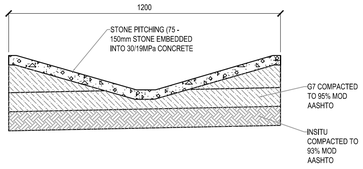
DETAIL OF EDGE BEAM
SCALE 1:20



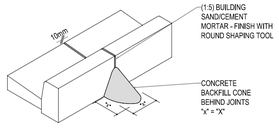
CAST IN-SITU EDGE BEAM
SCALE 1:20



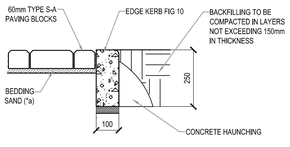
DETAIL OF KERBS ON CURVED SECTIONS
SCALE 1:20



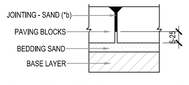
STONE PITCHING CHANNEL DETAIL
SCALE 1:10



CONCRETE HAUNCHING
SCALE 1:20

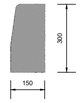


EDGE DETAIL (SANS 927 FIG 10)
SCALE 1:10



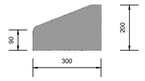
DETAIL B : JOINTS BETWEEN BLOCKS
SCALE 1 : 5

SABS FIG 10
SCALE 1 : 10

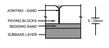


SABS FIG 3
SCALE 1 : 10

SABS FIG 14
SCALE 1 : 10



SABS FIG 8c
SCALE 1 : 10



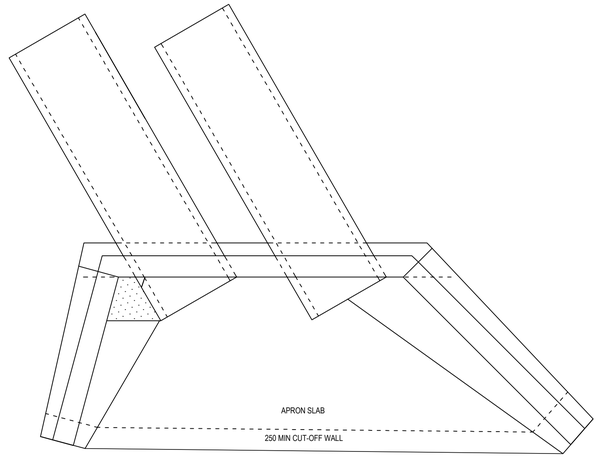
DETAIL A : JOINTS BETWEEN BLOCKS
SCALE 1 : 10

NOTE :

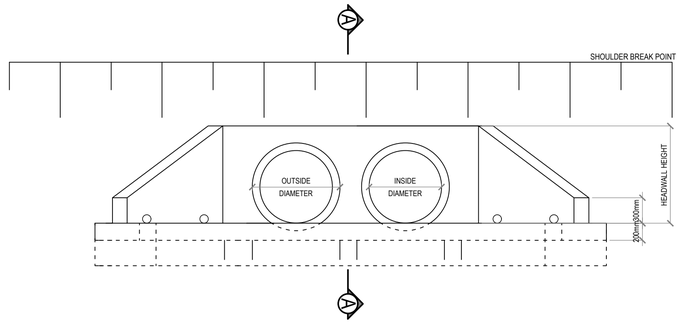
*a) BEDDING SAND SIZE AND GRADING TO COMPLY WITH STANDARDS AS SET OUT IN THE UTG 2 (STRUCTURAL DESIGN OF SEGMENTAL BLOCK PAVEMENTS) (SIEVE GRADING TEST RESULTS TO BE SUPPLIED TO ENGINEER)

*b) JOINTING SAND SHALL PASS A 1.18mm SIEVE AND SHALL CONTAIN 10 - 50% OF MATERIAL THAT PASSES A 0.075mm SIEVE (SIEVE GRADING TEST RESULTS TO BE SUPPLIED TO ENGINEER)

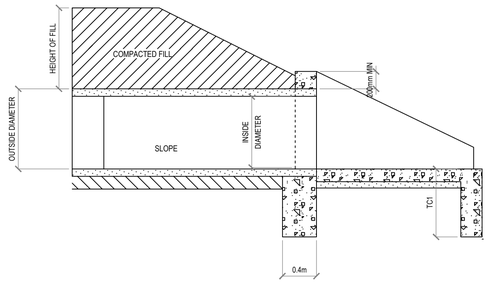
1. PAVER THICKNESS 60mm
   PAVER CLASS 40/2.6
   PAVER TYPE S-A (TYPE A) INTERLOCKING PAVING BLOCKS
   PAVER LAID IN HERRINGBONE PATTERN
2. ALL ROADS ARE 6.0m WIDE WITH A MIN 2% CROSS FALL OR CHAMBER
3. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS
4. ALL DIMENSIONS AND LEVELS MUST BE CHECKED AGAINST OTHER RELEVANT DRAWINGS AND ANY DISCREPANCIES MUST BE REFERRED TO THE ENGINEER FOR ATTENTION. DRAWINGS NOT TO BE SCALED.
5. ALL DIMENSIONS AND LEVELS MUST BE CHECKED ON SITE.
6. ALL CONCRETE WORKS TO COMPLY WITH S.A.B.S. 1200G AND ALL REINFORCEMENT STEEL TO COMPLY WITH S.A.B.S. 920
7. ALL CONCRETE TO BE VIBRATED AND THE MIN. 28 DAYS STRENGTH TO BE 30MPa UNLESS SPECIFIED OTHERWISE.
8. MAXIMUM SLUMP IN CONCRETE = 100mm
9. CONCRETE COVER TO REINFORCING STEEL: FOUNDATIONS = 40mm
10. REINFORCED STEEL TO BE HELD IN POSITION WITH THE USE OF PLASTIC SPACER BLOCKS (1 PER m²)
11. "Y" REINFORCEMENT TO SABS STANDARDS (MIN YIELD STRESS OF 450MPa). AND "R" REINFORCEMENT TO SABS STANDARDS (MIN YIELD STRESS OF 250MPa).
12. ENGINEER TO APPROVE ALL REINFORCING PRIOR TO CASTING OF CONCRETE.
13. 48hours INSPECTION AND SITE VISIT NOTICE PERIOD REQUIRED.
14. COPYRIGHT RESERVED ON ALL DRAWINGS
15. ALL CONCRETE STORMWATER CHANNELS TO HAVE A WOOD FLOAT FINISH
16. PRECAST CONCRETE KERBS SHOULD COMPLY WITH SANS 927-2003
17. KERBS ARE GENERALLY SUPPLIED IN LENGTHS OF 0.33m OR 1.0m FOR EXTRA HEAVY DUTY AREAS CONTINUOUS CONCRETE HAUNCHING SHOULD BE PLACED BEHIND KERB / EDGE RESTRAINT



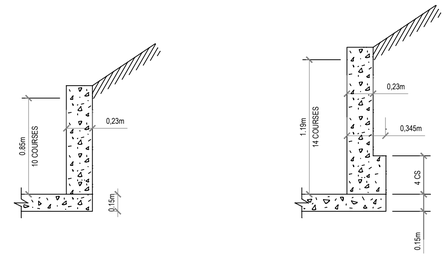
SKEW PIPE CULVERT
SCALE 1:20



ELEVATION
SCALE 1:20



PART SECTION A-A
SCALE 1:20



TYPICAL RETAINING WALL DETAILS
SCALE 1:20

NOTES / LEGEND

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

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Z	:	AS-BUILT	IFC	:	ISSUED FOR CONSTRUCTION
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CLIENT

KGOTSONG PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL ROAD AND
STORMWATER DETAILS

APPROVED BY BVI

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

SCALE	AS SHOWN @ A1	DRAWN	DJ COETZEE
DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
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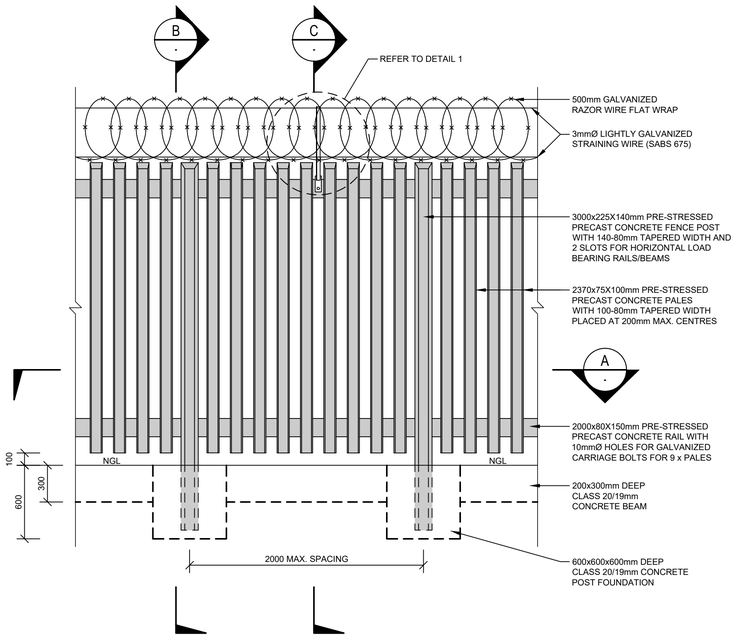
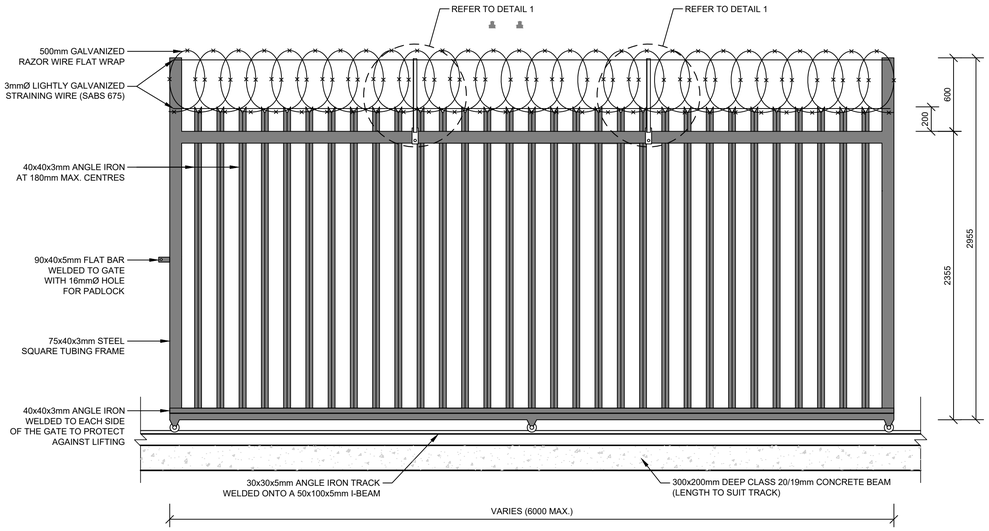
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

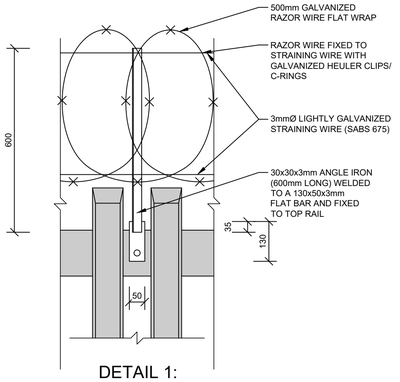
35563-BCN-ZZZ-00-DR-CIV-133-TS-010



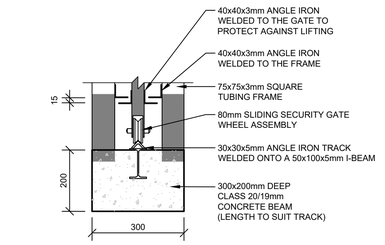
OUTER FENCE:
TYPICAL CONCRETE PALISADE FENCE FRONT ELEVATION
SCALE 1:25



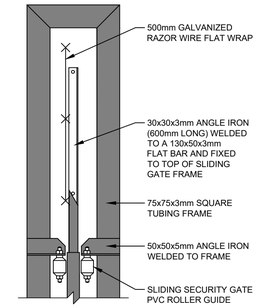
TYPICAL SLIDING GATE DETAIL
SCALE 1:25



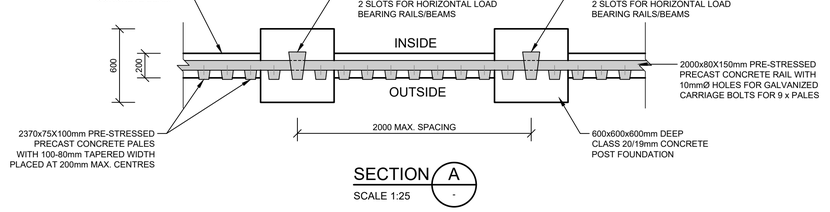
DETAIL 1:
BARBED WIRE EXTENSION
SCALE 1:10



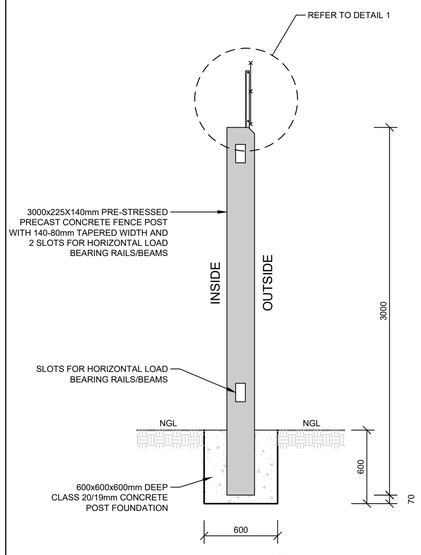
DETAIL 2:
SLIDING SECURITY GATE TRACK
SCALE 1:10



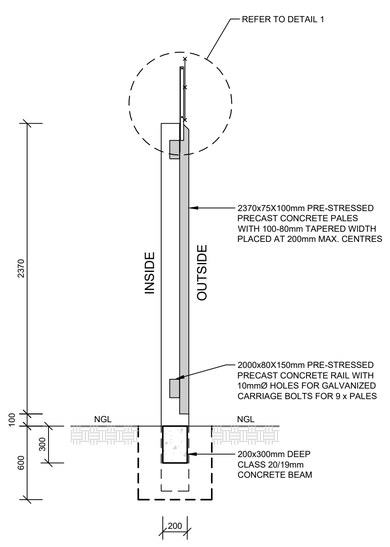
DETAIL 3:
SLIDING SECURITY GATE GUIDES
SCALE 1:10



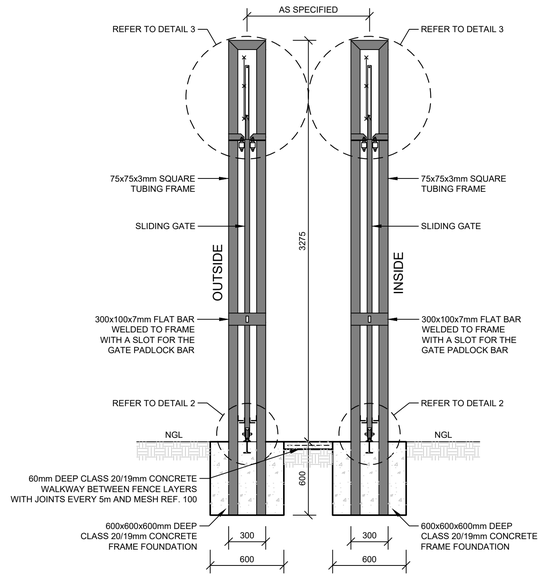
SECTION A
SCALE 1:25



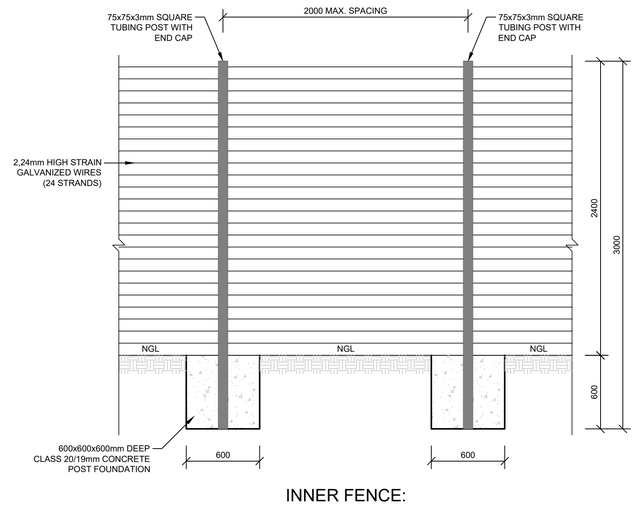
SECTION B
SCALE 1:25



SECTION C
SCALE 1:25



TYPICAL GATE POST SECTION DETAIL
FOR DOUBLE SLIDING GATES
SCALE 1:25



INNER FENCE:
TYPICAL 24 STAND ELECTRIC FENCE DETAIL
SCALE 1:25

NOTES / LEGEND

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PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

