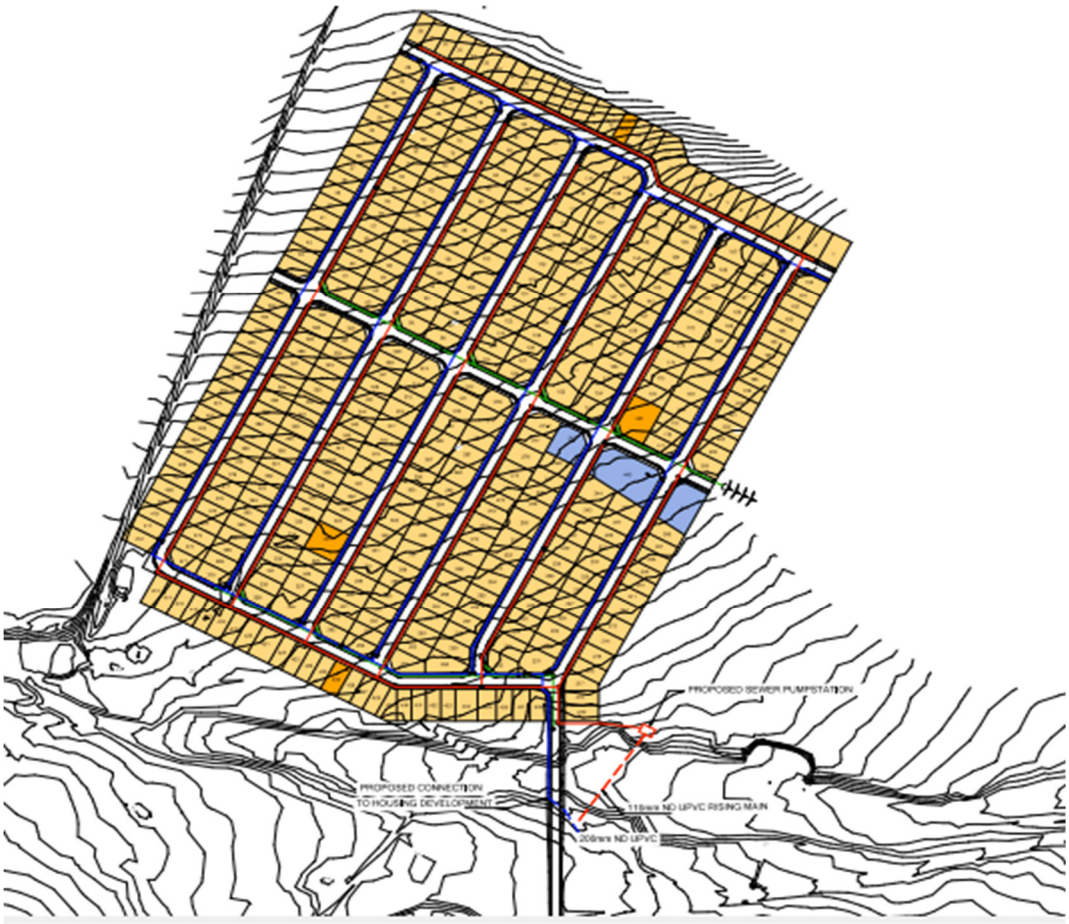
BOEKENHOUTSKLOOF BONNIEVALE: PROPOSED HOUSING DEVELOPMENT ON ERF 907 & REMAINDER OF FARM 174



TECHNICAL REPORT ON THE PROVISION OF CIVIL SERVICES

AUG 2018

Client:
Asla Devco
PO Box 116
GORDONS BAY
7150

Consulting Engineers
V3 Consulting Engineers (Pty)Ltd.
P.O. Box 1889
GEORGE
6530

V3 CONSULTING ENGINEERS

CLIENT	Asla Devco
CONTRACT NO:	10438000
PROJECT DESCRIPTION	V3 Consulting Engineers (Pty) Ltd, was appointed to prepare a services report for the provision of Civil Services to the proposed development of Boekenhoutskloof Housing, Bonnievale.
REPORT DESCRIPTION	Bonnievale: Boekenhoutskloof Housing SERVICES REPORT

Revision	00			
Date	15 Aug 2018			
Author(s)	Raywin Jacobs Rudi Beeslaar			
Approver	Chris Swart			

Approver's signature

Date 23 August 2018

Disclaimer:
This work is intended solely for Asla Devco. The scope of work and related responsibilities are defined in the Conditions of Assignment. Any use which a third party makes of the work, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Decisions made or actions taken as a result of our work shall be the responsibility of the parties directly involved in the decisions or actions.

Contents

1 INTRODUCTION

Asla Devco appointed V3 Consulting Engineers (Pty) Ltd to prepare a services report for the provision of Civil Services to the proposed housing development on Erf 907 & remainder of Farm 174, Bonnievale: Boekenhoutskloof.

The proposed development comprises of the following:

- 438 Residential Zone I erven
- 4 Proposed Government and Municipal Zoned erven
- 3 Open Space erven
- Roads

(Refer to Annexure A for the draft Subdivision Plan prepared by Urban Dynamics Western Cape Town and Regional Planners)

2 DESIGN AND CONSTRUCTION STANDARDS

The minimum standards proposed for the civil services and pertaining infrastructure will comply with the recommendations made by the Department of Human Settlements (Western Cape Government) in respect of the A Grade Engineering Services subsidy.

This is also in compliance with the "Guidelines for Human Settlements, Planning and Design" as compiled under patronage of the Department of Housing by CSIR Building & Construction Technology (also known as the "Red Book") as well as any specific requirements prescribed by the Langeberg Municipality.

The relevant code of standards (i.e. SANS 1200, etc.) should be made applicable to material and construction standards.

3 TOPOGRAPHY

Erf 907 & remainder of Farm 174 (the site) is approximately 11.2 hectare in size and is currently occupied by informal Structures (shacks) and undeveloped grasslands.

The topography of the area is characterized by gentle to moderate sloping terrains (1:6 to 1:16) draining in a south easterly direction into a watercourse to the south and is regarded as suitable for development.

A flood analysis was done by Fraser Consulting Engineers cc and the proposed development is above the 1:100 flood line.

4 GEOTECHNICAL CONDITIONS

No Geotechnical Investigation was available at the stage of the report but no adverse soil conditions are expected in this part of Bonnievale. The site should be suitable for residential development.

A Geotechnical Investigation will need to be undertaken before detail designs can be finalized and proposals made with regard to foundation designs for the streets and the buildings.

5 PROPOSED SERVICES

5.1 Sanitation

Internal Sewage Removal

Sewage will be removed by means of a waterborne gravity sewer network connected to the existing municipal network via a proposed sewer pump station, south east of the development.

The gravity sewer network will consist of 160mm diameter uPVC sewer pipes and 1,0m diameter concrete sewer manholes. The estimated length of the network is 2 580m and approximately 45 manholes will be constructed.

(Refer to attached drawings 10438000-001, -004 and -005 for the preliminary design).

Bulk Sewage Removal

A new sewer pump station with the capacity of 8 ℓ/s will need to be constructed just south east of the development.

The bulk sewage will be removed via a 110mm diameter uPVC rising main. Sewage will be pumped from the proposed new sewer pump station to an existing pump station to the west of the development. The estimated length of the rising main is 2 725m.

The Municipality need to confirm if any upgrades on the existing network, including the existing pump station, will be required.

The additional hydraulic loading on the WWTW system is estimated at 220 kℓ/day. The Municipality confirmed that the Waste Water Treatment Works (WWTW) have sufficient capacity for the proposed development.

(Refer to attached drawings 10438000-002 and -003 for the preliminary design).

5.2 Water

Internal Water Supply

The development will be serviced by means of a water network consisting of PVC water pipes of 75mm to 110mm diameter (total estimated length 2 618m) installed in road reserves. The proposed connection point is to a proposed 200mm ND UPVC supply line south of the development.

The fire-risk category assumed is “Low-risk (group 4)” for which no specific fire-fighting provision is required. Hydrants will however be located at convenient points ensuring the spacing does not exceed 240m (estimated total = 4).

Isolating valves will be installed in valve chambers and placed in accordance with the design guidelines (estimated total = 12).

(Refer to attached drawings 10438000-006, -008 and -009 for the preliminary design).

Bulk Water Supply for Domestic Usage

The development will be supplied with potable water from the existing Municipal water treatment works by means of a new 200mm ND UPVC pipeline (total estimated length 1 300m).

The estimated water usage is 270 kℓ/day (@ 600ℓ/erf/day).

The Municipality confirmed adequate water at the recommended residual pressure is available for the development and that the Water Treatment Works (WTW) has sufficient capacity for the development.

(Refer to attached drawings 10438000-007 for the preliminary design).

5.3 Roads and Storm water

Internal Roads

The development will be accessed via an existing gravel road from Bonnievale. All new roads for the proposed development will be provided with a permanent surface finish (25mm Asphalt) and will be 4.5m wide. Edging/kerbs will be provided on the sides of the roads in accordance with the standards. A gravel sidewalk will be provided on one side of the road.

The total estimated area to be surfaced is 13 650m² with approximately 3 000m of kerbs and 3 100m of edging.

It is anticipated that the existing road network leading up to the development will be able to accommodate the increase in traffic. This will however need to be confirmed by means of a TIA of Traffic Statement from a Traffic Engineer.

(Refer to attached drawings 10438000-010, -011 and -012 for the preliminary design).

Storm water drainage and management

Storm water from the proposed development area currently follows preferential drainage paths to the south-east to a larger water course. It is proposed that the storm water be directed in the roads reserves by means of the road geometry, kerbs and storm water pipes through-out the development where it will be discharged in a controlled manner into the existing water course.