TYPICAL FENCE DETAILS

APPROVED BY BVI

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DESIGNED	DJ COETZEE	CHECKED	JL REYNDERS

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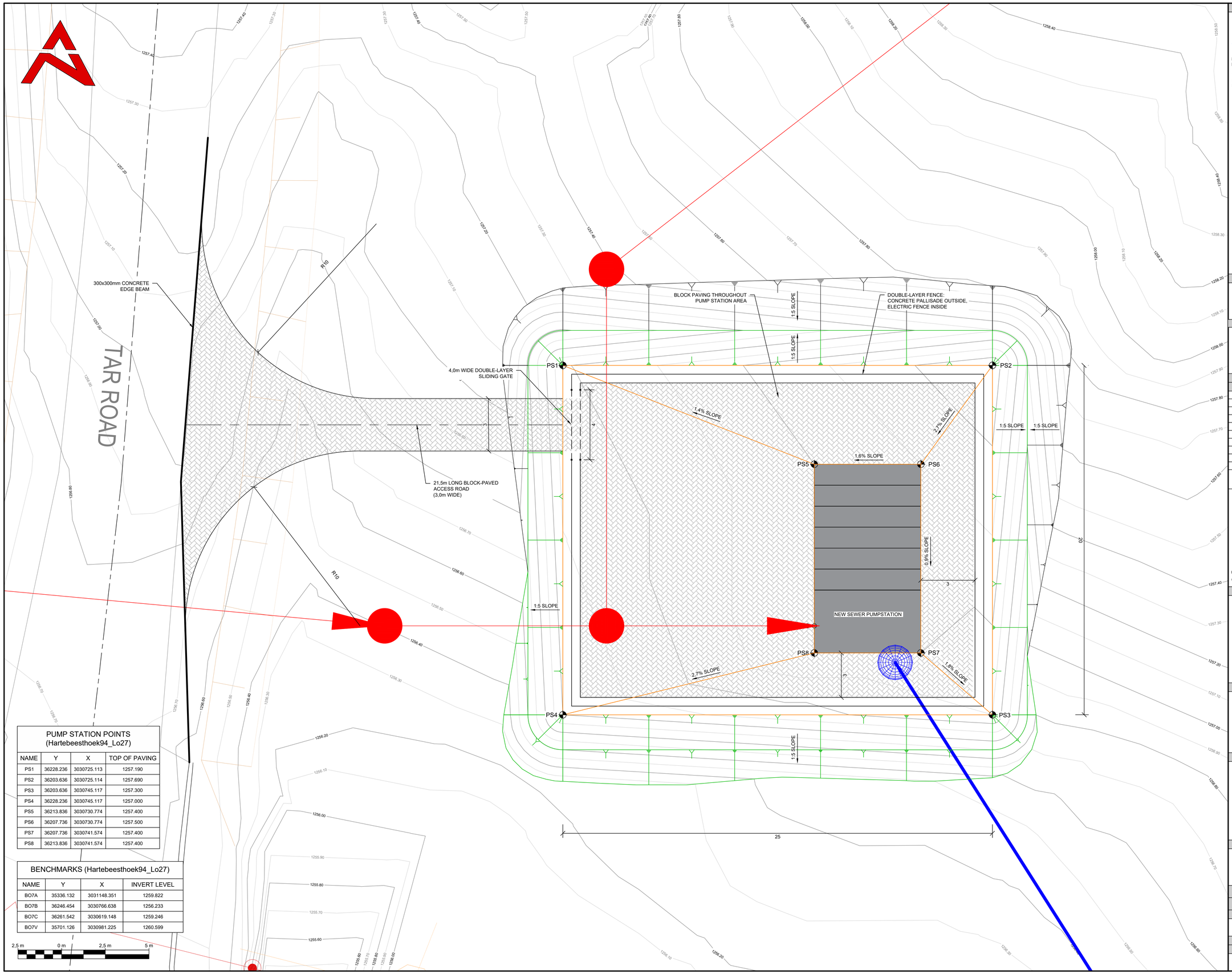
PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-133-TS-011



PUMP STATION POINTS (Hartebeesthoek94_Lo27)			
NAME	Y	X	TOP OF PAVING
PS1	36228.236	3030725.113	1257.190
PS2	36203.636	3030725.114	1257.690
PS3	36203.636	3030745.117	1257.300
PS4	36228.236	3030745.117	1257.000
PS5	36213.836	3030730.774	1257.400
PS6	36207.736	3030730.774	1257.500
PS7	36207.736	3030741.574	1257.400
PS8	36213.836	3030741.574	1257.400

BENCHMARKS (Hartebeesthoek94_Lo27)			
NAME	Y	X	INVERT LEVEL
BO7A	35336.132	3031148.351	1259.822
BO7B	36246.454	3030766.638	1256.233
BO7C	36261.542	3030619.148	1259.246
BO7V	35701.126	3030981.225	1260.599

2,5 m 0 m 2,5 m 5 m

NOTES / LEGEND

- SEWER PIPE (BY OTHERS)
- NEW SEWER PIPE
- NEW RISING MAIN
- WATERCOURSE
- SEWER MH (BY OTHERS)
- NEW SEWER MANHOLE
- SLEEVE PIPE (HDD)
- SLIPLINING
- ENV. BUFFER ZONE
- TELEPHONE LINE
- POWERLINE

MANHOLE LABELS: MANHOLE NAME / COVER LEVEL (m) / INVERT LEVEL (m) / DEPTH (m)

SEWER PIPE LABELS: PIPE LENGTH x PIPE Ø, MATERIAL / PIPE FLOW/CAPACITY @ SLOPE

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PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

SEWER PUMP STATION LAYOUT PLAN

APPROVED BY BVi

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

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DESIGNED	DJ COETZEE	***CHECKED***	JL REYNDERS

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PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

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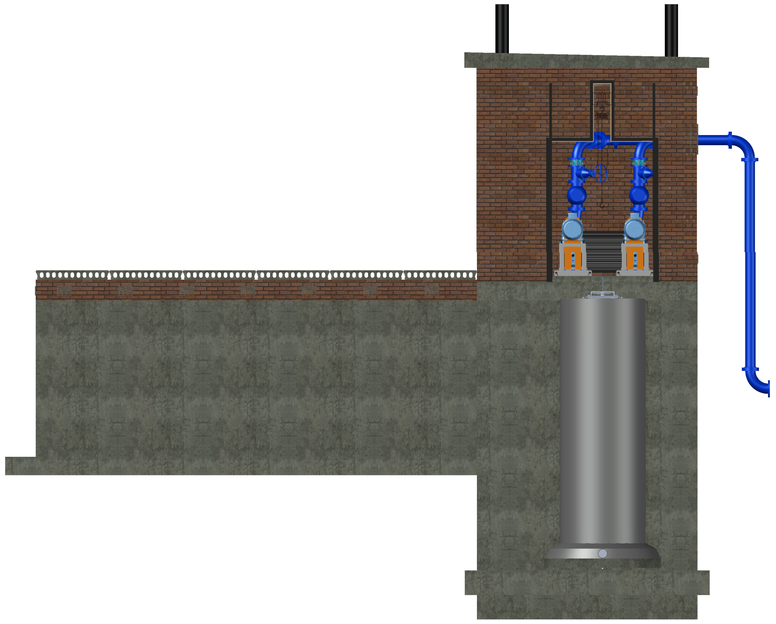
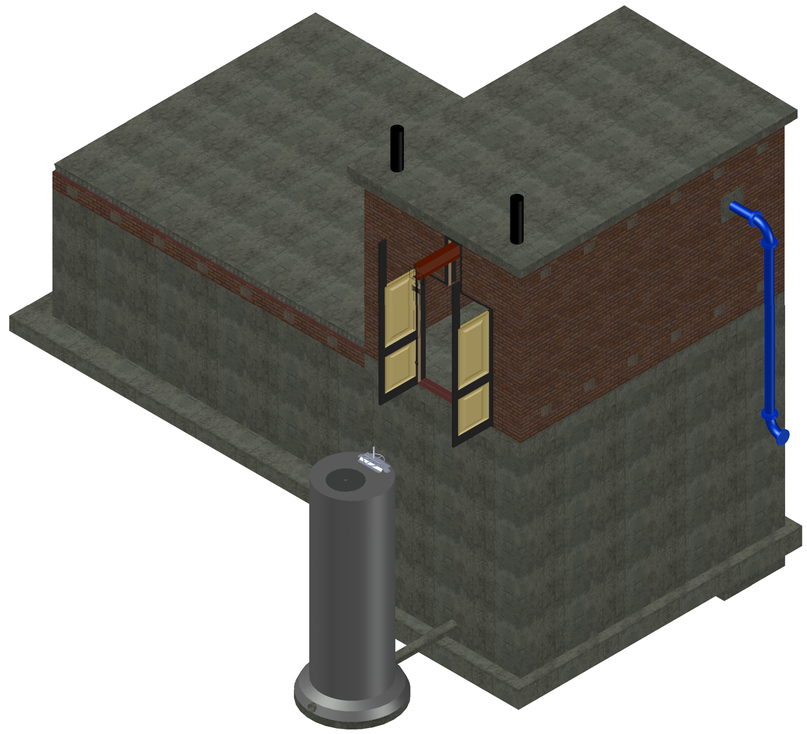
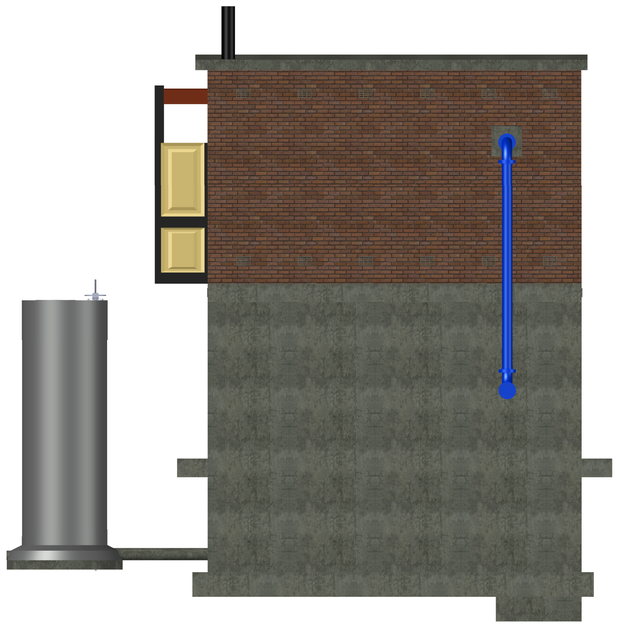


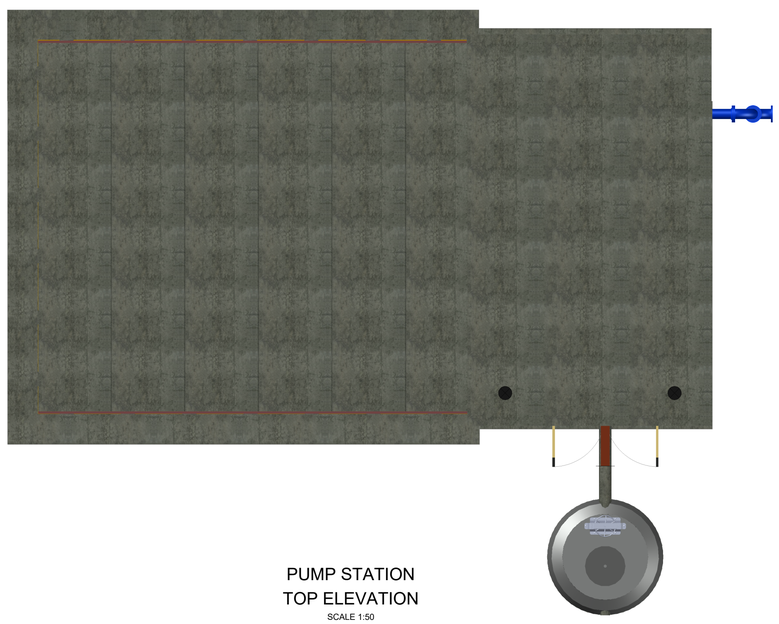
PUMP STATION
WEST ELEVATION
SCALE 1:50



PUMP STATION
3D VIEW
SCALE 1:50



PUMP STATION
SOUTH ELEVATION
SCALE 1:50



PUMP STATION
TOP ELEVATION
SCALE 1:50

NOTES / LEGEND

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CITY ENGINEER / CLIENT | REG. NO. | DATE

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0, 1, 2...	:	CONSTRUCTION	IFR	:	ISSUED FOR REVIEW
Z	:	AS-BUILT	IFC	:	ISSUED FOR CONSTRUCTION
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PROJECT NAME

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CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

PUMP STATION ELEVATIONS

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ENGINEER/TECHNOLOGIST | REG. NO. | DATE

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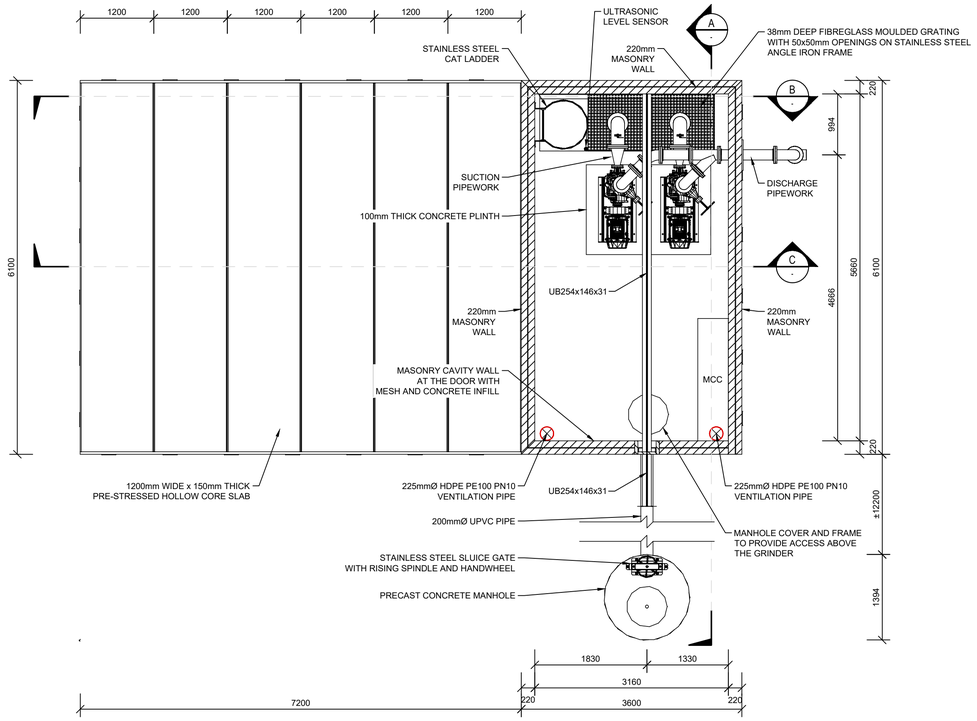
DESIGNED	JL REYNDERS	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

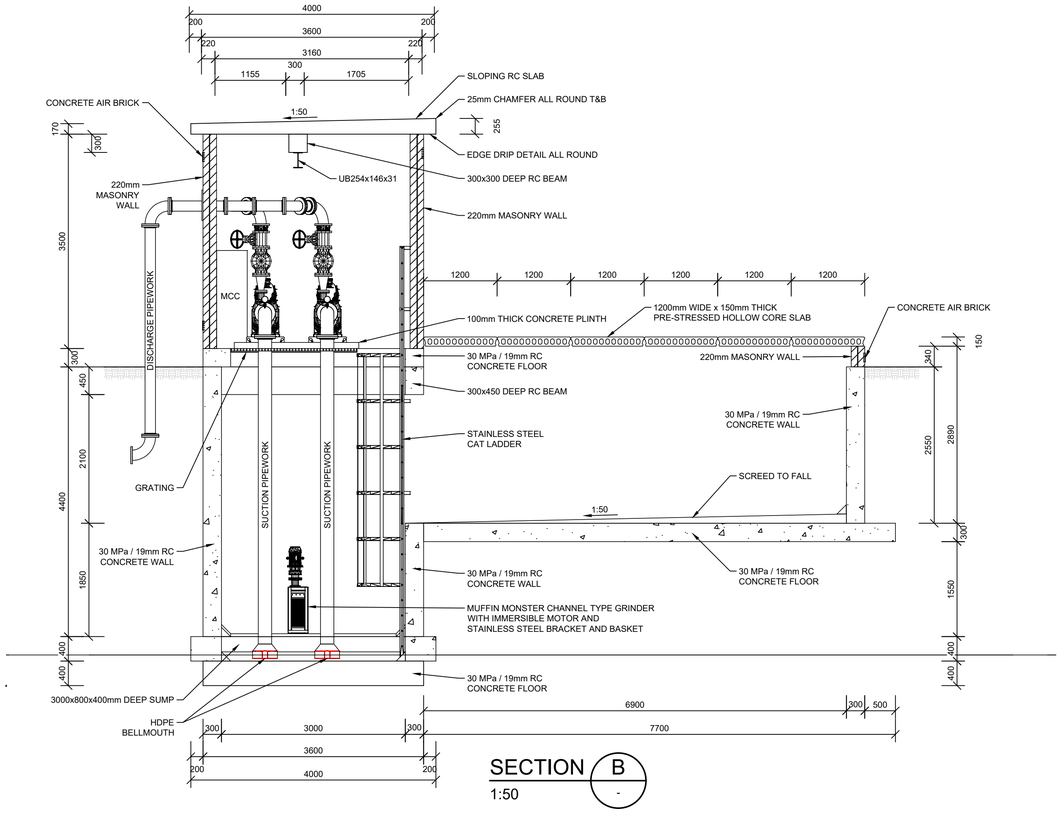
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

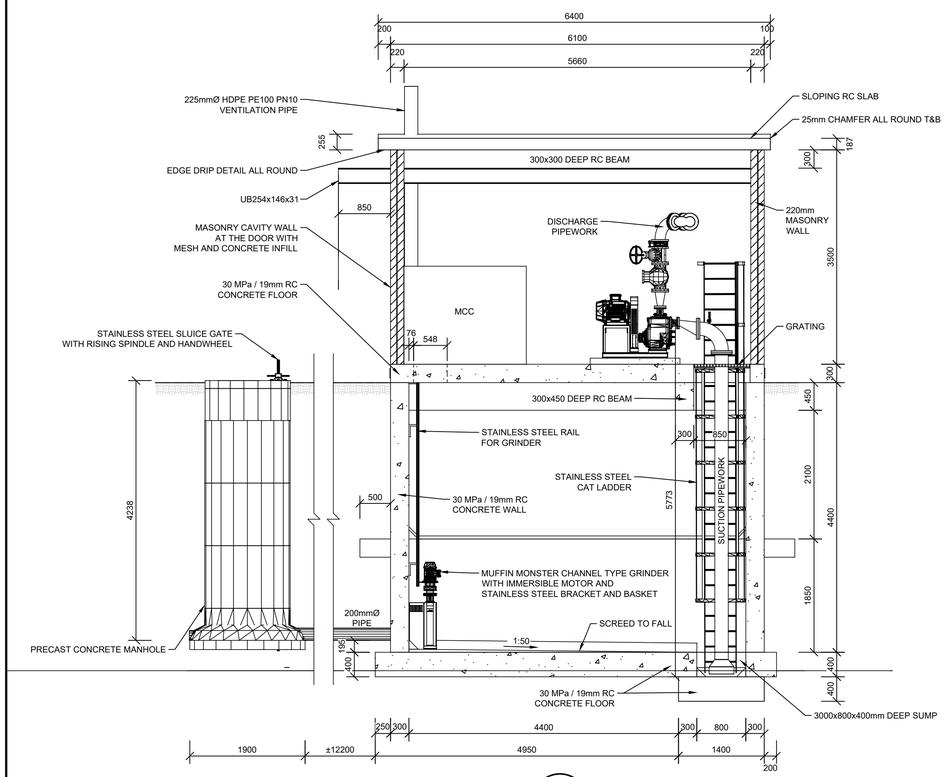
35563-BCN-ZZZ-00-DR-CIV-135-TS-001



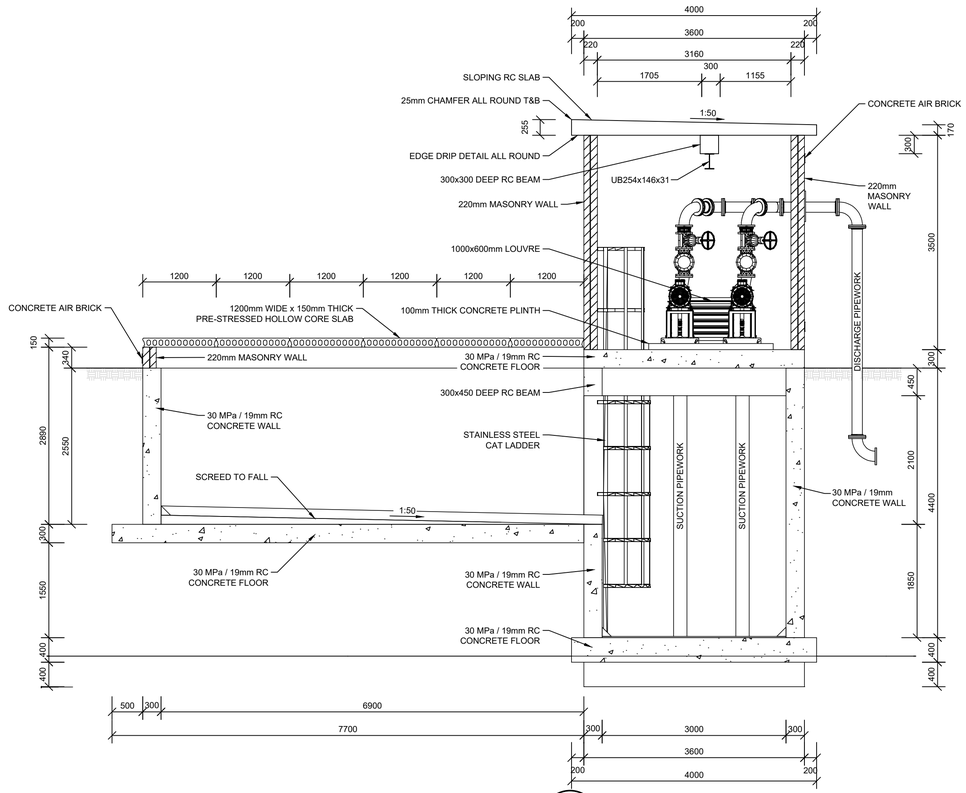
PUMP STATION
TOP SECTION VIEW
SCALE 1:50



SECTION B
1:50



SECTION A
1:50



SECTION C
1:50

NOTES / LEGEND

1. ALL WORKS TO COMPLY WITH ACCURACY LEVEL II AND GRADE II PERMISSIBLE DEVIATION/TOLERANCE.
2. ANY DISCREPANCIES ON THIS DRAWING TO BE BROUGHT TO THE ENGINEERS ATTENTION PRIOR TO IMPLEMENTATION OF ANY WORK.
3. MINIMUM COVER TO MESH REINFORCEMENT = 50mm.
4. EXACT DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO MANUFACTURE OF ANY SPECIALS.

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES		SUITABILITY CODES	
A,B,C...	: BEFORE TENDER	IFI	: ISSUED FOR INFORMATION
T0, T1, T2...	: FOR TENDER	FAC	: FOR ACCEPTANCE CONTROL
0, 1, 2...	: CONSTRUCTION	IFR	: ISSUED FOR REVIEW
Z	: AS-BUILT	IFC	: ISSUED FOR CONSTRUCTION
		ASB	: AS-BUILT

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DATE	INITIAL	NO./CODE	REVISION DESCRIPTION

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CLIENT

KGOTSOI PULA

PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

PUMP STATION SECTIONS

APPROVED BY BVI

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

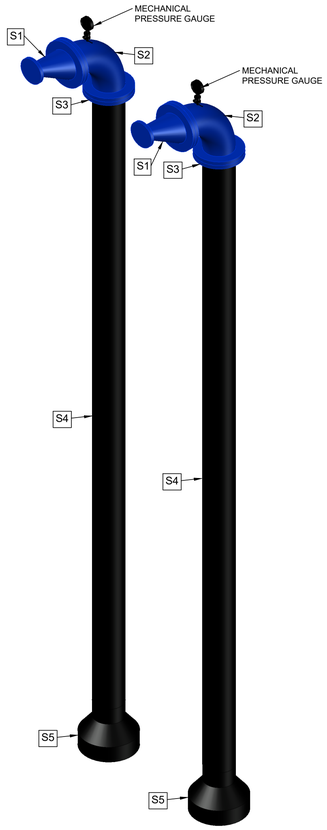
SCALE	1:50 @ A1	DRAWN	DJ COETZEE
DESIGNED	JL REYNDERS	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

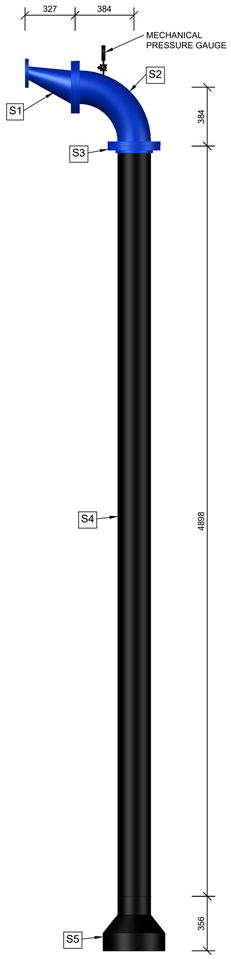
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-135-TS-002



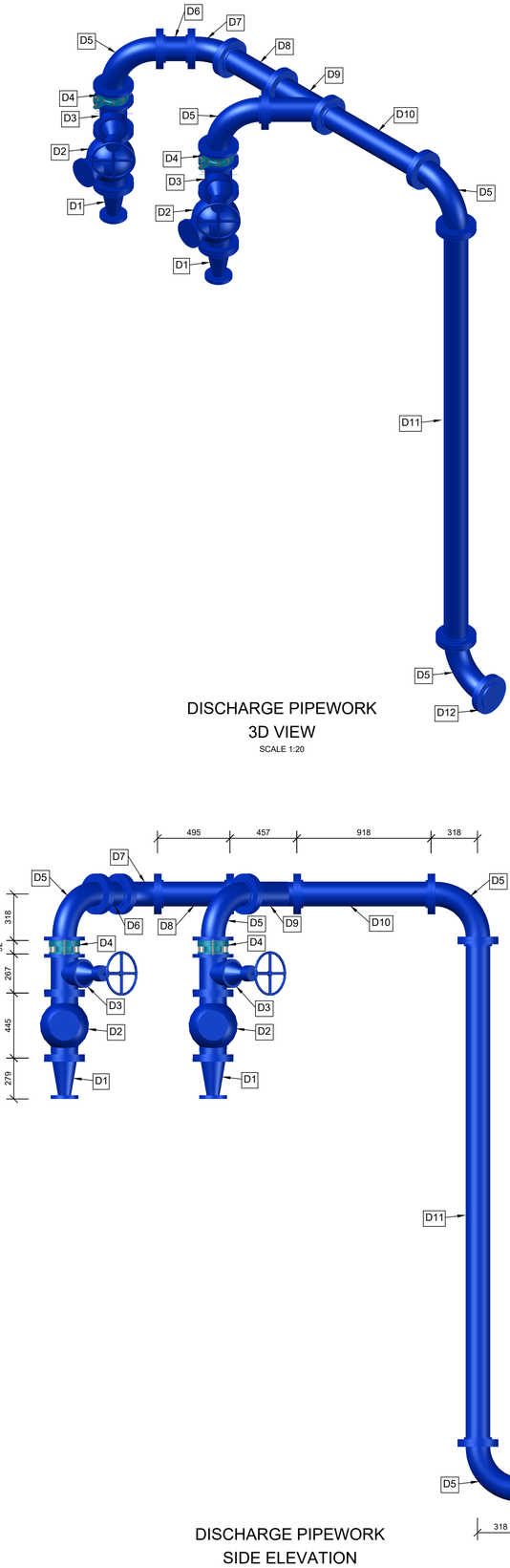
SUCTION PIPEWORK
3D VIEW
SCALE 1:20



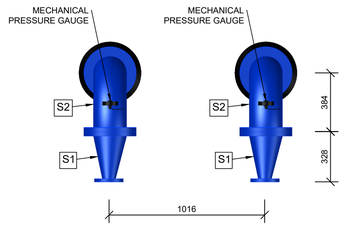
SUCTION PIPEWORK
SIDE ELEVATION
SCALE 1:20

SUCTION PIPE FITTING SCHEDULE (PN10)		
ITEM NO.	**DESCRIPTION**	**NO. OF**
S1	DN 200x65mm MILD STEEL FLANGED ECCENTRIC REDUCER (LENGTH = ±327mm)	2
S2	DN 200mm MILD STEEL FLANGED 90° MEDIUM RADIUS BEND WITH A MECHANICAL PRESSURE GAUGE (WIKA MODEL 232.50 OR SIMILAR APPROVED)	2
S3	DN 200mm HDPE FLANGE ADAPTOR (TO SUIT DN 225mm HDPE PIPE)	2
S4	DN 225mm HDPE PE100 PN10 PIPE (LENGTH = ±4898mm)	2
S5	DN 355x225mm HDPE PE100 PN10 BELLMOUTH	2