To achieve the above, concrete storm water pipes ranging from 375mm to 525mm in diameter (total estimated length = 580m) with associated catch pits and junction boxes will need to be installed.

The southern ravine will need to be crossed to access to the development. An anticipated culvert size of approximately 4 x 3,0m x 1,8m will need to be installed for the crossing of the ravine to accommodate the 1:100 year flood.

(Refer to attached drawings 10438000-010, -011 and -012 for the preliminary design).

5.4 Refuse Removal

Refuge removal will be done by the Langeberg Municipality as part of their normal services provided.

No hazardous waste is expected to be generated and waste will be normal household waste.

6. CONCLUSION

Pending the confirmation from the Municipality with regard to possible upgrades on the service networks, this development is deemed viable and will contribute positively to the development of Bonnievale.

ANNEXURE A: DRAWINGS

- Draft Layout Plan (Urban Dynamics)
- 10438000-001: Sewer: Layout Plan
- 10438000-002: Bulk Sewer: Plan 1
- 10438000-003: Bulk Sewer: Plan 2
- 10438000-004: Sewer: Detail Plan 1
- 10438000-005: Sewer: Detail Plan 2
- 10438000-006: Water: Layout Plan
- 10438000-007: Bulk Water: Layout Plan
- 10438000-008: Water: Detail Plan 1
- 10438000-009: Water: Detail Plan 2
- 10438000-010: Roads and Storm Water: Layout Plan
- 10438000-011: Roads and Storm Water: Detail Plan1
- 10438000-012: Roads and Storm Water: Detail Plan2

DRAFT

RE/174

RE/174

907

10.00m

pole transformer

met ankerpale

lamppaal

Stream

32m Buffer

Drainage Line Edge

Development Footprint

FLOW DIRECTION

GRAVEL ROAD

LEGEND:

LAYOUT
SCALE 1:1000

0 50 100 250m

BOEKENHOUTSKLOOF
BONNIEVALE
ERF 907 &
REMAINDER FARM 174

LAYOUT PLAN

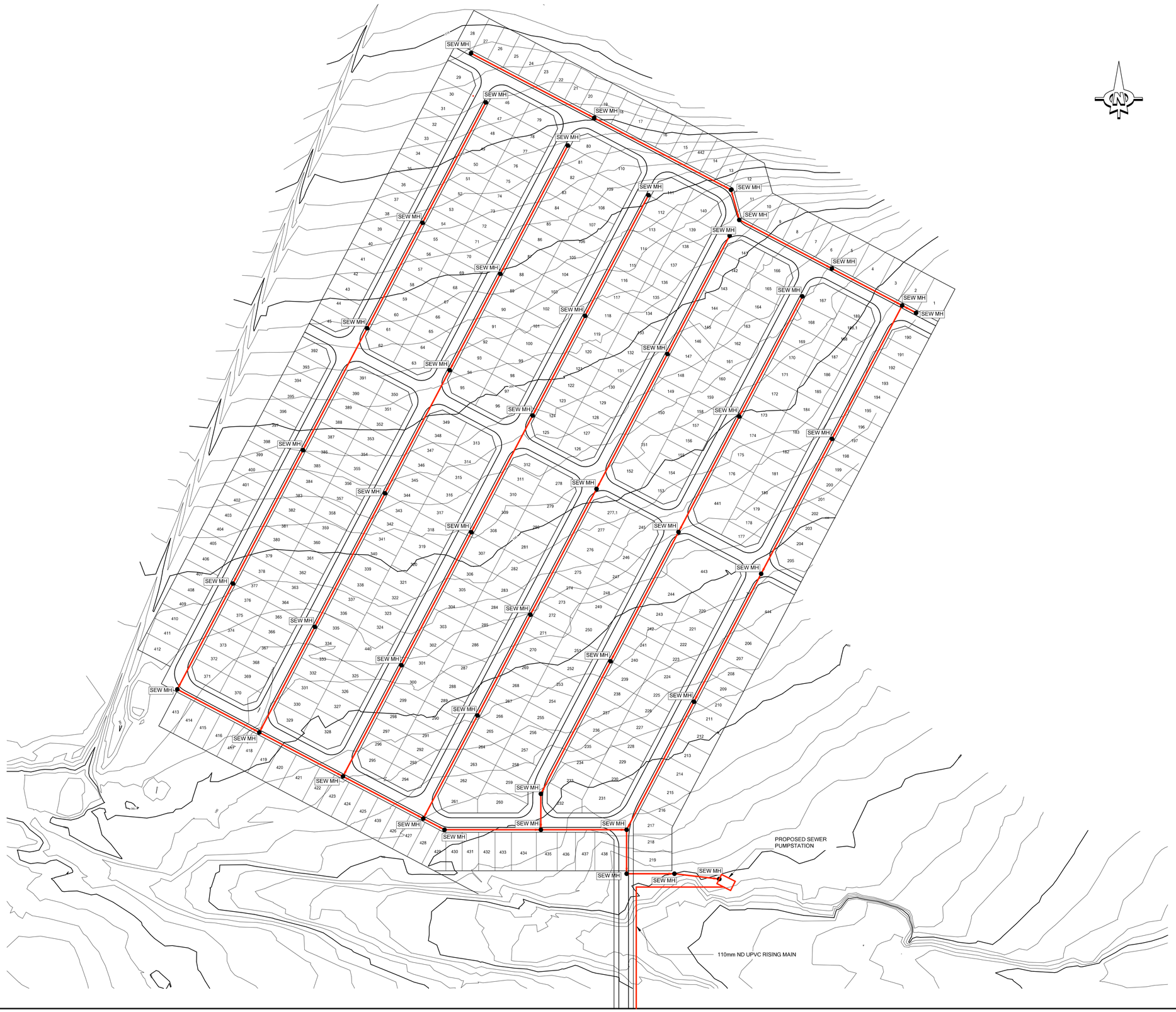
- Application Area
- Existing Cadastral Boundaries
- Proposed Layout - Residential Units = 438
- Proposed Community Facilities = 4 units (Existing Toilets, Water Tanks & Taps)
- Informal Structure
- 100 Year Floodline
- Drainage Line Edge
- Contour Lines (0.5m Interval)

PLEASE NOTE:
All boundary line positions, distances and property sizes need to be verified by a Professional Land Surveyor.

DATE	June 2018	COPYRIGHT RESERVED	CLIENT
SCALE	See linescale		
PLAN NO.	1		

FILE NAME:

URBAN DYNAMICS WESTERN CAPE
TOWN & REGIONAL PLANNERS
SEA VIEW BUILDING
NO. 3 DJ WOOD WAY
BELLVILLE - 7530
PO BOX 2445
BELLVILLE
7535
TEL: (021) 948 1545
FAX: (021) 948 1588
Website: www.udwc.co.za
URBAN DYNAMICS WESTERN CAPE INC REG. No : 95/09962/21



LEGEND:

- EXISTING SEWER LINE
- 160mm ND — PROPOSED PIPELINE WITH: NOMINAL DIAMETER
- EXISTING MANHOLE
- MH — PROPOSED MANHOLE WITH NODE NUMBER
- MH — PROPOSED DROP MANHOLE
- 200 / 195 — 1m CONTOUR INTERVALS

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 100
100 MILLIMETRES ON ORIGINAL DRAWING

A BEFORE CONTRACT COMMENCES
A AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
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CESA Consulting Engineers South Africa

PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
PROPOSED SEWER LAYOUT

DRAWING NO.
10438000-001

DESIGNED:	RJ	DEVCO	CHECKED:	GRB	
DRAWN:	RJ	DEVCO	SCALE:	1:1000	A1
APPROVED:			DATE:	2018-07-31	
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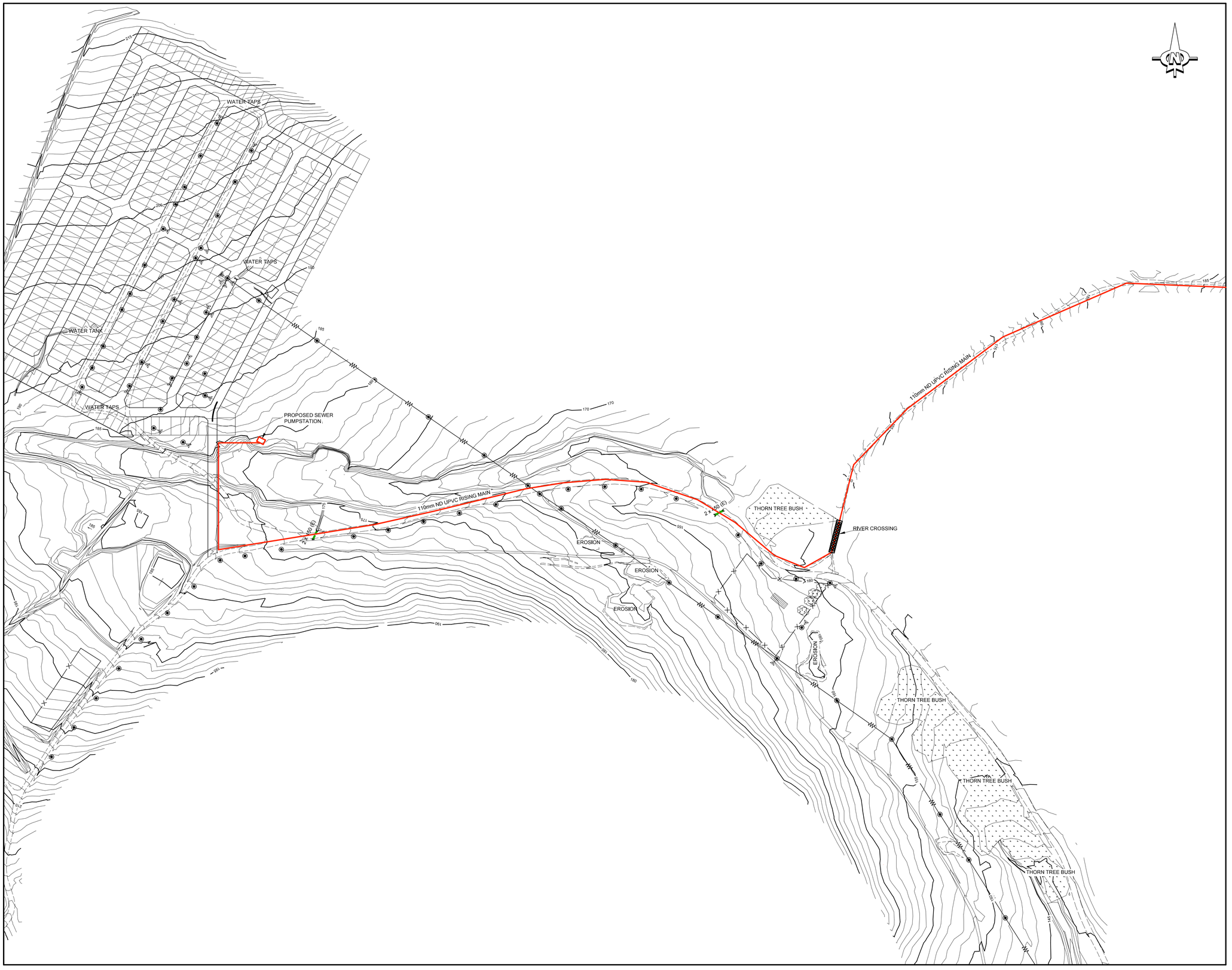