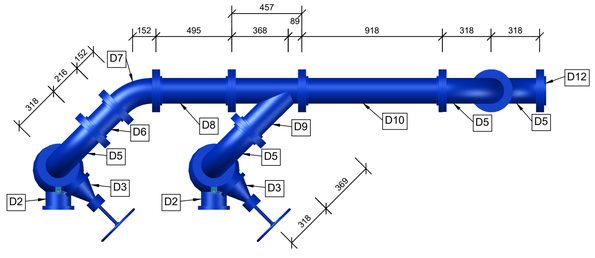
DISCHARGE PIPE FITTING SCHEDULE (PN10)		
ITEM NO.	**DESCRIPTION**	**NO. OF**
D1	DN 150x65mm MILD STEEL FLANGED CONCENTRIC REDUCER (LENGTH = ±279mm)	2
D2	DN 150mm FLANGED NON-RETURN VALVE	2
D3	DN 150mm FLANGED RSV GATE VALVE WITH HANDWHEEL	2
D4	DN 150mm FLANGED DISMANTLING JOINT	2
D5	DN 150mm MILD STEEL FLANGED 90° MEDIUM RADIUS BEND	4
D6	DN 150mm MILD STEEL STRAIGHT PIECE, BOTH ENDS FLANGED (LENGTH = ±216mm)	1
D7	DN 150mm MILD STEEL FLANGED 45° MEDIUM RADIUS BEND	1
D8	DN 150mm MILD STEEL STRAIGHT PIECE, BOTH ENDS FLANGED (LENGTH = ±495mm)	1
D9	DN 150x150mm MILD STEEL FLANGED 45° LATERAL (LENGTH = ±457mm)	1
D10	DN 150mm MILD STEEL STRAIGHT PIECE, BOTH ENDS FLANGED, WITH PUDDLE FLANGE (LENGTH = ±918mm)	1
D11	DN 150mm MILD STEEL STRAIGHT PIECE, BOTH ENDS FLANGED (LENGTH = ±3432mm)	1
D12	DN 150mm PVC-U FLANGE ADAPTOR (TO SUIT DN 160mm PVC-U PIPE)	1



DISCHARGE PIPEWORK
3D VIEW
SCALE 1:20



SUCTION PIPEWORK
TOP ELEVATION
SCALE 1:20



DISCHARGE PIPEWORK
TOP ELEVATION
SCALE 1:20

DISCHARGE PIPEWORK
SIDE ELEVATION
SCALE 1:20

NOTES / LEGEND

1. ALL STEEL SPECIALS TO BE HOT-DIPPED GALVANIZED AND EPOXY COATED TO SANS 719 (200 MICRON).
2. MINIMUM COVER TO MESH REINFORCEMENT = 50mm.
3. FLANGES TO BE DRILLED TO SANS 1123 TABLE 1000/3.
4. EXACT DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO MANUFACTURE.

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES		***SUITABILITY CODES***	
A,B,C...	: BEFORE TENDER	IFI	: ISSUED FOR INFORMATION
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DRAWING REVISION

DATE	*INITIAL*	*NO./CODE*	*REVISION DESCRIPTION*

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CLIENT

KGOTSOI PULA

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

PUMP STATION PIPEWORK
DETAILS

APPROVED BY BVI

JL REYNDERS | 2020300701 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

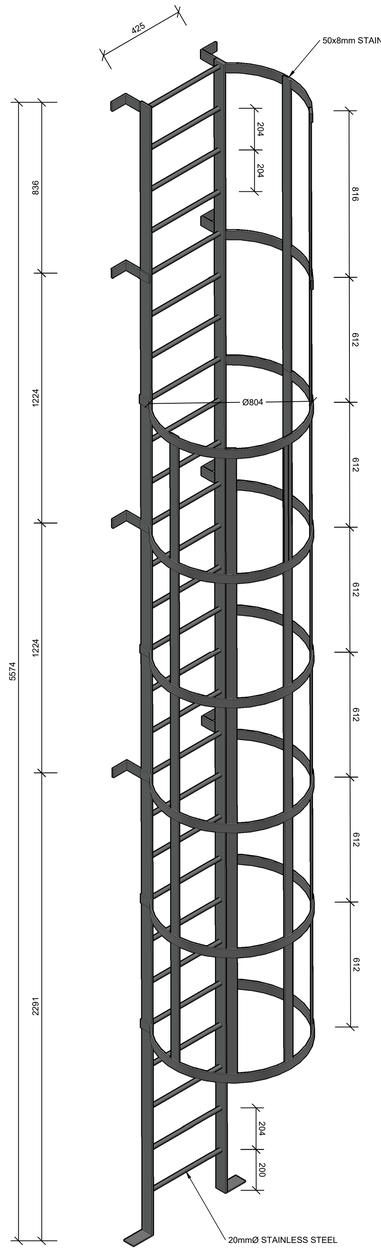
SCALE	1:20 @ A1	***DRAWN***	DJ COETZEE
DESIGNED	DJ COETZEE	***CHECKED***	JL REYNDERS

SUITABILITY STATUS	***REV. NO.***
ISSUED FOR TENDER	T0

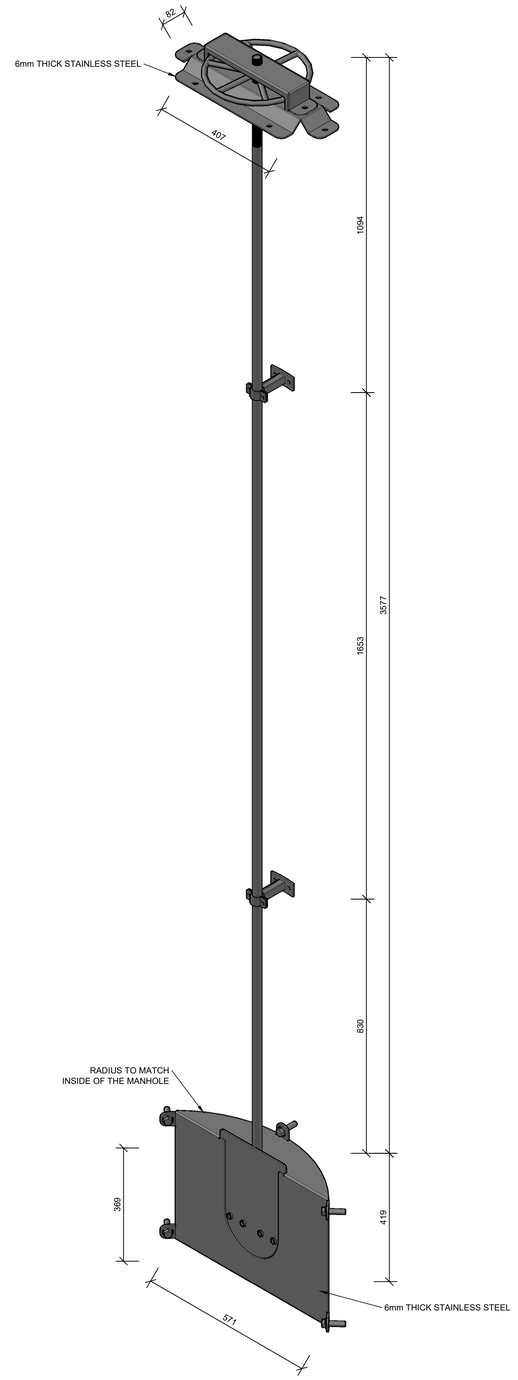
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-135-TS-003



STTAINLESS STEEL ACCESS LADDER
3D VIEW
SCALE 1:15



STTAINLESS STEEL SLUICE GATE
3D VIEW
SCALE 1:15

NOTES / LEGEND

1. ALL STAINLESS STEEL SPECIALS TO BE GRADE 316L STAINLESS STEEL.
2. EXACT DIMENSIONS TO BE CONFIRMED ON SITE PRIOR TO MANUFACTURE.

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES			SUITABILITY CODES		
A,B,C...	:	BEFORE TENDER	IFI	:	ISSUED FOR INFORMATION
T0, T1, T2...	:	FOR TENDER	FAC	:	FOR ACCEPTANCE CONTROL
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DRAWING REVISION

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CLIENT

KGOTSOI PULAI

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

PUMP STATION
ACCESS LADDER AND
SLUICE GATE DETAILS

APPROVED BY BVi

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

SCALE	1:15 @ A1	DRAWN	DJ COETZEE
DESIGNED	JL REYNDERS	CHECKED	JL REYNDERS

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-135-TS-004

CODES:

DESIGN CODES:
- SANS 10100-1: The structural use of concrete.
- SANS 2001: Standardised specification for Civil Engineering Construction.
- SANS 10160: The General procedures and loadings to be adopted in design of buildings
- SANS 10162: The structural use of steel
- SANS 10400: The application of National Building Regulations

CONSTRUCTION CODES AND NOTES
The contractor shall adhere to the following codes during construction as applicable:
SANS 2001 construction works:
- Part CC1: Concrete Works (Structural)
- Part CC2: Concrete Works (Minor Works)
- Part CG1: Installation of Glazing In Window And Door Frames
- Part CM1: Masonry Walling
- Part CM2: Strip Footings, Pad Footings and Slab-On-The-Ground Foundations for Masonry Walling
- Part CS1: Structural Steelwork
- Part CT1: Structural Timberwork (Flooring)
- Part CT2: Structural Timberwork (Roofing)
- Part EM1: Cement Plaster

SANS 10155 accuracy in buildings (SANS 2001 CC1 Table 11)
Grade II permissible deviation / tolerance shall apply U.N.O.
One copy of each of these codes shall be kept on-site and shall be made available to the engineer on request.

GENERAL
- SANS 10155 accuracy in buildings (SANS 2001 CC1 Table 11)
- Grade II permissible deviation / tolerance shall apply U.N.O.
- One copy of each of these codes shall be kept on-site and shall be made available to the engineer on request.
- All civil works to comply with S.A.N.S. 1200 accuracy level II UNO
- Do not scale any drawings, work to figured dimensions only.
- These drawings must be read as part of the contract documents and all discrepancies must be discussed with the engineer without delay.
- Any discrepancies on the drawings are to be brought to the engineers' attention prior to implementation of any work.
- The engineer should be notified in good time if he is required on site.
- All setting-out dimensions and levels must be checked by the contractor prior to any work commencing on-site.
- Only concrete dimensions are shown on these drawings.
- Refer to the relevant architect's drawings for finishing details and masonry work.
- The contractor is to maintain a full set of the latest drawings on site.

STRUCTURAL CONCRETE (SANS 10100 - 1: 2000)

CONCRETE SPECIFICATION:
- Only CEM 1 cement to be used. (SANS 50197-1)
- Maximum extender to be used is 30% for all concrete, except extenders for surface beds must be limited to 20%
- Only fly ash to be used as an extender. No GGBS allowed.
- Maximum water content for walls and slabs = 180 l/m³
- Aggregate to be 19mm stone U.N.O
- Only potable water to be used
- Sand to be well graded, free of clay with a sand equivalent of more than 85% (AASHTO T 176) (SANS 1083)
- Aggregate to consist of rock types that will produce low shrinkage and are not Alkali Reactive
- Design mix to be submitted to BVI for approval before the concrete pour.

Minimum concrete cubes crushing strength after 28 days for: (u.n.o.)

• Retaining walls	30 MPa
• Structural foundations	25 MPa
• Structural columns	30 MPa
• Structural walls	30 MPa
• Suspended slabs, beams & parapets	30 MPa
• Non-structural foundations	20 MPa
• Blinding layers	15 MPa
• Surface beds (with max. 20% extender)	30 MPa
• Mass concrete (non-structural fill)	10 MPa
• Mass concrete (structural fill below found.)	25 MPa
• Bond-dek or bond-lok slabs	30 MPa
• Shear walls and lift shafts	35 MPa
• Soilcrete	80 kg/m³
• Water retaining concrete (water tank)	35 MPa

PLACEMENT AND POURING (SANS 2001 CC1 4.7.9 – 4.7.10)
No concrete pouring allowed without obtaining the written consent of the consulting engineer.
No concrete must be poured in rainy conditions or after 16h00 without approval.
Do not pour concrete after a delay of 60 minutes if mixing water has been added. (SANS 2001 CC1 4.7.10.3)
Concrete must not be mixed or poured in temperatures under 2 degrees Celsius on a rising thermometer or under 5 degrees Celsius on a falling thermometer. Thereafter concrete must be kept at a minimum of 10 degrees Celsius and a maximum of 26 degrees Celsius for at least 72 hours. (SANS 2001 CC1 4.7.14)
When concrete is poured against existing concrete, existing concrete must be watered and coated with cement paste (SANS 2001 CC1 Table 7)
Concrete shall not be allowed to fall freely through a height of more than 3 m. (SANS 2001 CC1 4.7.10.8)

CURING (SANS 2001 CC1 4.7.13):
All green concrete must be effectively covered and watered for a minimum period of 10 days (e.g. Hessian for walls and columns and 25mm sand for floor plus water).
The use of a curing compound is also allowed. Curing method of concrete to be agreed with the engineer.

PRESTRESSING:
The support and laying of prestressed material must be in accordance with the supplier's requirements.

FINISHES (SANS 2001 CC1 Table 1):
Concrete surfaces to be power float finished (U.N.O) to be confirmed with architects' drawings.
All exposed concrete edges to have 25x25mm chamfer (U.N.O).

OFF-SHUTTER (Special off-form):
- Formwork quality shall be special: smooth and fair in accordance with SANS 2001 CC1 Table 1.
- Designated joints shall be in the position and of the details shown on the working drawings. Should the contractor wish to incorporate further construction joints or amend the position of those shown to suit his own requirements or technique, this may be allowed provided that all design considerations are met, that the prior approval of the engineer is obtained and that any extra costs are borne by the contractor.
- Special care shall be taken to ensure that forms are clean and free of all pieces of tying wire, nails and other debris at the time of concreting. The standard of finish shall be such that upon removal of the formwork, no further treatment, other than treatment of bolt holes if required, shall be found necessary to provide a straight, smooth and uniform finish of good quality and consistent colour and texture, free of all honeycombing etc. Any defect shall be made good by either removing and replacing the defective concrete or, in certain instances only, by patching.

Removal of formwork as per SANS 2001 CC1 Table 2

REMEDIALS:
- No "honey-combing" in concrete should be rectified without inspection and consent of the engineer. Do not cover with plaster or other finishes to hide the defect. All Honey Combing must be chipped open for visual inspection by engineer before repair remedial can be provided.
- Crack repairs to be confirmed by engineer before repairs commence.

CONCRETE COVER ON MAIN REINFORCING: (U.N.O.)
(To be confirmed with Durability class, see SANS 2001 CC1 Table 3)

• Slabs all round	30mm
• Beams all round	30mm
• Foundation bottom, no blinding	75mm
• Foundation sides and top	50mm
• Columns	30mm
• Ret. Walls - inside face	30mm
• Ret. Walls - outside face	40mm
• RC walls	30mm

CONCRETE SLABS
In slabs with main reinforcement in two directions, the steel spanning the shorter distance must be laid first (u.n.o). Reinforcement in top of slabs must be supported by stools at 1/m² (minimum).

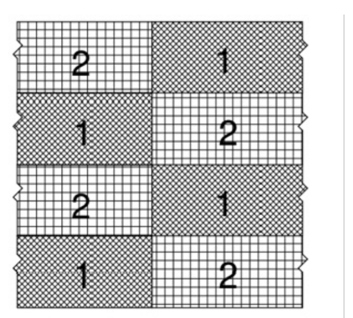
BACKPROPPING
When suspended floor slabs are poured in a multi-storey building, the following guidelines apply with regard to the propping of the supporting floor slabs:
- If slabs are poured less than 10 days apart
  - Wet concrete and construction joint of the slab to be poured must be supported with 100% propping on at least 3 former slabs,
- If slabs are poured more than 10 days apart:
  - 50% props under the first slab
  - 25% props under the second slab
  - 0% props under the third slab.
- The position of the props on top and bottom of slab must correspond.
- Not withstanding the above-mentioned, no shuttering may be stripped without the consent of the consulting engineer. Stripping procedures should be agreed with consulting engineer.
- Props to remain in place for 21 days or as otherwise directed by the engineer.

UPWARD CAMBER:
Beams and slabs to be poured with an upward camber as follows:
- Cantilever beams & cantilever slabs — Span / 150
- Other beams & slabs — Span / 500

Beam dimensions:
- Width x depth UP/DOWN -STAND. The slab thickness is excluded in the beam depth (U.N.O). i.e 230x510 DP RC UP-STAND BEAM
- Width x depth. The slab thickness is included in the beam depth (U.N.O). i.e 230x510 DP RC BEAM

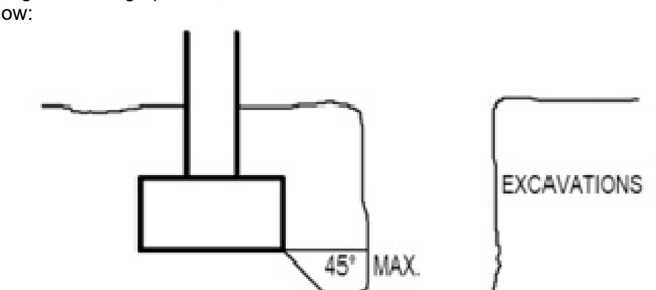
COMPACTION
- In-situ material (cut to fill) compacted in layers of 150mm TO 95% MOD. AASHTO (U.N.O).
- Final 150mm layers to be compacted to 98% MOD. AASHTO (U.N.O).
- If topsoil is collapsible sand then top soil to be removed to a depth of 300mm and replaced with an approved material.
- Soil to be compacted in 150mm LAYERS to a density of 95% MOD. AASHTO (U.N.O).
- Refer to drawings to confirm if above is adapted for specific site conditions

SURFACE BED
- All surface beds to be constructed on 250-micron polyethene sheeting.
- Surface beds to be cast in panels not exceeding 13x13m with saw cut and isolation joints as indicated on drawings. A proper construction joint must be formed. Saw cut joints to be cut within 24 hours after pouring of concrete.
- Alternatively; Surface beds to be cast in a block pattern, of no more than 5x5m. Alternative casting to be approved by the consulting engineer.



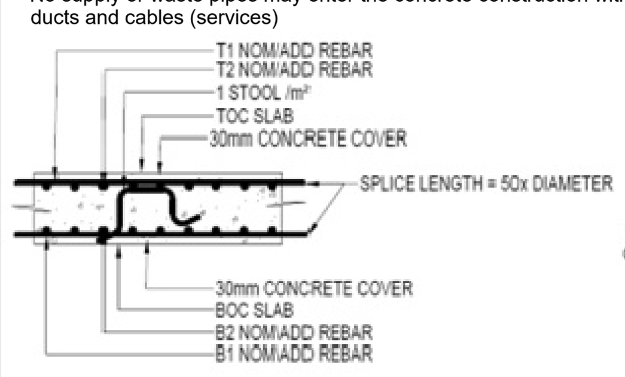
TYPICAL PANEL CAST SEQUENCE

FOUNDATIONS:
- The final dimension for the foundations are reserved until the excavations are approved.
- The excavation for foundations must be kept dry and compacted where necessary (U.N.O).
- All concrete work to be founded on in-situ soil or fill as specified on the construction drawing.
- When excavating for drainage pits etc, the contractor must take care that the bottom of such excavation does not undermine adjacent footings. See figure below:

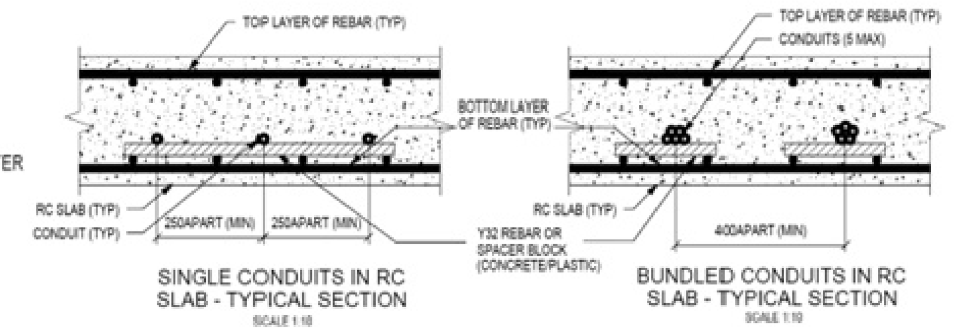


REINFORCEMENT
- All bending dimensions for reinforcement are overall, unless shown otherwise on the schedules.
- Reinforcing steel to SANS 920-1969 as amended.
- When pouring concrete: reinforcement to be maintained in position and at specified depth by means of approved spacers to ensure correct concrete cover.
- Measures should be taken to protect reinforcement from rust. All rust must be removed. Excessively corroded rebar may be rejected by the consulting engineer. All rebar to be clean from shutter oil / rust / dirt or any contaminants.
- Where main reinforcement in beams is laid in two or more layers (in same direction) spacer bars must be provided at 1000mm centre-to-centre to support the upper layers.
- The engineer shall be informed 72 hours in advance when an inspection on the reinforcement fixing is required.
- All reinforcement is to be inspected by the responsible engineer prior to casting of any concrete.
- Bars to be bundled and tagged with bar no., drg no. and member no. before delivery to site.
- SANAS certificate to be provided to confirm reinforcement compliance (SANS 2001 CC1 4.2.5.3)

SERVICES
No supply or waste pipes may enter the concrete construction without the consent of the consulting engineer. And no rebar may be cut to make space for ducts and cables (services)



TYPICAL SLAB REBAR SECTION
SCALE 1:20



ALLOWABLE CONDUIT PLACING IN RC SLAB

WATERPROOFING
- Waterproofing to be designed and installed by a manufacturer's approved applicator.
- All pipes must be cast in-situ unless approved by the structural engineer.
- 250 micron DPM waterproofing required beneath foundations
- 250 micron DPC waterproofing required brickwall at NGL
- Drainage around perimeter of buildings and water to drain away from building with the use of aprons.
- Edge drip detail at the soffit of all exposed RC slabs.

CONCRETE TESTING (SANS 2001 CC1 5:
- Concrete SANS 2001-CC1: 5.1.3.2 Unless otherwise specified in the specification data, at least one set of samples of concrete shall be taken from each day's casting and from at least every 50 m³ of concrete of each grade placed.
- Concrete cubes must comply with the SANS code (see C&CI publication on "how to make 150mm test cubes"). SANS 5861-3.
- Slump Testing: SANS 5862-1.
- Slump: Max 80mm for vibrated and max 120mm for pumped concrete. (SANS 2001 CC1 Table 4 and 4.7.3)
- MOD AASHTO tests on earthworks per layer: every 30m or 3 sets per individual structure
- Soil classification test: 1 per 1000m³ imported soil
- Compliance as per SANS 2001 CC1 5

NOTE:
- Further construction procedures must comply with SANS codes for reinforced and plain concrete.
- Equivalent products from the specified can be used if approved by engineer beforehand.

STRUCTURAL STEEL

The quality of work and materials must comply with SANS 10162 "the structural use of steel", SANS 1200H "standardized specifications for civil engineering construction chapter 4 - structural steelwork" and SANS 2001 CS1.

CONSTRUCTION / MANUFACTURING / ERECTION:
- Steel structures are to be strictly in accordance with SANS 2001.CS1
- Steel grade S355JR U.N.O. and the mark must be clearly visible
- The contractor must submit detailed workshop drawings to the engineer for review prior to manufacture
- Only sizes of structural members, connections and splices will be checked
- Final dimensions and the correct fitting of members shall remain the responsibility of the contractor,
- All dimensions are to be confirmed on site prior to manufacturing of elements.
- The position of holding down bolts is to be verified on-site.
- All sliding plates must be supplied with graphite grease.
- Permissible deviations as per SANS 2001 CC1 Table 3

FASTENERS:
- All fasteners to be class 8.8 bolts with class 8 lock nuts (u.n.o.). (SANS 1700-5-1)
- Only 2mm oversize bolt holes are permitted
- Minimum bolt size to be M12 (u.n.o.).

WELDING:
- Welding must be of high quality with minimum defects
- No notches or cracks shall be accepted
- The full penetration groove welds shall have contoured fillet reinforcing to provide a smooth flow of stresses.
- All welds to be continuous and not intermittent welds shall be allowed
- Intersecting welds running in various directions at any point must be prevented by cutting selected plates so as to remain clear of the intersection
- Welding must comply with SANS 10044. If gusset plates are used, members must be welded around full circumference of contact area. If not specified, welds must be 6mm fillet welds with 4,2mm throat thickness.
- Welding machines must be of sufficient capacity to ensure full penetration - 150 amps is regarded the minimum.
- All welds to be E70 XX electrodes with min weld strength of 480 MPa (SANS 2001 CS1 Table2)
- Welders certificate must be qualified as per ANSI/AWS D1.1/D1.1M (SANS 2001 CC1 5.2)
- MINIMUM WELD SIZES:

THICKNESS OF THICKER PART (mm)	MIN FILLET WELD
UP TO 12mm	6mm
OVER 12mm TO 20mm	6mm
OVER 20mm TO 40mm	8mm

The structural steel contractor must provide for the following in his tender price:
- Temporary bracing and struts, if necessary to improve ease of erection and positioning of any steel members.
- Testing of at least 5 welds if required by the engineer via X-Ray, Magnetic Particle Inspection or dye penetrant inspection. (SANS 2001 CC1 5.3.4)
- Workshop drawings (SANS 1200H 5.1.2 refers).

CORROSION PROTECTION:
- All structural steel must be painted directly after manufacture, in accordance with contract specifications.
  - Damage to paintwork must be touched-up after completion of structural steelwork.
  - Corrosion protection to all external steel elements for environmental class C3 industrial for 5-year maintenance period in accordance with ISO 12944 part 2 U.N.O TBC with engineer
  - If manufactured structural steelwork has to be stored, measures should be taken to avoid rusting. No rusted steel may be erected.

Bolt anchoring and grout:
- If grout is specified, use PRO-STRUCT 531MCI five star grout (u.n.o).
- If an epoxy grout is specified, use PRO-STRUCT 510 epoxy grout (u.n.o).
- If an epoxy is specified, use PRO-STRUCT 617 general epoxy adhesive (u.n.o).
- If a chemical anchor is specified, use HILTI HVU with grade 8.8 has rods (u.n.o).
- Use PRO-STRUCT 617 general-purpose epoxy adhesive for fixing of dowel bars.

Dowel bars: holes drilled for dowels to be 1.25 to 1.5 x dowel bar diameter (u.n.o):
- Y10 DOWELS = ø14mm HOLE
- Y12 DOWELS = ø18mm HOLE.
- Y16 DOWELS = ø24mm HOLE.
- Y20 DOWELS = ø30mm HOLE.
- Y25 DOWELS = ø36mm HOLE.
- Y32 DOWELS = ø44mm HOLE.

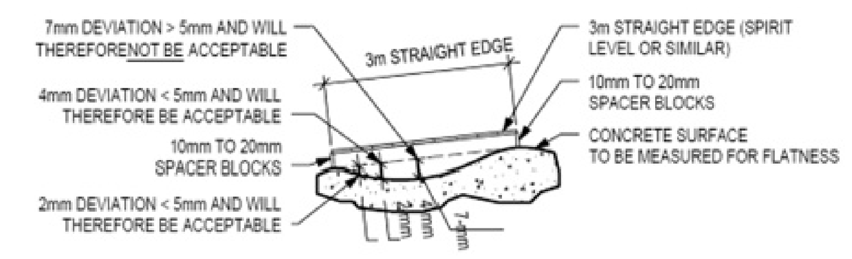
PERMISSIBLE DEVIATION ACCEPTANCE CRITERIA ON CONCRETE SLABS
In general, tolerances for structural elements to comply with SANS 1200G (Concrete Structural) Clause 6 or SANS 2001 CC1 Table 11.