LEGEND:

- EXISTING SEWER LINE
- PROPOSED SEWER PIPELINE
- EXISTING MANHOLE
- PROPOSED MANHOLE
- 200 / 195 — 1m CONTOUR INTERVALS

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 — 100

100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES

(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

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PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
BULK SEWER PLAN 1

DRAWING NO.
10438000-002

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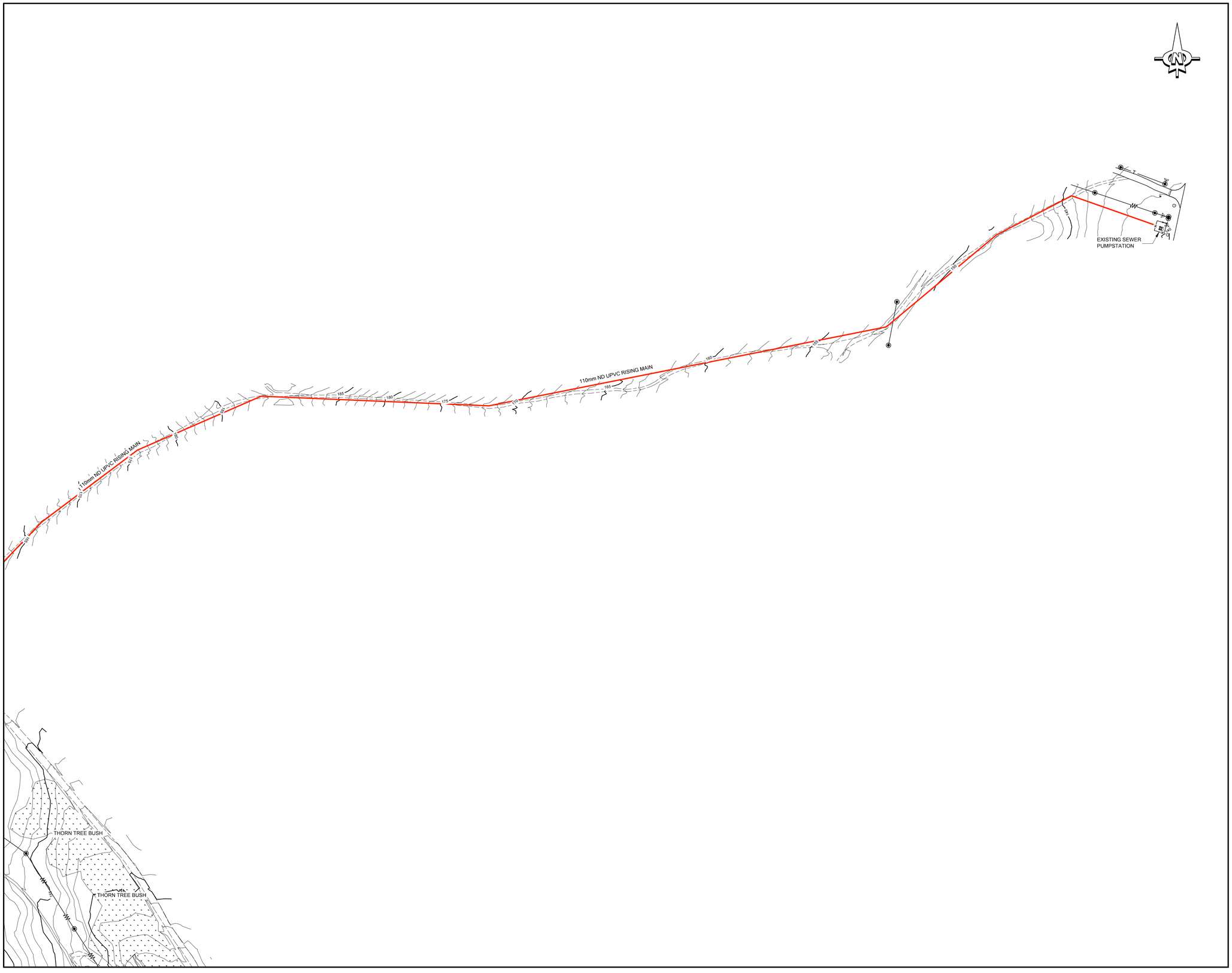

LEGEND:

- EXISTING SEWER LINE
- PROPOSED SEWER PIPELINE
- EXISTING MANHOLE
- PROPOSED MANHOLE
- 1m CONTOUR INTERVALS

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 — 100

100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES

(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

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PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
BULK SEWER PLAN 2

DRAWING NO.
10438000-003

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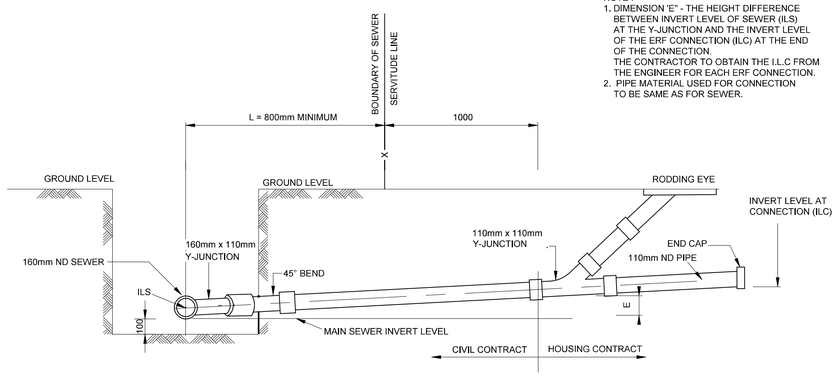
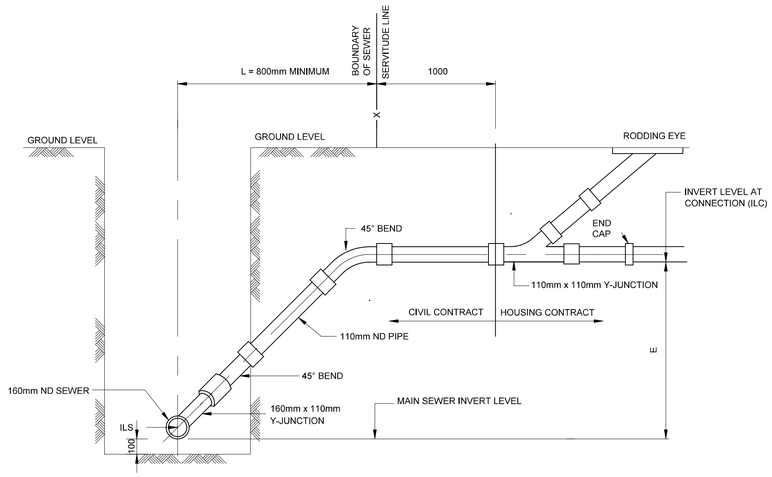
NOTE :
1. DIMENSION 'E" - THE HEIGHT DIFFERENCE BETWEEN INVERT LEVEL OF SEWER (ILS) AT THE Y-JUNCTION AND THE INVERT LEVEL OF THE ERF CONNECTION (ILC) AT THE END OF THE CONNECTION.
THE CONTRACTOR TO OBTAIN THE I.L.C FROM THE ENGINEER FOR EACH ERF CONNECTION.
2. PIPE MATERIAL USED FOR CONNECTION TO BE SAME AS FOR SEWER.



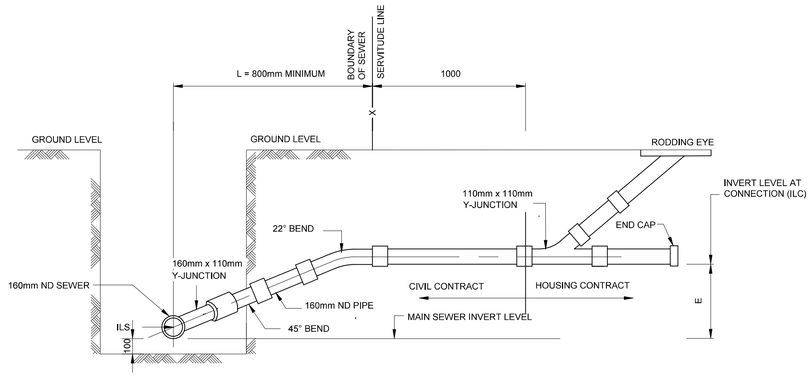
ERF CONNECTION DETAILS : TYPE 1 DETAILS FOR "E"
VARYING BETWEEN 150mm AND 405mm

SCALE 1:20



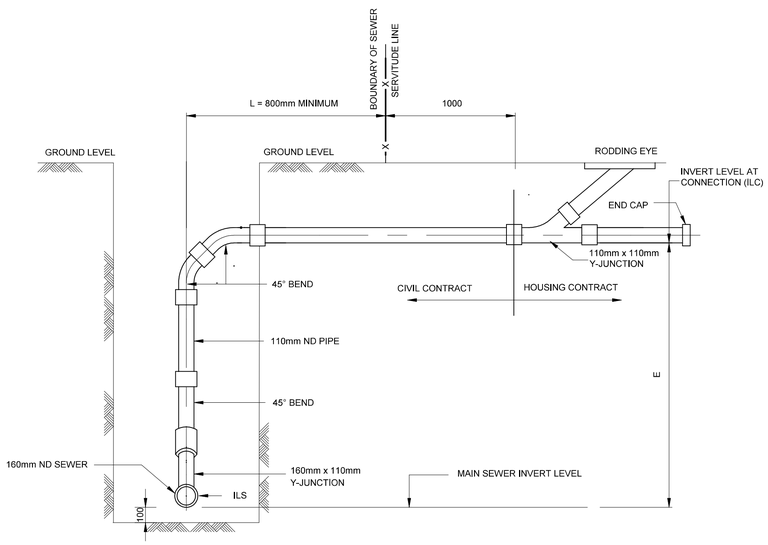
ERF CONNECTION DETAILS : TYPE 4 DETAILS FOR "E"
VARYING BETWEEN 1015mm AND 1500mm

SCALE 1:20



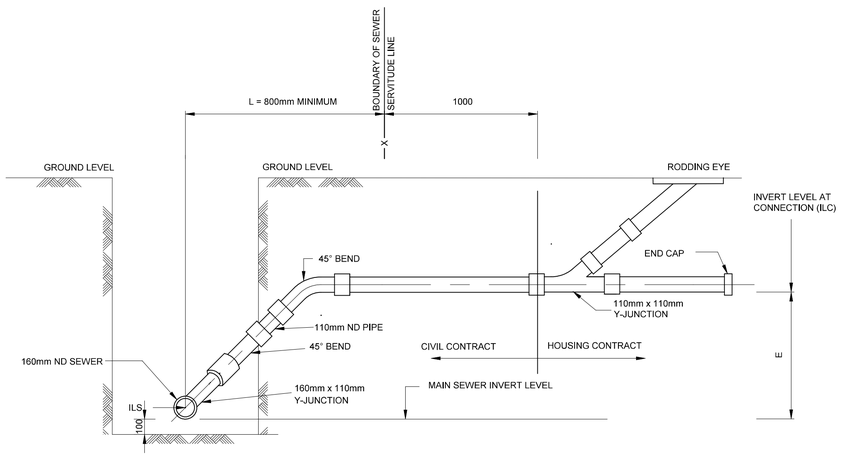
ERF CONNECTION DETAILS : TYPE 2 DETAILS FOR "E"
VARYING BETWEEN 405mm AND 710mm

SCALE 1:20



ERF CONNECTION DETAILS : TYPE 5
DETAILS FOR "E" GREATER THAN 1500

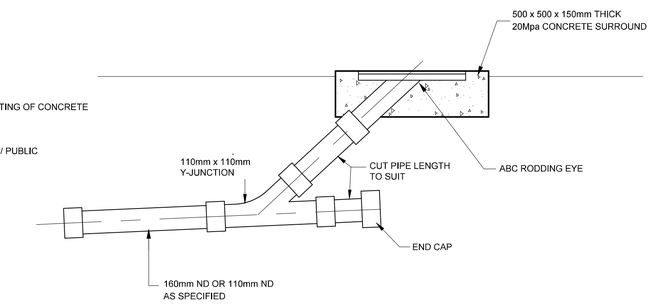
SCALE 1:20



ERF CONNECTION DETAILS : TYPE 3 DETAILS FOR "E"
VARYING BETWEEN 710 AND 1015mm

SCALE 1:20

NOTE
1. KEEP TOP SURFACE OF RODDING EYES AND BOLTS CLEAN DURING CASTING OF CONCRETE SURROUND.
2. LEVEL OF RODDING EYE
= 25mm ABOVE SURROUNDING SURFACE IN OPEN AREAS.
= SAME LEVEL AS SURROUNDING SURFACE IN SURFACED/PAVED AREAS/ PUBLIC AREAS.



TYPICAL DETAIL OF RODDING EYE

N.T.S

NOTES:

1. ALL CONSTRUCTION MUST BE DONE IN ACCORDANCE WITH SANS 1200.

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 100
100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES
(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

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PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
SEWER: DETAIL PLAN 1

DRAWING NO.
10438000-004

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DRAWN:	GRB		SCALE:	AS SHOWN	A1
APPROVED:			DATE:	2018-08-15	
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Dimension of Anchoring Slab (B x B)						
D	**X (min)**	**L = 0m (B x B)**	**L = 0,25m (B x B)**	**L = 0,5m (B x B)**	**L = 0,75m (B x B)**	**L = 1,0m (B x B)**
0 - 2.0	0,09	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only
2.0 - 2.5	0,10	1,2 x 1,2	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only
2.5 - 3.0	0,10	1,2 x 1,2	1,2 x 1,2	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only
3.0 - 3.5	0,125	1,2 x 1,2	1,2 x 1,2	Sand Bedding Only	Sand Bedding Only	Sand Bedding Only
3.5 - 4.0	0,125	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	Sand Bedding Only	Sand Bedding Only
4.0 - 4.5	0,150	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	Sand Bedding Only	Sand Bedding Only
4.5 - 5.0	0,150	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	Sand Bedding Only
5.0 - 5.5	0,150	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	Sand Bedding Only
5.5 - 6.0	0,150	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2	1,2 x 1,2

NOTES:

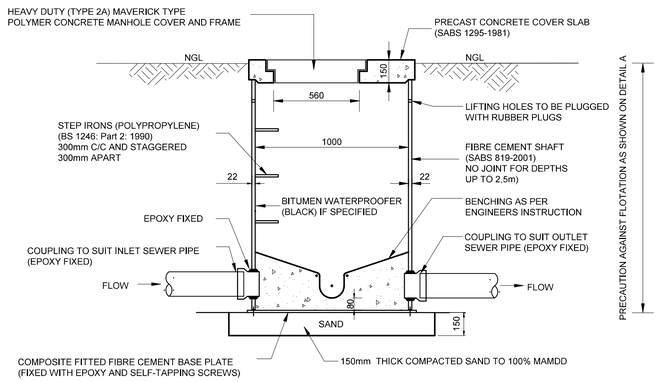
1. COMPLETE BENCHING, WELL COMPACTED BACKFILL (95% MAMDD) TO NGL AND PLACE COVER SLAB BEFORE WATER TABLE IS ALLOWED TO RISE.

2. TO BE READ IN CONJUNCTION WITH DETAIL A.

3. RECOMMENDED BASE PLATE THICKNESSES:
   - 9mm BASEPLATE WITH 2 x 9mm INTERNAL RE-INFORCEMENT STRIPS FOR MANHOLES UP TO 1,5m DEEP
   - 18mm BASEPLATE WITH 1 x 9mm INTERNAL RE-INFORCEMENT STRIP FOR MANHOLES 1,5m TO 2,5m DEEP
   - 27mm BASEPLATE WITH 1 x 9mm BASEPLATE WITH 1 x 9mm INTERNAL RE-INFORCEMENT STRIP FOR MANHOLES DEEPER THAN 2,5m

4. PROVIDE ANTI-FLOTATION CONCRETE SLAB AS SHOWN IN DETAIL A. (ASSUMED L=0,25m UNLESS OTHERWISE STATED BY THE ENGINEER)

5. 20mm FALL BETWEEN INLET AND OUTLET UNLESS OTHERWISE SPECIFIED



TYPICAL SECTION OF FIBRE CEMENT MANHOLE

SCALE 1:20

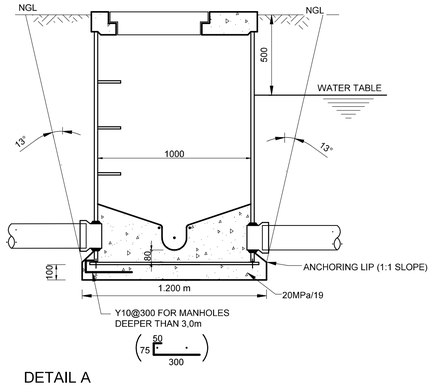
NOTES:

1. MANHOLE TO BE BEDDED INTO FRESH WET CONCRETE AND ANCHORING LIP TO BE CAST IN ONE OPERATION WITH FOUNDATION SLAB.

2. COMPLETE WELL COMPACTED BACKFILL (MAMDD) BENCHING AND PLACE COVER SLAB BEFORE WATER TABLE IS ALLOWED TO RISE.

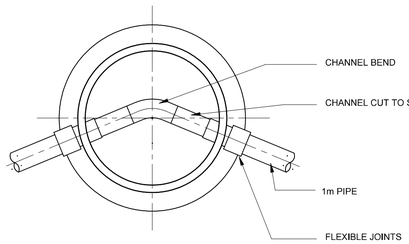
3. SUPPLIER TO BE INFORMED WHICH MANHOLES WILL BE BEDDED ONTO FOUNDATION CONCRETE (OUTSIDE OF BASE PLATE WILL THEN NOT BE BITUMEN COATED)