Floor tolerances to fulfil two criteria, flatness and deviation from a prescribed level.

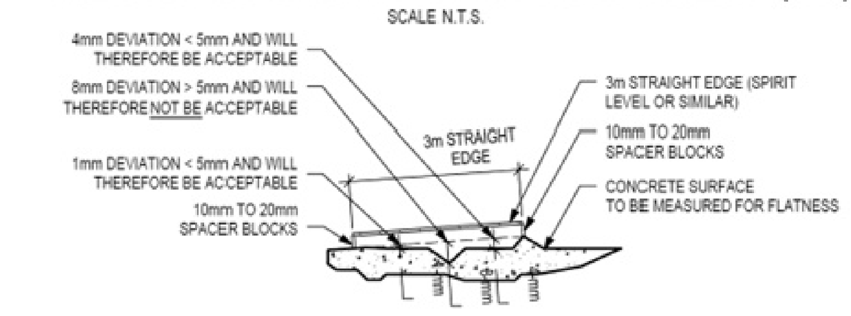
FLATNESS:
- A) Any deviation from flatness of a plane surface will be measured as the maximum deviation of the surface from any straight line of length 3m joining two points on the surface, determined by means of a straight-edge, the ends of which are supported on identical blocks of suitable thickness placed over each of the points. (See sketch 1 and 2).
- B) Any abrupt change in a continuous surface, including a local depression or peak in a floor or wall and any abrupt change caused by a joint in framework will be measured as specified in (a) above. (see sketch 3).

The maximum deviation from flatness as measured in (A) and (B) above shall be 5mm.

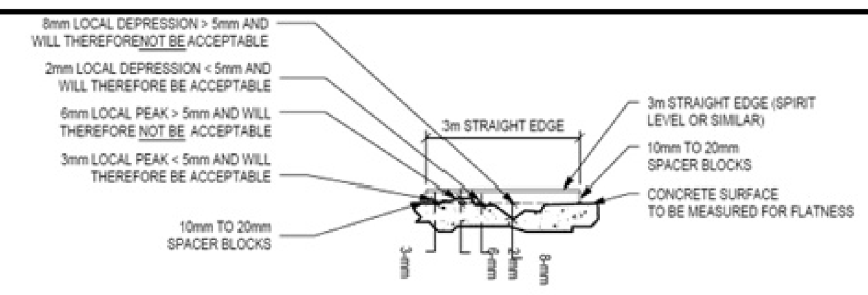
DEVIATION FROM A PRESCRIBED LEVEL (SEE SKETCH 4):
- The permissible deviation from a prescribed design level on the upper or lower surface unless otherwise specified is +5 /-15mm PLUS the expected elastic and long-term deflection calculated by the engineer i.e. SPAN/300 (±25mm at midspan for a 7500mm or SPAN/300 for terminal deflection of cantilevers.
- Quality assurance investigation shall be carried out after removal of shuttering, but before removal of props.
- Props to remain in place for 21 days or as otherwise directed by the engineer.
- There shall be no limitation as to the number of readings.
- No deviation from the specification shall be accepted i.e. remedial works will be necessary in non-compliant areas



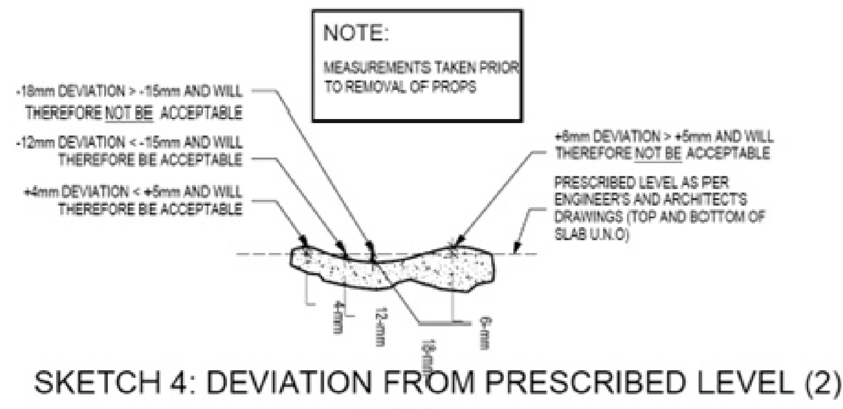
SKETCH 1: DEVIATION FROM FLATNESS (1.a)
SCALE N.T.S.



(STRAIGHT EDGE PLACED ONTO A LOCAL PEAK)
SKETCH 2: DEVIATION FROM FLATNESS (1.a)
SCALE N.T.S.



SKETCH 3: DEVIATION FROM FLATNESS (1.b)
SCALE N.T.S.



SKETCH 4: DEVIATION FROM PRESCRIBED LEVEL (2)
SCALE N.T.S.

BRICKWORK (SANS 10164 -1)

All load-bearing brickwork to be in accordance with SANS 10164 and installed as per SANS 10400-K.
- Loadbearing walls to be a minimum 220mm wide with a minimum compressive strength of the masonry units to be 14 MPa, with class II Mortar.
  - 375µm DPM on the troweled mortar between all RC slabs and masonry.
  - Openings in load-bearing walls to be spanned by prestressed lintels supplied by contractor with min support of 300mm on load-bearing walls. Max 2.4m span for precast lintels with minimum coarse height of 425mm.
  - All non-load-bearing brickwork to receive jointex or softboard between slab soffit and top of walls.
  - Plaster joint between slabs/cols & brickwork to be cut through the plaster to create a clear movement joint.
  - Jointex/softboard to be installed between RC cols & brickwork
  - No brickwork to continue over structural expansion joints.
  - Seismic requirement: all brickwork shall be tied to concrete with galvanised hoop iron ties every 4th course

Cavity Walls:
- To be filled with mass concrete below surface bed level and typ. 600mm below RC slabs/beams
- Must have 3.15mm thick galvanised butterfly wall ties spaced at 400mm vertically, 600mm horizontally (± 3 ties / m²) and staggered with min. overlap of 50mm on mortar
- Weepholes installed in the external cavity wall above DPC to prevent moisture build-up spaced at max. 1m c/c

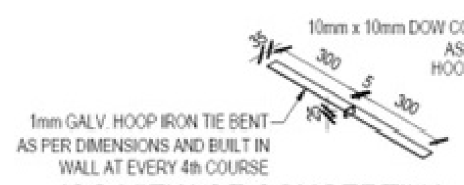
2mm brickforce to be placed in brick walls every:
- Brick course in foundation walls.
- Brick course in internal walls for the first 3 brick courses, then
- Every fifth brick course.
- Third brick course for external brick courses.
- Brick course for the last 4 brick courses below roof level.
- Brick course for 5 courses below all windows & 5 courses above all Windows & doors - to extend 800mm on both sides of openings.

Vertical Control- / expansion joints to comply with sans 10400-K:
- Max 7.5m c/c for walls (u.n.o) or
- As specified by SANS 10400-K:2011 ed 3 Table 19

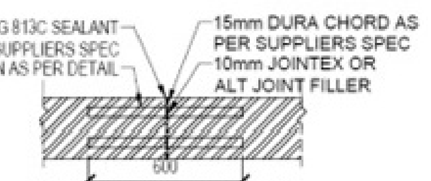
Wall stiffeners / lateral support to comply with SANS 10400-K:
- Generally 5m c/c for 230mm walls (u.n.o) above 3.3m in height tbc
- Generally 3m c/c for 110mm walls (u.n.o) above 3.3m in height tbc

Horizontal movement joint:
- To be every floor level, max 3.3m (seating angle).

Engineers to be consulted with regards to additional brickwork requirements.



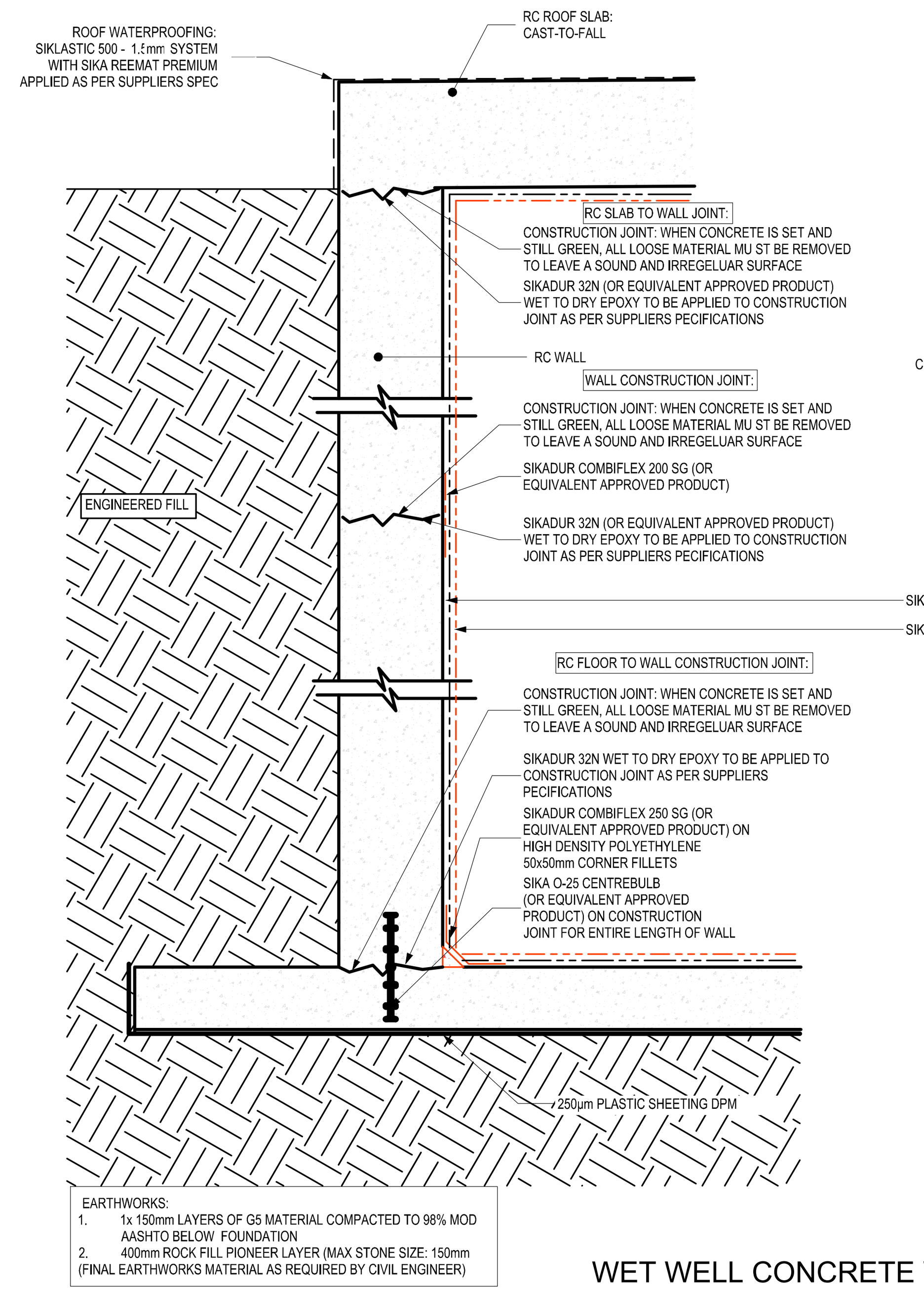
ISO VIEW OF CONCERTINA TIE TO EXP JOINT
SCALE 1:20



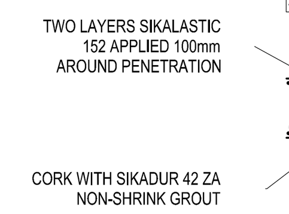
EXPANSION JOINT
SCALE 1:20

ABBREVIATIONS:

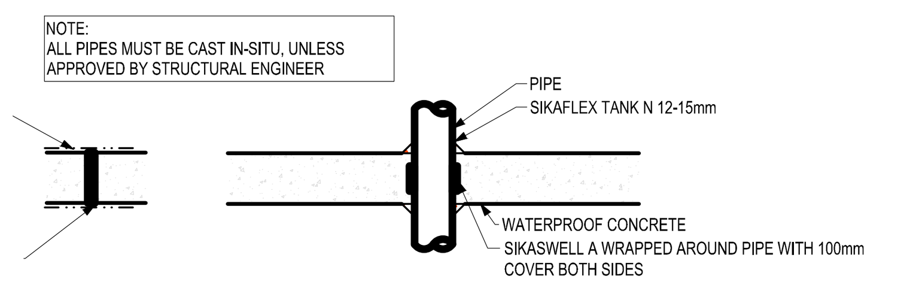
U.N.O	= UNLESS NOTED OTHERWISE
U.S.O	= UNLESS STATED OTHERWISE
RET.	= RETAINING (EXAMPLE: RETAINING WALLS)
EXP.	= EXPANSION (EXAMPLE: EXPANSION BOLTS)
S/BED	= SURFACE BED
RC	= REINFORCED CONCRETE
COL	= COLUMN
BM	= BEAM
T.O.C.	= TOP OF CONCRETE
B.O.C.	= BOTTOM OF CONCRETE
S.S.L.	= STRUCTURAL SLAB LEVEL
F.F.L.	= FINISHED FLOOR LEVEL
F.L.	= FINISHED / FINAL LEVEL
I.L.	= INVERT LEVEL
R.E.	= RODDING EYE
C.E.	= CLEANING EYE
I.E.	= INSPECTION EYE
RWDP.	= RAIN WATER DOWN PIPE
THK	= THICK
PL OR PLT	= PLATE
L	= ANGLE IRON
UB	= UNIVERSAL BEAM (I-SECTION)
UC	= UNIVERSAL COLUMN (H-SECTION)
CFLC	= COLD-FORMED LIPPED CHANNEL
PFC	= PARALLEL FLANGE CHANNEL
TFC	= TAPERED FLANGE CHANNEL
RHS	= RECTANGULAR HOLLOW SECTION
CHS	= CIRCULAR HOLLOW SECTION
SHS	= SQUARE HOLLOW SECTION



WET WELL CONCRETE WATERPROOFING DETAILS
SCALE 1:15



TIE ROD CLOSURE



CAST IN-SITU PIPE

CONCRETE MIX DESIGN SPECIFICATION
- MAX W/C = 0.5 FOR CEM 1-FLY ASH CEMENT
- MAX 30% FLY-ASH
- CONCRETE = 35 MPA/19mM
- SIKAPLAST WT 200
- ADMIXTURES MUST BE NOTED

WATER RETAINING STRUCTURES:

DESIGN DETAILS
1.1 THE FOLLOWING DESIGN CODES ARE APPLICABLE:
WATER RETAINING STRUCTURES BS 8007 / SANS 10100-3
REINFORCED CONCRETE BS 8110
LOADINGS SANS 10160
1.2 THE FOLLOWING LOADINGS ARE USED:
DENSITY OF BACKFILL MATERIAL = 1800kg/m AND INTERNAL ANGLE OF FRICTION =30°
LOADS OF MECHANICAL EQUIPMENT TO BE SUPPLIED BY MECHANICAL CONTRACTOR

2.1 THE CONTRACTOR SHALL ADHERE TO THE FOLLOWING CODES DURING CONSTRUCTION AS APPLICABLE:
SANS 2001 CONSTRUCTION WORKS:
PART CC1: CONCRETE WORKS (STRUCTURAL)
PART CC2: CONCRETE WORKS (MINOR WORKS)
PART CM1: MASONRY WALLING
PART CM2: STRIP FOOTINGS, PAD FOOTINGS AND SLAB-ON-THE-GROUND FOUNDATIONS FOR MASONRY WALLING
PART CS1: STRUCTURAL STEELWORK
PART EM1: CEMENT PLASTER

SANS 10155 ACCURACY IN BUILDINGS
GRADE I PERMISSIBLE DEVIATION / TOLERANCE SHALL APPLY UNLESS OTHERWISE NOTED.
ONE COPY OF EACH OF THESE CODES SHALL BE KEPT ON SITE AND SHALL BE MADE AVAILABLE TO THE ENGINEER ON REQUEST.