D = MANHOLE DEPTH
L = DEPTH TO WATER TABLE
B = DIMENSION OF SQUARE FOUNDATION CONCRETE SLAB (20MPa)
0 = 15° (ASSUMED INTERNAL SOIL FRICTION ANGLE)

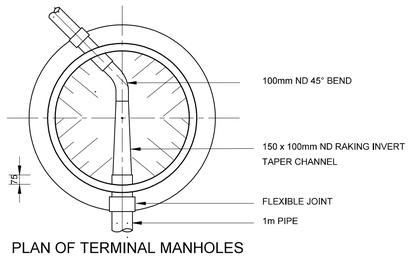


DETAIL A
TYPICAL FLOTATION PRECAUTION FOR MANHOLES IN HIGH WATER TABLE AREAS

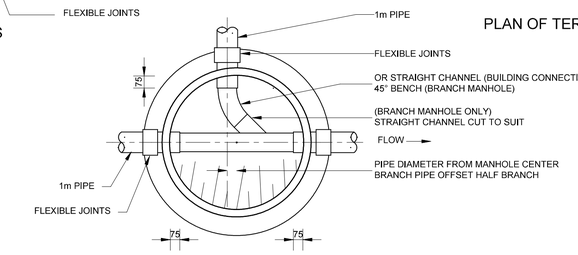
SCALE 1:20



PLAN OF MANHOLE AT BENDS



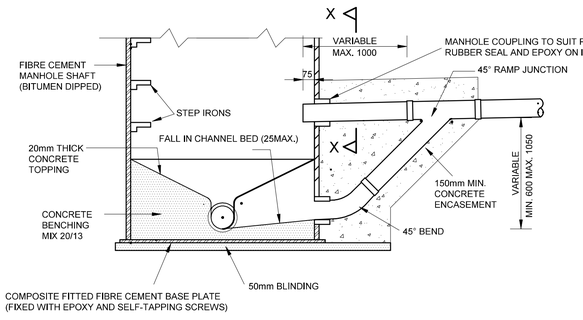
PLAN OF TERMINAL MANHOLES



PLAN OF 90° BRANCH & BUILDING CONNECTION

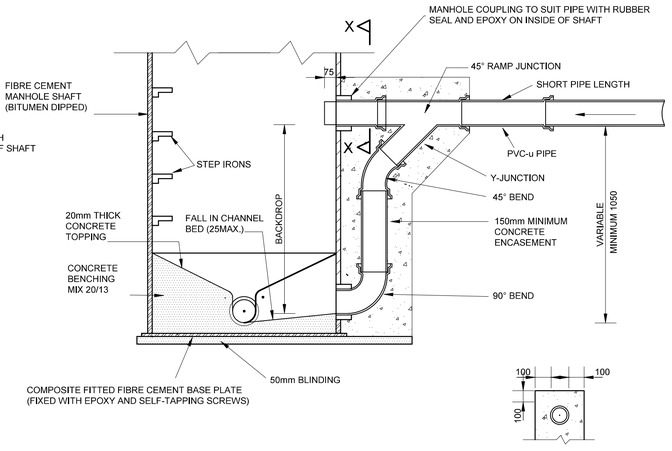
TYPICAL CHANNEL LAYOUTS MANHOLES

NTS



RAMP MANHOLE DETAIL FOR SEWER MANHOLE

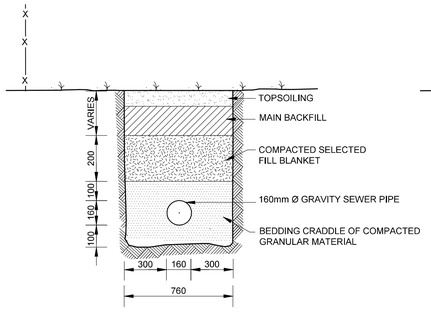
SCALE 1:20



BACKDROP DETAIL FOR SEWER MANHOLE

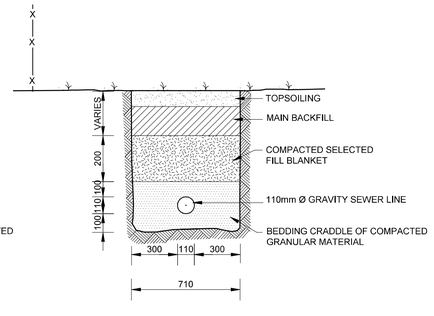
SCALE 1:20

SECTION X-X



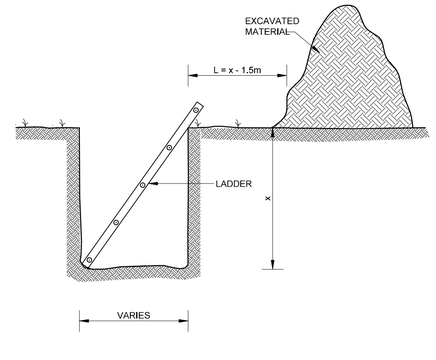
TYPICAL DETAIL OF GRAVITY SEWER TRENCH

SCALE 1 : 20



TYPICAL DETAIL OF SEWER CONNECTION TRENCH

SCALE 1 : 20



TYPICAL EXCAVATION DETAIL FOR TRENCHES DEEPER THAN 1.5m

SCALE 1 : 20

NOTES:

1. ALL CONSTRUCTION MUST BE DONE IN ACCORDANCE WITH SANS 1200.

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 — 100
100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES
(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

ASLA DEVCO

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50 Victoria Street, George, 6529
PO Box 1889, George, 6530, South Africa
CESA Consulting Engineers South Africa

PROJECT
BONNIEVALE HOUSING: BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
SEWER: DETAIL PLAN 2

DRAWING NO.
10438000-005

DESIGNED:	GRB		CHECKED:	GRB	
DRAWN:	GRB		SCALE:	AS SHOWN	A1
APPROVED:			DATE:	2018-08-15	
FILE PATH:	P:\Projects_George\10438000_Bonnievale Housing_Boekenhoutskloof\01 Inception\Draw\3-Working\				

LEGEND:

- EXISTING WATER PIPES
- PROPOSED WATER PIPES
- FUTURE WATER PIPES
- FH — EXISTING FIRE HYDRANT
- FH — PROPOSED FIRE HYDRANT
- PROPOSED VALVE
- EXISTING END CAP
- PROPOSED END CAP
- PROPOSED CONNECTION
- BM1 100.00 — BENCHMARK WITH BENCHMARK NUMBER AND STAKE LEVEL
- 200 / 195 — 1m CONTOUR INTERVALS

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 — 100
100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES
(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

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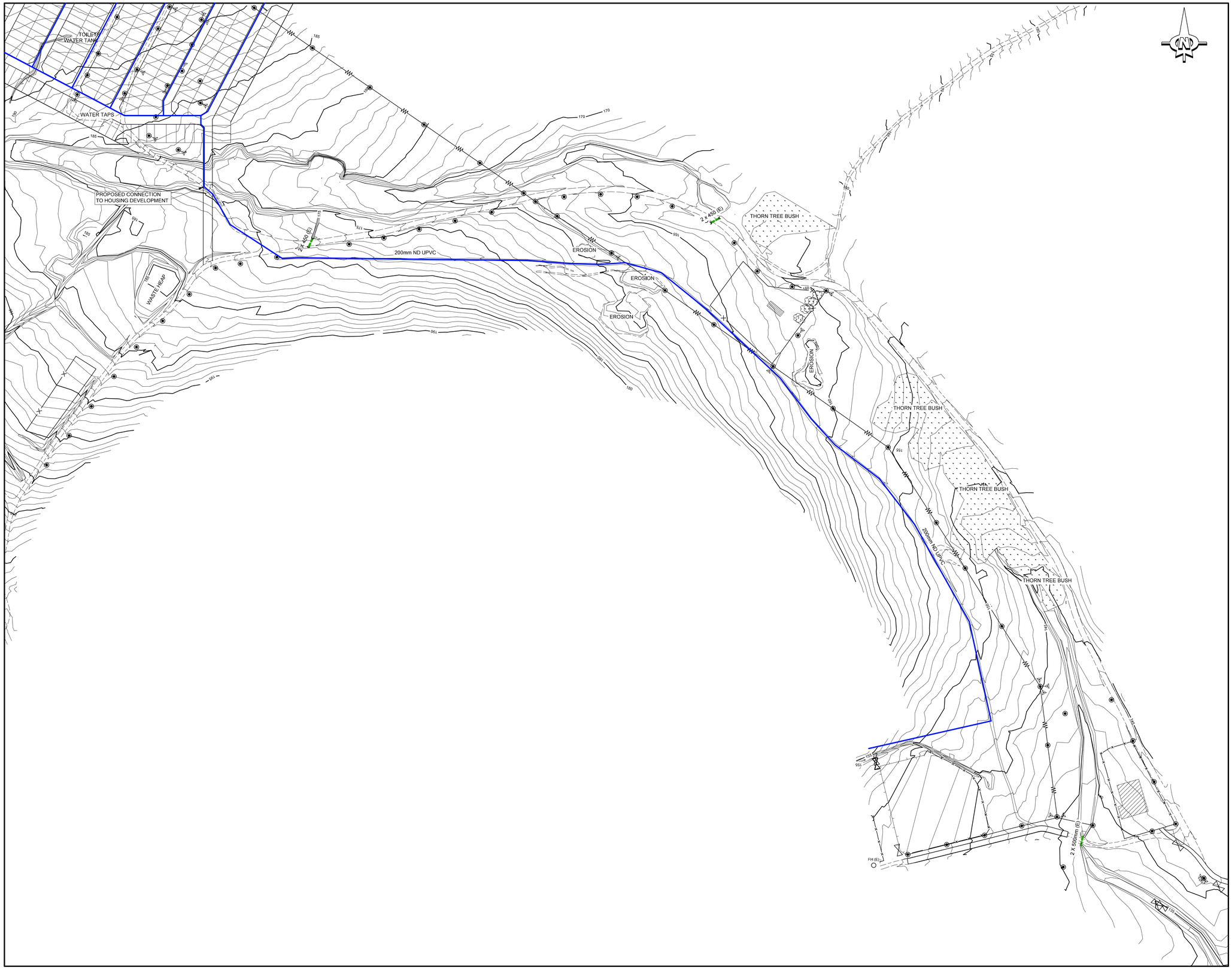
PO Box 1889, George, 6530, South Africa
CESA Consulting Engineers South Africa

PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
PROPOSED WATER LAYOUT

DRAWING NO.
10438000-006

DESIGNED: RJ		CHECKED: GRB		
DRAWN: RJ		SCALE: 1:1000		A1
APPROVED:		DATE: 2018-07-31		
FILE PATH:	Z:\Projects\George10438000\Bonnievale Housing\Boekenhoutskloof\02 ConceptDrawWater1.DR4			



LEGEND:

PROPOSED WATER PIPES

200 / 195 1m CONTOUR INTERVALS

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 100
100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES
(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

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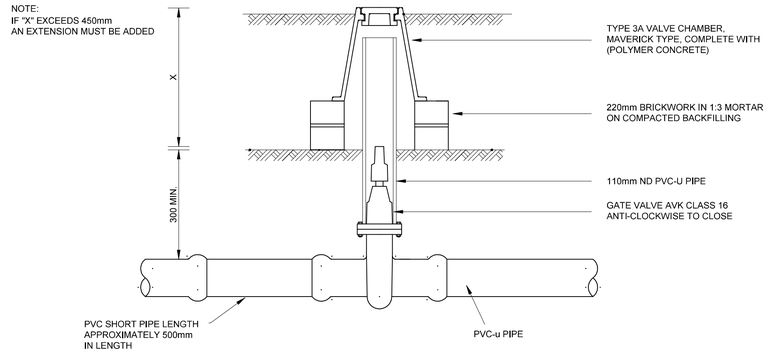
CESA Consulting Engineers South Africa

PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
BULK WATER PLAN

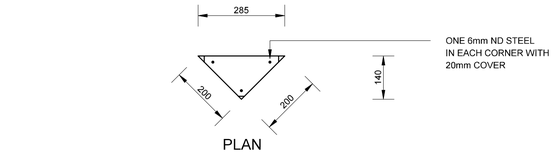
DRAWING NO.
10438000-007

DESIGNED:	MVW		CHECKED:	CVS	
DRAWN:	MVW		SCALE:	1:2000	A1
APPROVED:			DATE:	2016-10-31	
FILE PATH:	Z:\Projects\George\10438000\Bonnievale Housing\Boekenhoutskloof\02 Concept\Draw\3-Working				

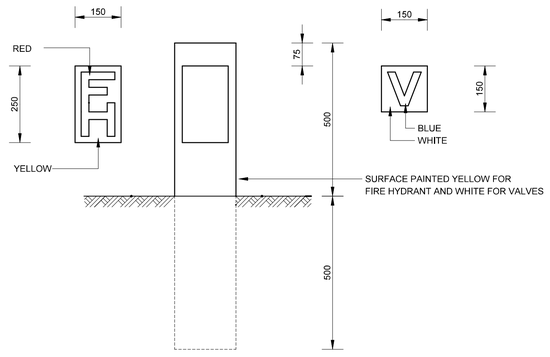


VALVE CHAMBER

SCALE 1:10

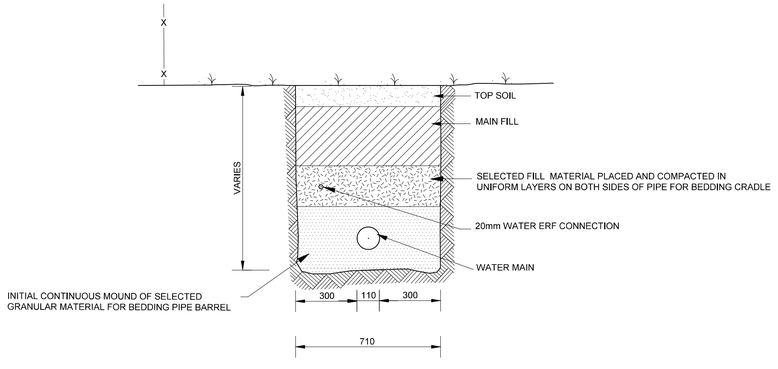


PLAN



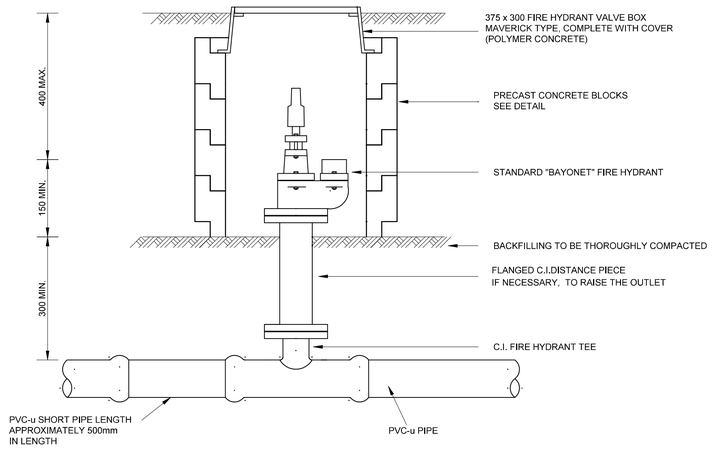
VALVE AND FIRE HYDRANT MARKER

SCALE 1:10



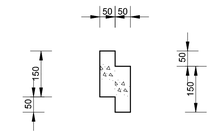
TYPICAL DETAIL OF WATER AND WATER ERF CONNECTION

SCALE 1 : 15

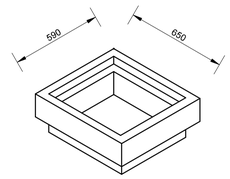


FIRE HYDRANT CHAMBER

SCALE 1:10

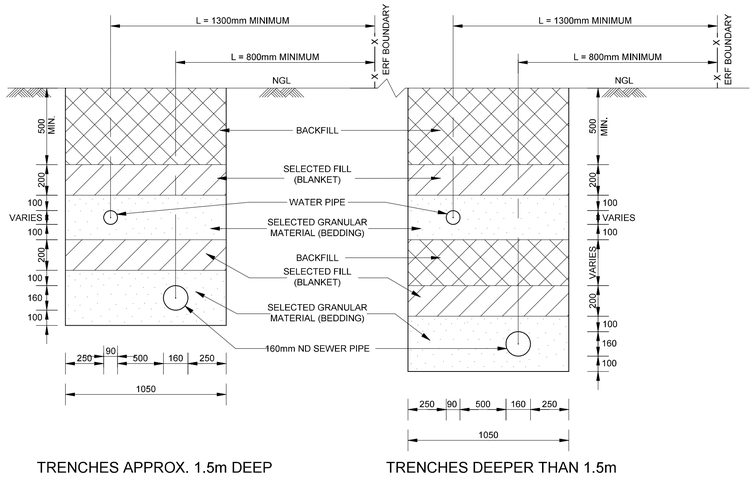


SECTION



PRECAST CONCRETE BLOCKS

SCALE 1:20



TRENCHES APPROX. 1.5m DEEP

TRENCHES DEEPER THAN 1.5m

DETAIL OF COMBINED PIPE TRENCHES FOR WATER AND SEWER

N.T.S

NOTES:

1. ALL CONSTRUCTION MUST BE DONE IN ACCORDANCE WITH SANS 1200.

PRELIMINARY

(FOR DISCUSSION PURPOSES ONLY)

0 100

100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES

(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

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CESA Consulting Engineers South Africa

PROJECT

BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

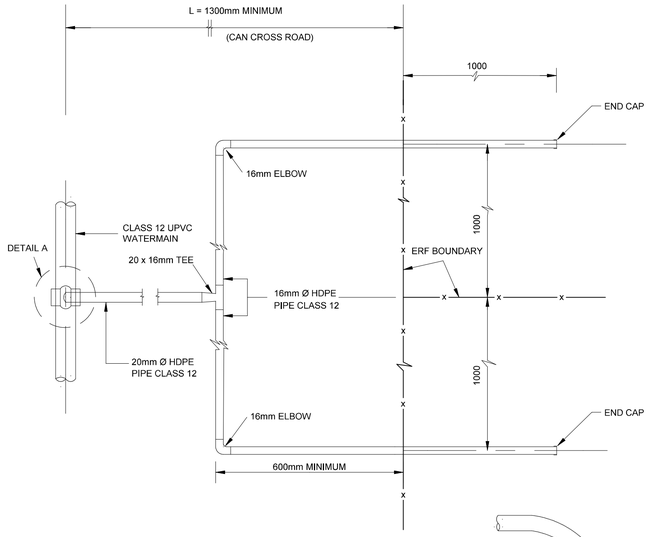
DRAWING DESCRIPTION

WATER: DETAIL PLAN 1

DRAWING NO.