SPECIFICATION FOR MATERIALS
2.1 SCREEDS AND BENCHING TO BE CLASS 20/10 CONCRETE U.N.O.
BLINDING AND MASS CONCRETE TO BE CLASS 15/19 CONCRETE.
ALL OTHER CONCRETE TO BE CLASS 35/19 U.N.O.
2.2 NO FINES CONCRETE-USE CLASS NF-19 (NO FINES CONCRETE WITH 19mm NOMINAL SIZE AGGREGATE) - THE VOLUME OF AGGREGATE FOR EACH 50kg OF CEMENT IS 0,3m AND THE MIX SHALL NOT CONTAIN MORE THAN 20 L OF WATER PER 50kg CEMENT.
2.3 COURSE AND FINE AGGREGATE FOR ALL CONCRETE SHALL BE OF DOLOMITIC ORIGIN AS SPECIFIED UNLESS INDICATED DIFFERENTLY.
2.4 REINFORCEMENT FOR CONCRETE SHALL COMPLY WITH SABS 920
MILD STEEL YIELD STRESS = 250MPa
HIGH TENSILE STEEL YIELD STRESS = 450MPa

CONCRETE TESTS
WITH REGARDS TO RESERVOIRS / SUMPS, THE FOLLOWING TESTS ARE ALSO REQUIRED ADDITIONALLY:
- SANS 201:2008 GRADING/SIEVE ANALYSIS OF AGGREGATES
- SANS 5844:2014 RELATIVE DENSITY OF AGGREGATE
- SANS 5845:2006 BULK DENSITIES
- SANS 5862-1 SLUMP TEST
- SANS 5863 COMPRESSIVE STRENGTH OF HARDENED CONCRETE
- SANS 3001-GR20 DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING
- **DURABILITY TESTS**
  - OXYGEN PERMEABILITY - ≥ 9.5
  - CHLORIDE CONDUCTIVITY TEST - ≤ 1.5
  - WATER SORPTIVITY TEST - ≤ 10
- AGGREGATES MUST COMPLY WITH SANS 1083.
- SMALL AND LARGE AGGREGATES TESTS:
  - SANS 5832: ORGANIC MATERIAL TEST
  - SANS 843 WATER ABSORPTION TEST, WATER ABSORPTION <3%, MOST SA AGGREGATES ARE <1%
- LARGE AGGREGATE STRENGTH TESTS:
  - SANS 5841 AGGREGATE CRUSHING VALUE (ACV) TEST, <30% PASS
  - SANS 5842 10 FACT VALUE TEST: FORCE REQUIRED TO OBTAIN 10% FINES OF THE TOTAL SAMPLE, THAT WILL THROUGH 2.36MM SIEVE, >70 KN PASS
- AGGREGATES MUST NOT BE ALKALI-REACTIVE AND TESTED TO CONFIRM

CONSTRUCTION
3.1 COVER TO REINFORCEMENT = 40mm UNLESS SHOWN OTHERWISE
3.2 ALL VISIBLE CORNERS SHALL BE CHAMFERED 25x25mm U.N.O.
3.3 BLINDING UNDER ALL REINFORCED CONCRETE STRUCTURES SHALL BE 75mm THICK CLASS 15/19 CONCRETE U.N.O.
3.4 FORMED CONCRETE SURFACE FINISHED SHALL BE AS SPECIFIED IN SANS 2001
3.5 CONCRETE SURFACE FINISHES SHALL BE AS SPECIFIED IN SANS 2001
3.6 PULL-OUT BARS FOR WATER RETAINING STRUCTURES SHALL NOT BE PERMITTED
3.8 WHERE PIPES PASS THROUGH WALLS OF WATER RETAINING STRUCTURES THEY SHALL BE CAST INTO THE WALL SIMULTANEOUSLY WITH THE CASTING OF THE WALL.
3.9 CONCRETE SHALL NOT BE ALLOWED TO FALL FREELY THROUGH A HEIGHT OF MORE THAN 3m.

NOTES / LEGEND

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CLIENT

KGOTSO! PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

STANDARD STRUCTURAL SPECIFICATIONS

APPROVED BY BVi

JL REYNDERS	2020300701	20/10/2025
ENGINEER/TECHNOLOGIST	REG. NO.	DATE

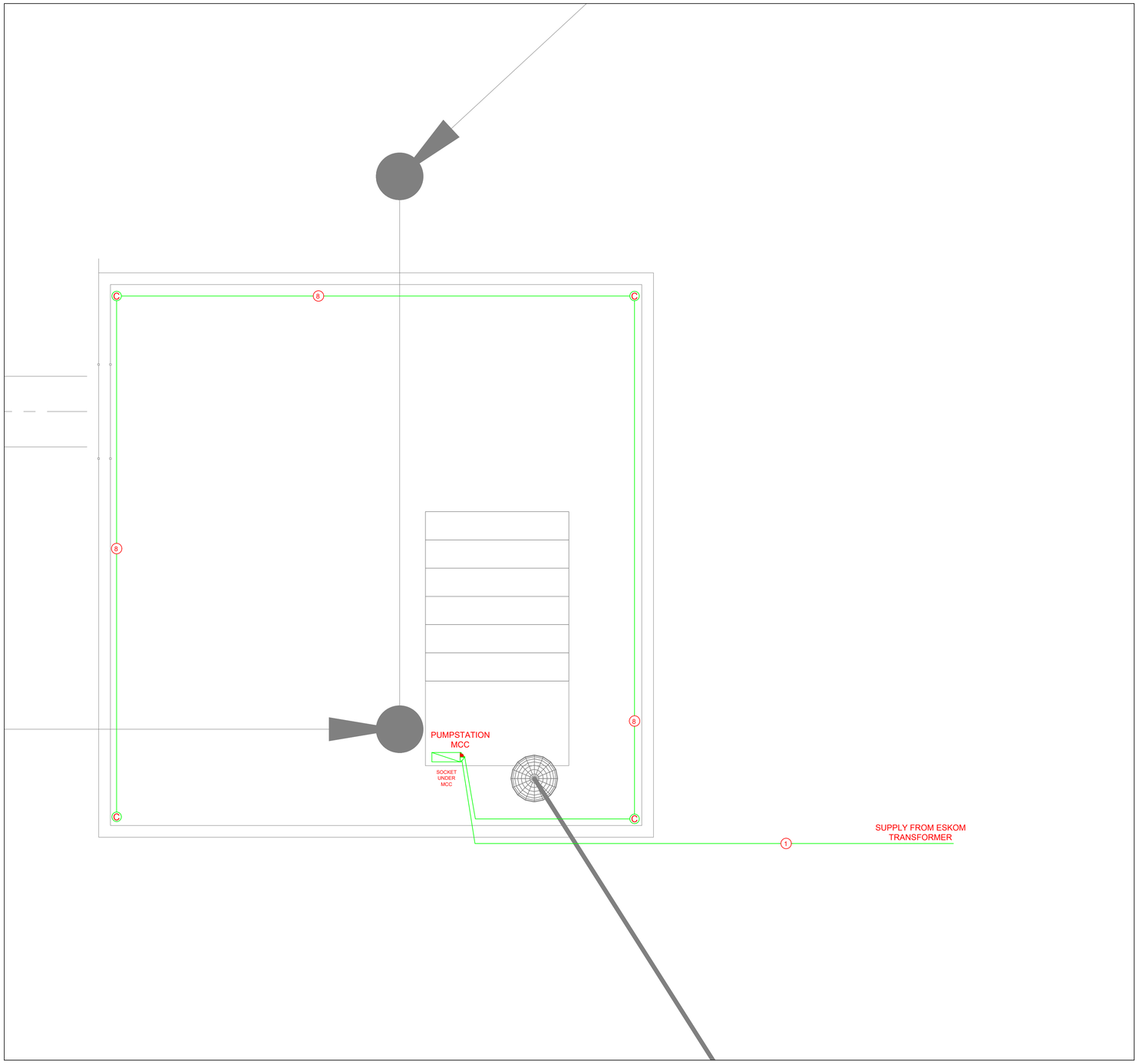
SCALE	AS SHOWN @ A1	***DRAWN***	DJ COETZEE
DESIGNED	J HAEFELE	***CHECKED***	JL REYNDERS

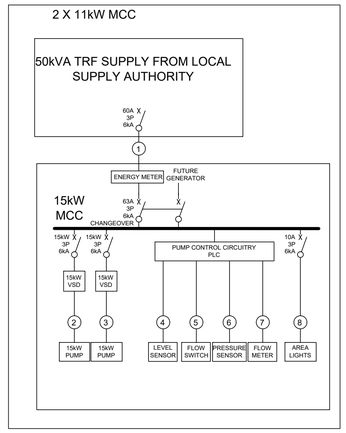
SUITABILITY STATUS	***REV. NO.***
ISSUED FOR TENDER	T0

PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-CIV-135-TS-005





CABLE SCHEDULE

NO	FED FROM	FEED TO	DESCRIPTION	CORES	EARTH	LENGTH	LOAD CB
1	MUNIC	MCC	25mm SQ PVC/SWA CU LV	4	25mm SQ BCEW	150M	60A 3P
2	MCC	11kW PUMP	6mm SQ PVC/SWA CU LV	4	6mm SQ BCEW	10M	15KW 3P
3	MCC	11kW PUMP	6mm SQ PVC/SWA CU LV	4	6mm SQ BCEW	10M	15KW 3P
4	PLC TERMS	LEVEL SENSOR	2,5mm SQ PVC/SWA CU LV	3	NIL	15M	FUSED
5	PLC TERMS	FLOW SWITCH	2,5mm SQ PVC/SWA CU LV	3	NIL	15M	FUSED
6	PLC TERMS	PRESSURE SENSOR	1 mm SQ 4PAIR MYLAR SCREENED DIEF SPEC	4PAR	NIL	5M	FUSED
7	PLC TERMS	PRESSURE SENSOR	1 mm SQ 4PAIR MYLAR SCREENED DIEF SPEC	4PAR	NIL	5M	FUSED
8	MCC	AREA LIGHTS	4mm SQ PVC/SWA CU LV	4	4mm SQ BCEW	120M	10A 3P

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			ASB	:	AS-BUILT

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CLIENT

KGOTSON PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY: CONSTRUCTION OF BOTHARNIA 9 PUMP STATION IN KGOTSONG

DRAWING TITLE

ELECTRICAL SITE LAYOUT

APPROVED BY BVI

P HARMSE | 201570312 | 20/10/2025
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SCALE	1:100 @ A1	*DRAWN*	DJ COETZEE
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PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

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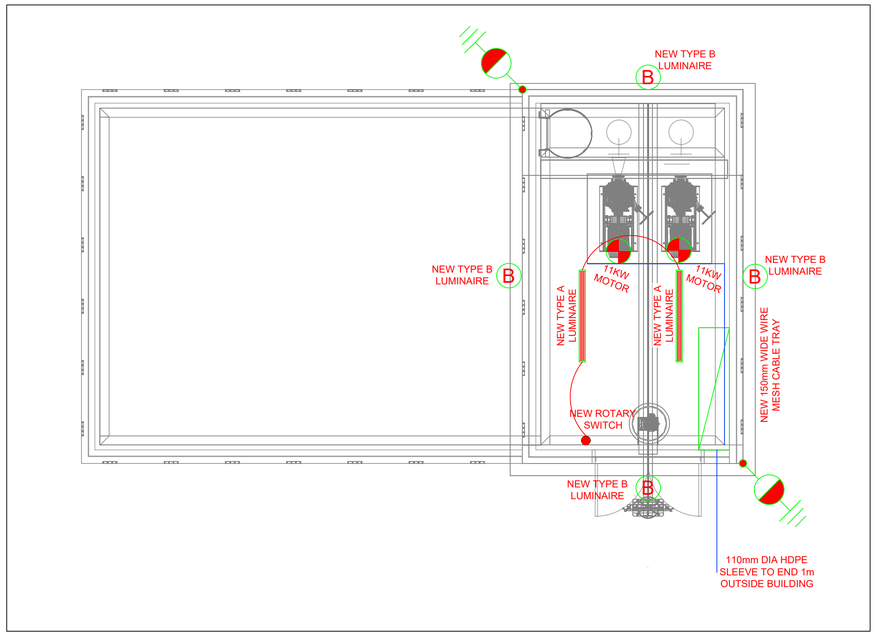

SYMBOL	DESCRIPTION
2W	2WAY-LIGHT SWITCH MOUNTED AT 1400mm AFFL UNLESS STATED OTHERWISE.
1L	1L LIGHT SWITCH MOUNTED AT 1400mm AFFL UNLESS STATED OTHERWISE.
ROT	IP65 ROTARY WEATHERPROOF LIGHT SWITCH MOUNTED AT 1400mm AFFL.
DN	16A DAY/NIGHT SWITCH MOUNTED INSIDE CLEAR LID BOX
	16A SWITCHED SOCKET OUTLET WITH 1 X SANS 164-1 AND 2 X SANS 164-2 SOCKETS WALL MOUNTED AT HEIGHT INDICATED.
ST	60A DP STOVE ISOLATOR COMPLETE WITH OUTLET BOX AND CONNECTION AND STOVE COUPLER
G	60A DP GEYESER ISOLATOR COMPLETE WITH OUTLET BOX
	LIGHTNING PROTECTION DOWN CONDUCTOR POINT COMPLETE
WT	WEATHER TIGHT 16A SWITCHED SOCKET OUTLET WITH 1 X SANS 164-1 AND 2 X SANS 164-2 SOCKETS WALL MOUNTED AT HEIGHT INDICATED COMPLETE WITH IP65 OUTLET BOX
	EQUIPMENT MOTOR CONNECTION COMPLETE WITH WEATHERPROOF ISOLATOR BOX 63A 3P ISOLATORS