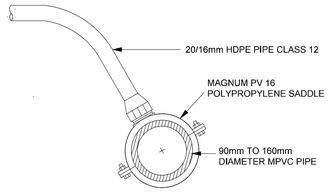
10438000-008

DESIGNED:	GRB		CHECKED:	GRB	
DRAWN:	GRB		SCALE:	AS SHOWN	A1
APPROVED:			DATE:	2018-08-15	
FILE PATH:	P:\Projects_George\10438000_Bonnievale Housing_Boekenhoutskloof\01 Inception\Draw\3-Working\				



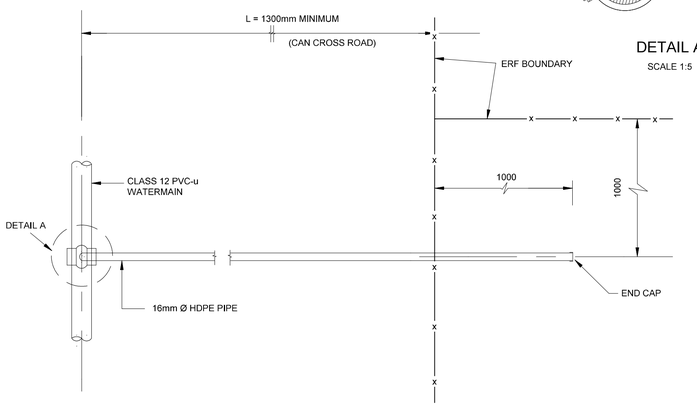
WATER ERF CONNECTION FOR DOUBLE ERF

SCALE 1:10



DETAIL A

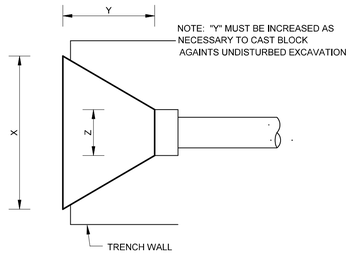
SCALE 1:5



WATER ERF CONNECTION FOR SINGLE ERF

SCALE 1:10

PIPE DIAMETER	DEPTH OF BLOCK	X	Y	Z
75	500	500	300	150
90	500	500	300	150
110	500	500	300	150

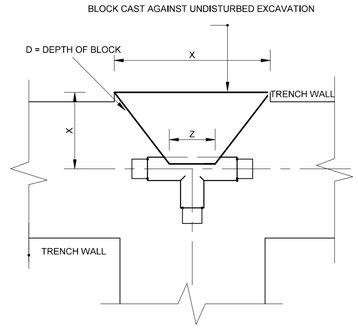


TRUST BLOCK FOR END CAPS

NTS

PIPE DIAMETER	X	D	Z
75	500	300	150
90	650	400	200
110	650	400	200

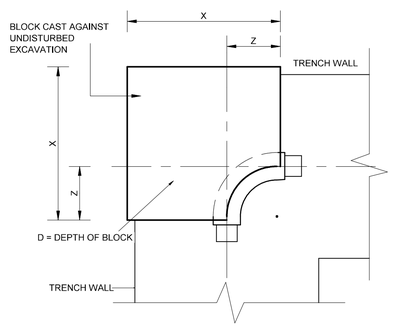
NOTES :
1. TO CAST CONCRETE AGAINST UNDISTURBED EXCAVATION "Y" MUST BE INCREASED AS NEEDED
2. BEARING PRESSURE OF SOIL BEHIND THRUST BLOCK MUST BE AT LEAST 40kPa AND THE TEST PRESSURE HEAD IN PIPELINE NOT BIGGER THAN 135kPa
3. TRUST BLOCKS MUST BE BUILT SYMMETRICAL AROUND FITTINGS



THRUST BLOCK FOR T-JUNCTIONS

NTS

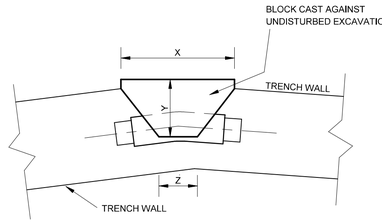
PIPE DIAMETER	X	D	Z
75	500	300	175
90	650	400	250
110	650	400	250



THRUST BLOCK FOR 90° BENDS

NTS

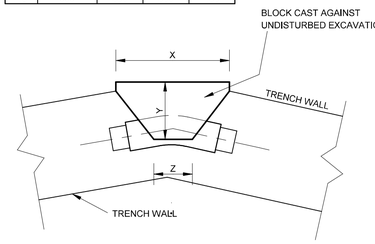
FOR 11.25° BENDS				
PIPE DIA.	DEPTH OF CONCRETE	X	Y	Z
75	200	200	300	100
90	200	300	300	100
110	200	300	300	100



TRUST BLOCK FOR 11.25° BENDS

NTS

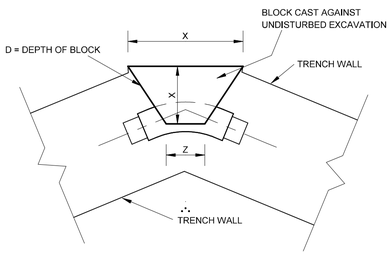
FOR 22.5° BEND				
PIPE DIA.	DEPTH OF CONCRETE	X	Y	Z
75	250	250	300	100
90	300	350	300	150
110	300	350	300	150



TRUST BLOCK FOR 22.5° BENDS

NTS

PIPE DIAMETERS	X	D	Z
75	375	300	125
90	500	400	175
110	500	400	175



THRUST BLOCK FOR 45° BENDS

NTS

NOTES:

1. ALL CONSTRUCTION MUST BE DONE IN ACCORDANCE WITH SANS 1200.

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 100
100 MILLIMETRES ON ORIGINAL DRAWING

A BEFORE CONTRACT COMMENCES
A AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

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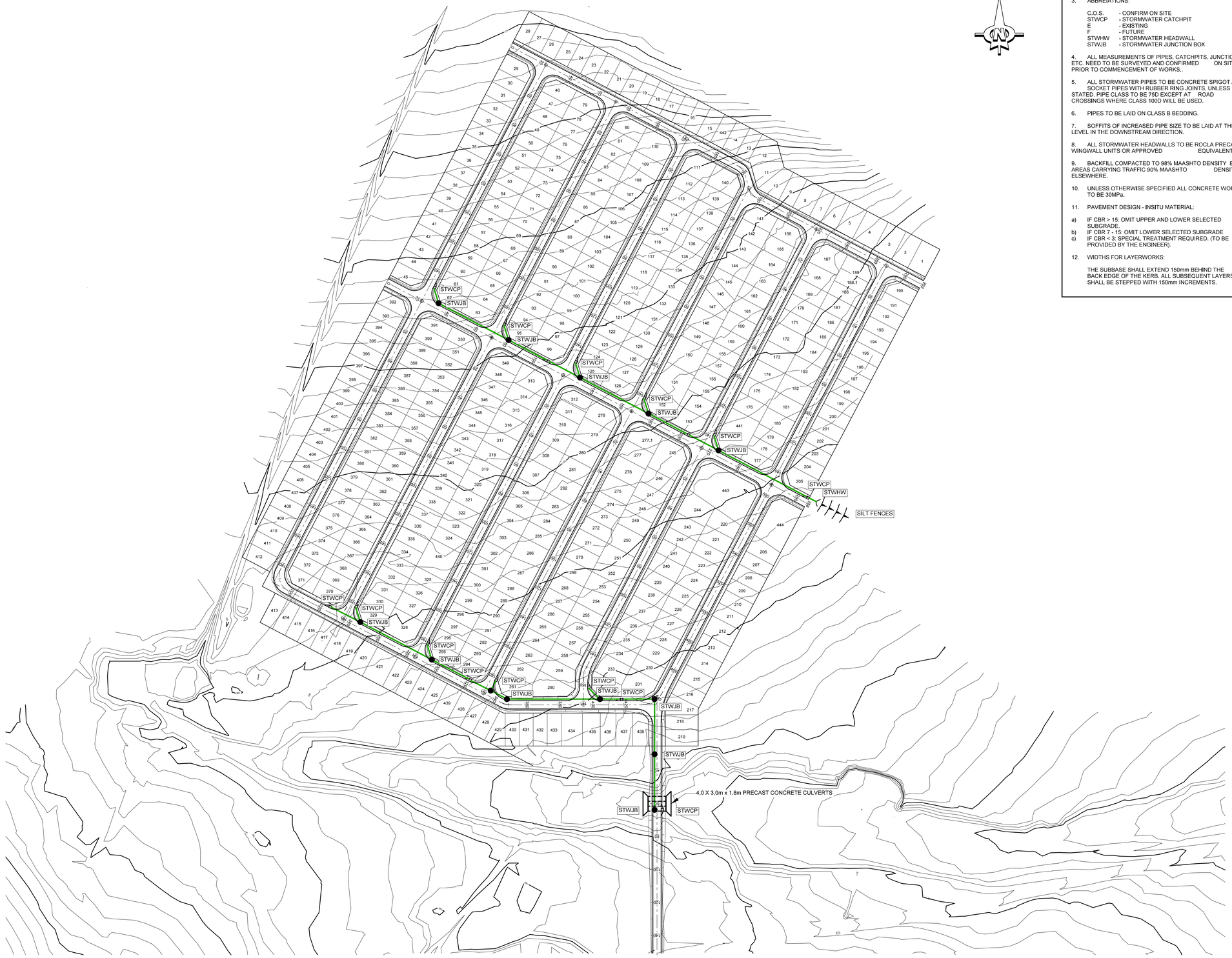
CESA Consulting Engineers South Africa

PROJECT
BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION
WATER: DETAIL PLAN 2

DRAWING NO.
10438000-009

DESIGNED:	GRB		CHECKED:	GRB	
DRAWN:	GRB		SCALE:	AS SHOWN	A1
APPROVED:			DATE:	2018-08-15	
FILE PATH:	P:\Projects_George\10438000_Bonnievale Housing_Boekenhoutskloof\01 Inception\Draw\3-Working\				