SYMBOL	DESCRIPTION
NEW TYPE A LUMINAIRE	20W VAPOURPROOF LED LUMINAIRE AS PER SPECIFICATIONS
B	15W LED BULHEAD LUMINAIRE AS PER SPECIFICATIONS
C	40W LED FLOODLIGHT LUMINAIRE AS PER SPECIFICATIONS COMPLETE WITH POLE AND MCB

ILLUSTRATION

TYPE	SYMBOL	SPECIFICATION	
A		Type:	24W LED Weatherproof channel
		Dimensions:	1500mm narrow body
		Mounting:	Surface ceiling
		Body Materials:	Injection moulded Polycarbonate
		Lens / diffuser Material	prismatic polycarbonate diff
		Operating temperature:	-25deg C to 45deg C
		Light source	LED T8 glass tube
AREA	Outdoor parking	Wattage	24W
		Lumen	2400Lm
		Colour temp	4000K
		CRI	>80
		Voltage and powerfactor	230+-10% 0.9PF
		Lifetime(hrs)	25 000
		Dimmable / DALI	N/A
		Surge arrester	10kA MOV fitted
		Motion sensor fitted	N/A
		Emergency batt:	N/A
		IP rating	IP 65
		IK rating	IK 05
		Approved supplier	Synerj

ILLUSTRATION

TYPE	SYMBOL	SPECIFICATION	
C	C	Type:	40W LED Streetlight inlcuding 4m MH pole and 5A 1P mcb.
		Dimensions:	615 x 154 x 304mm
		Mounting:	Rear Spigot mounted
		Body Materials:	High pressure die cast AL
		Lens / diffuser Material	4mm clear tempered glass
		Operating temperature:	-30deg C to 45deg C
		Light source	LED
AREA	Outdoor area	Wattage	40W
		Lumen	5840Lm
		Colour temp	4000K
		CRI	>80
		Voltage and powerfactor	230+-10% 0.9PF
		Lifetime(hrs)	100 000
		Dimmable / DALI	N/A
		Surge arrester	10kA MOV fitted
		Motion sensor fitted	N/A
		Emergency batt:	N/A
		IP rating	IP 66
		IK rating	IK 08
		Approved supplier	Genlux

ILLUSTRATION

TYPE	SYMBOL	SPECIFICATION	
B	B	Type:	15W LED Weatherproof Bulkhead
		Dimensions:	280mm diameter x 104h
		Mounting:	Surface ceiling
		Body Materials:	high pressure die cast AL
		Lens / diffuser Material	High impact acrylic
		Operating temperature:	-25deg C to 45deg C
		Light source	LED
AREA	Outdoor area	Wattage	15W
		Lumen	2250Lm
		Colour temp	4000K
		CRI	>80
		Voltage and powerfactor	230+-10% 0.9PF
		Lifetime(hrs)	50 000
		Dimmable / DALI	N/A
		Surge arrester	10kA MOV fitted
		Motion sensor fitted	N/A
		Emergency batt:	N/A
		IP rating	IP 65
		IK rating	IK 05
		Approved supplier	Beka

NOTES / LEGEND

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CLIENT

MOTSOPA PULA

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

ELECTRICAL BUILDING LAYOUT

APPROVED BY BVI

P HARMSE | 201570312 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

SCALE	1:100 @ A1	DRAWN	DJ COETZEE
DESIGNED	P HARMSE	CHECKED	P HARMSE

SUITABILITY STATUS | **REV. NO.**

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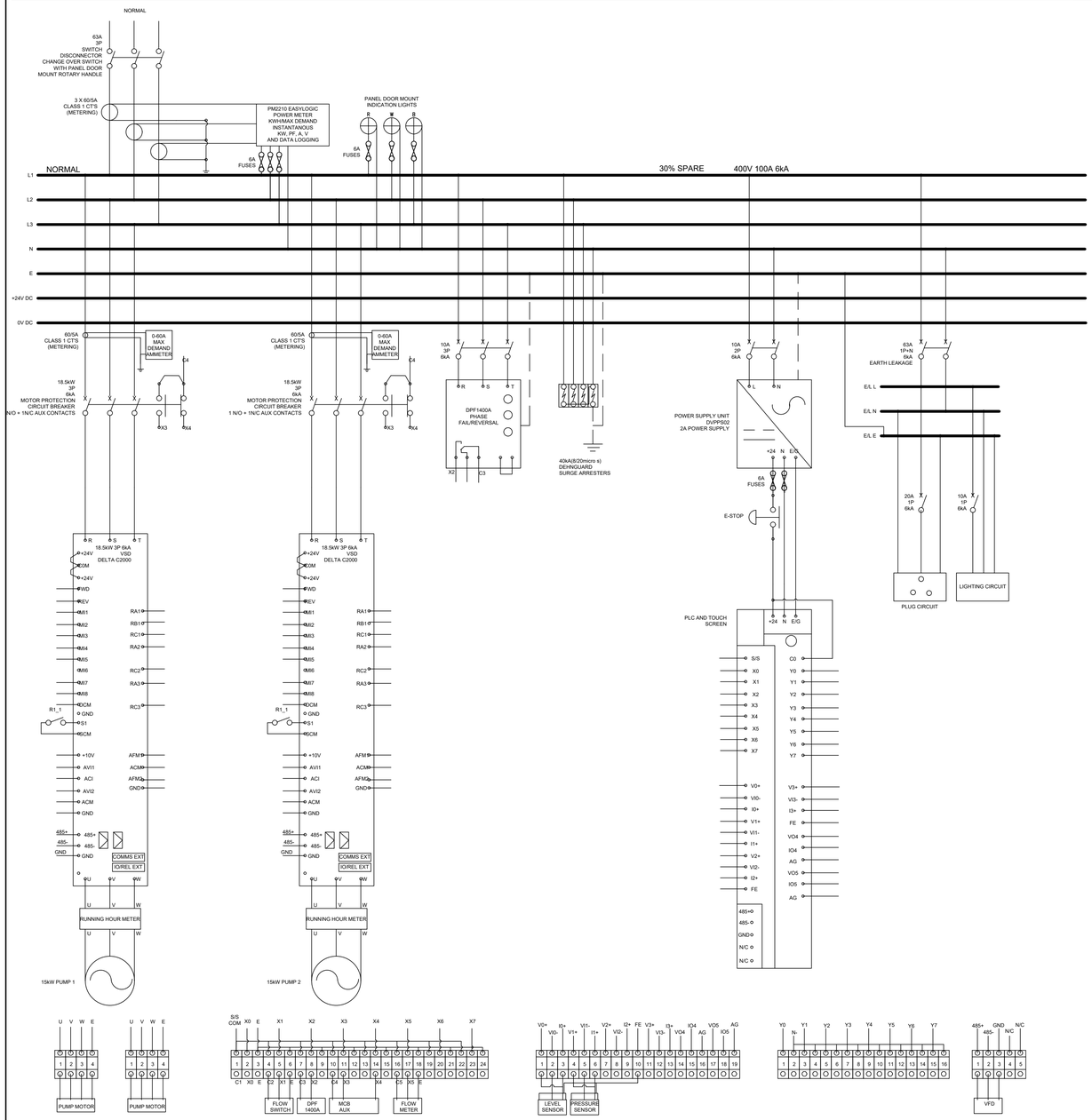
PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-ELC-300-TS-002

MOUNTING		MATERIAL		SECTIONS		EQUIPMENT		CABLE ENTRY		ACCESS		COLOUR			RATINGS		HINGES/HANDLES		NORMAL SECTION		EMERGENCY SECTION		UPS SECTION	
SEMI RECESSED		1.6MM 3CR12	X	INCOMER		CBI	X	TOP	X	TOP	X	DOOR	ORANGE	YES SQUARE KEY	NORMAL	63A 400V	LOCKABLE	YES SQUARE KEY	FED FROM	ESKOM TRF	FED FROM	-	FED FROM	-
SURFACE	X	1.6MM MILD STEEL		NORMAL	X	SCHNEIDER		BOTTOM	X	FRONT	X	FACEPLATE	RDE SECTION	¼ TURN ALAN	EMERGENCY	-	DOOR LOCK TYPE	¼ TURN ALAN	CABLE SIZE/CORES	-	CABLE SIZE/CORES	-	CABLE SIZE/CORES	-
FLOOR STANDING		GALVANIZED		EMERGENCY		LOVATO	X	SIDES		SIDES		SURROUND	ORANGE		UPS	-			BUSBAR RATING	63A	BUSBAR RATING	-	BUSBAR RATING	-
KIOSK		POWDER COATED	X	UPS				REAR		REAR		BACKTRAY	GALV				FACEPLATE LOCK	¼ TURN ALAN	FAULT LEVEL	6KA	FAULT LEVEL	-	FAULT LEVEL	-
WEATHERPROOF	X	COMPOSITE															HINGES	PEDASTAL HINGES	CASCADED	YES/NO	CASCADED	-	CASCADED	-
																			SUPPLY VOLTAGE	400V +-10%	SUPPLY VOLTAGE	-	SUPPLY VOLTAGE	-
																			COLOUR	ORANGE	COLOUR	-	COLOUR	-

PUMPSTATION MCC

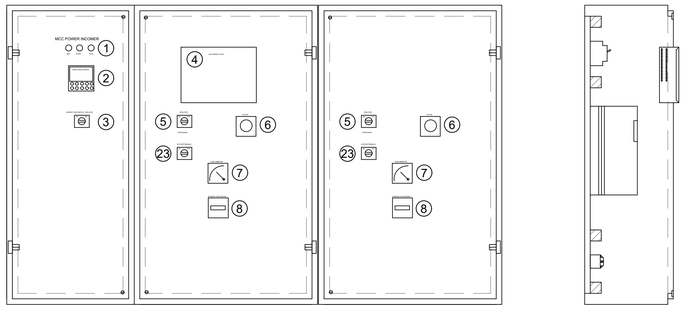


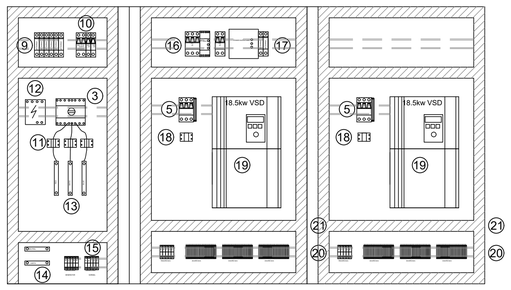
PANEL LAYOUT

NOTES AND EQUIPMENT LIST
MCC TO BE MANUFACTURED FROM 1.6mm 3CR12 STEEL, BE WEATHERPROOF, POWDERCOATED ORANGE, WALL MOUNT WITH FIXING TABS.

EQUIPMENT LIST:

1. 3 X 22mm DIA AD22-22VM PILOT LIGHTS (RED,YELLOW,BLUE)
2. 1 X SCHNEIDER PM2210 ENERGY METER
3. 1 X GA063SAET6 63A CHANGEOVER SWITCH CW GAX61CB DOOR MOUNT HANDLE AND EXTENSION SHAFT
4. TP70P-21EX1R TOUCH SCREEN PLC DELTA
5. 18kW MOTOR PROTECTION CIRCUIT BREAKER CW SM1X1211 CLIP ON 1 NO 1 NC AUX CONTACT CW 1 X SM1X18200R PANEL MOUNT DOOR ROTARY HANDLE WITH SHAFT
6. EE3RMH1 ESTOP COMPLETE WITH LPX AU113 LABEL RING
7. 96 X 96 ERBC004A9/63 MAX DEMAND AMMETER
8. 96 X 96 BEHCA/9 RUNNING HOUR METER
9. 6 x 420006 10 x 38mm gG 6A FUSES AND 6 X 485101 32A 10 X 38mm PMX FUSE HOLDERS
10. CBI 63A 1P+N 6kA EARTH LEAKAGE + CBI 20A 1P 6kA MCB + CBI 10A 1P 6kA
11. 3 X ASK31.3 7039 60/A CL1 CURRENT TRANSFORMERS
12. TYPE 1+2 CPROTEC S/A PSC4-12.5 / 400 TT 3PH+N S/A
13. 3 X 12 x 4mm X 150mm CU BUSBAR BRF1000 CW 6 X SM25 BUSBAR INSULATOR CW THREADED STUD KITS
14. 2 X 12 X 4mm X 150mm CU BUSBAR BRF1000 CW 2 X SM25 BUSBAR INSULATORS + 2 X M6 30mm HEX COUPLING NUTS WITH THREADED STUD KITS
15. 2 X 5 X 16mm SQ TERMINATIONS WT10(3 X GR(1XBL) (1XYEL/GRN)
16. CBI 10A 3P 6kA + DPF1400A PHASE FAIL/REVERSAL RELAY 400V 3PH
17. CBI 10A 2P 6kA + DVPS02 2A POWER SUPPLY + 2 X 42006 gG 6A FUSES AND PMX FUSE HOLDERS
18. 1 X ASK31.3 7039 60/A CL1 CURRENT TRANSFORMERS
19. DELTA C2000 18.5KW VFD THREE PHASE VFD110C43EA-21
20. 5 X 16mm SQ TERMINATIONS WT10(3 X GR(1XBL) (1XYEL/GRN) + 72X 4mm SQ TERMINATIONS WT2.5
21. 40 X 40mm SLOTTED PVC TRUNKING
22. DIN RAIL
23. AUTO/OFF/MANUAL SPRING RETURN SELECTOR SWITCH COMPLETE-LPCS233





NOTES / LEGEND

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT | REG. NO. | DATE

REVISION CODES			SUITABILITY CODES		
A,B,C...	:	BEFORE TENDER	IFI	:	ISSUED FOR INFORMATION
T0, T1, T2...	:	FOR TENDER	FAC	:	FOR ACCEPTANCE CONTROL
0, 1, 2...	:	CONSTRUCTION	IFR	:	ISSUED FOR REVIEW
Z	:	AS-BUILT	IFC	:	ISSUED FOR CONSTRUCTION
			ASB	:	AS-BUILT

DRAWING REVISION

DATE	INITIAL	NO./CODE	REVISION DESCRIPTION

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Registration no. 1998/000185/07
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Free State - Bloemfontein - (051) 447 2137

CLIENT

KGOTSOI PULA!

PROJECT NAME

NALA LOCAL MUNICIPALITY:
CONSTRUCTION OF
BOTHARNIA 9 PUMP
STATION IN KGOTSONG

DRAWING TITLE

ELECTRICAL MCC PANEL LAYOUT

APPROVED BY BVi

P HARMSE | 201570312 | 20/10/2025
ENGINEER/TECHNOLOGIST | REG. NO. | DATE

SCALE	1:100 @ A1	DRAWN	DJ COETZEE
DESIGNED	P HARMSE	CHECKED	P HARMSE

SUITABILITY STATUS	REV. NO.
ISSUED FOR TENDER	T0

PLAN NUMBER

PROJECT NO. - ORIGIN - SYSTEM - LOCATION - TYPE - ROLE - DR. CODE - PHASE - SEQ. NO.

35563-BCN-ZZZ-00-DR-ELC-313-TS-001