NOTES:

1. NO DIMENSIONS MAY BE SCALED FROM DRAWINGS.
2. ALL CONSTRUCTION MUST BE DONE IN ACCORDANCE WITH SANS 1200.
3. ABBREIATIONS:

   C.O.S. - CONFIRM ON SITE
   STWCP - STORMWATER CATCHPIT
   E - EXISTING
   F - FUTURE
   STWHW - STORMWATER HEADWALL
   STWJB - STORMWATER JUNCTION BOX

4. ALL MEASUREMENTS OF PIPES, CATCHPITS, JUNCTION BOXES ETC. NEED TO BE SURVEYED AND CONFIRMED ON SITE PRIOR TO COMMENCEMENT OF WORKS..
5. ALL STORMWATER PIPES TO BE CONCRETE SPIGOT AND SOCKET PIPES WITH RUBBER RING JOINTS, UNLESS OTHERWISE STATED. PIPE CLASS TO BE 75D EXCEPT AT ROAD CROSSINGS WHERE CLASS 100D WILL BE USED.
6. PIPES TO BE LAID ON CLASS B BEDDING.
7. SOFFITS OF INCREASED PIPE SIZE TO BE LAID AT THE SAME LEVEL IN THE DOWNSTREAM DIRECTION.
8. ALL STORMWATER HEADWALLS TO BE ROCLA PRECAST CONCRETE WINGWALL UNITS OR APPROVED EQUIVALENT.
9. BACKFILL COMPACTED TO 98% MAASHTO DENSITY BELOW AREAS CARRYING TRAFFIC 90% MAASHTO DENSITY ELSEWHERE.
10. UNLESS OTHERWISE SPECIFIED ALL CONCRETE WORKS TO BE 30MPa.
11. PAVEMENT DESIGN - INSITU MATERIAL:

a) IF CBR > 15: OMIT UPPER AND LOWER SELECTED SUBGRADE.
b) IF CBR 7 - 15: OMIT LOWER SELECTED SUBGRADE
c) IF CBR < 3: SPECIAL TREATMENT REQUIRED. (TO BE PROVIDED BY THE ENGINEER).

12. WIDTHS FOR LAYERWORKS:

    THE SUBBASE SHALL EXTEND 150mm BEHIND THE BACK EDGE OF THE KERB. ALL SUBSEQUENT LAYERS SHALL BE STEPPED WITH 150mm INCREMENTS.

LEGEND:

- 375mm (E) — EXISTING PIPES WITH SIZE AND TYPE
- EXISTING JUNCTION BOX
- EXISTING CATCHPIT
- EXISTING HEADWALL
- 375mm ND — PROPOSED STORM WATER PIPELINE
- STWJB — PROPOSED JUNCTION BOX
- STWCP — PROPOSED CATCHPIT
- PROPOSED PRECAST CONCRETE WINGWALL UNITS
- 200 / 195 — 1,0m CONTOUR INTERVAL.

PRELIMINARY
(FOR DISCUSSION PURPOSES ONLY)

0 — 100
100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES
(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
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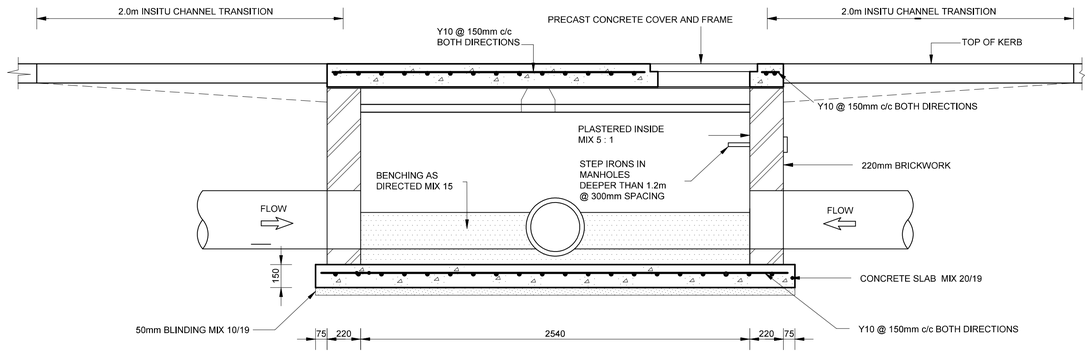
PROJECT
BONNIEVALE HOUSING: BOEKENHOUTSKLOOF

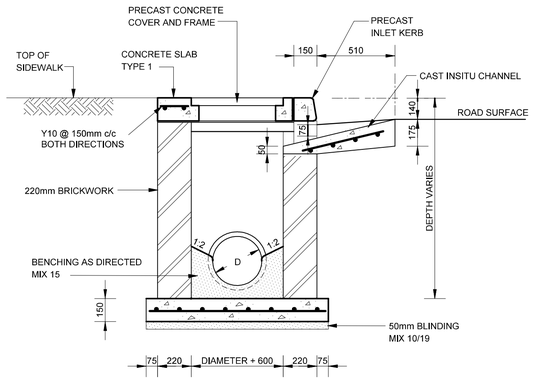
DRAWING DESCRIPTION
ROADS AND STORMWATER: PROPOSED LAYOUT

DRAWING NO.
10438000-010

DESIGNED: RJ		CHECKED: GRB	
DRAWN: RJ		SCALE: 1:1200	A1
APPROVED:		DATE: 2018-07-31	
FILE PATH:	P:\Projects_George\10438000_Bonnievale ousing_Boekenhoutskloof\01 Inception\Draw\3-Working		



SECTION D-D



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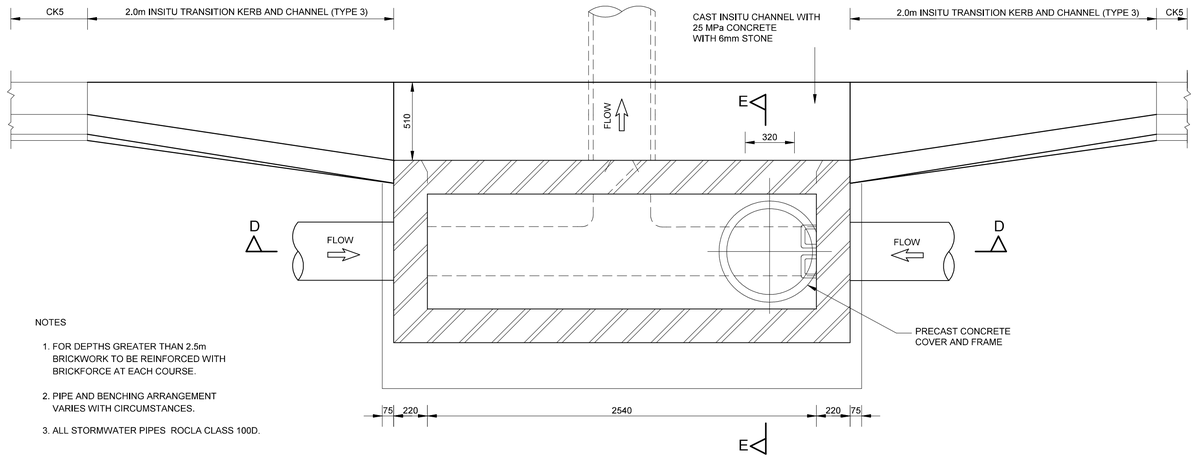


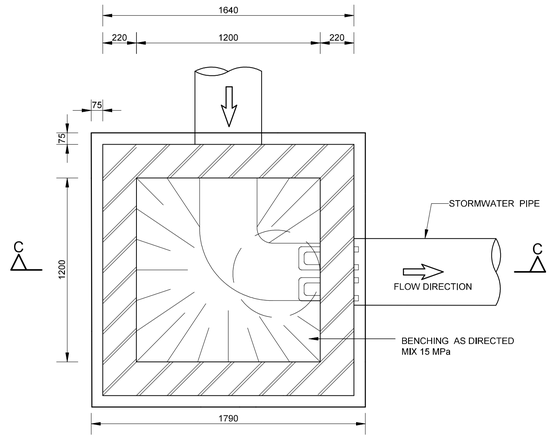
NOTES

1. FOR DEPTHS GREATER THAN 2.5m BRICKWORK TO BE REINFORCED WITH BRICKFORCE AT EACH COURSE.
2. PIPE AND BENCHING ARRANGEMENT VARIES WITH CIRCUMSTANCES.
3. ALL STORMWATER PIPES ROCLA CLASS 100D.

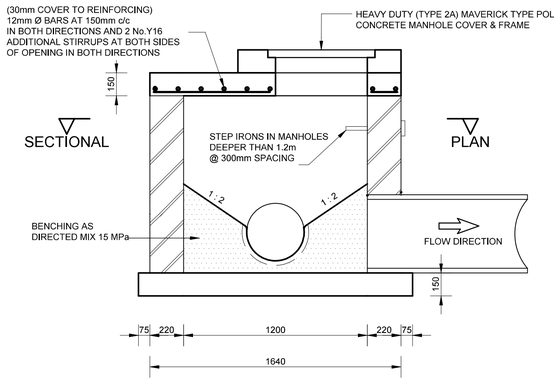
PLAN

DOUBLE INLET CATCHPIT : TYPE 1

SCALE 1:20



SECTIONAL PLAN



SECTION C-C

STORMWATER MANHOLE

SCALE 1:20

PRELIMINARY

(FOR DISCUSSION PURPOSES ONLY)

0 100

100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES

(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

ASLA
DEVCO

V3 CONSULTING ENGINEERS
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F : +27 (0) 44 873 3263
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PO Box 1889, George, 6530, South Africa
CESA Consulting Engineers South Africa

PROJECT

BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

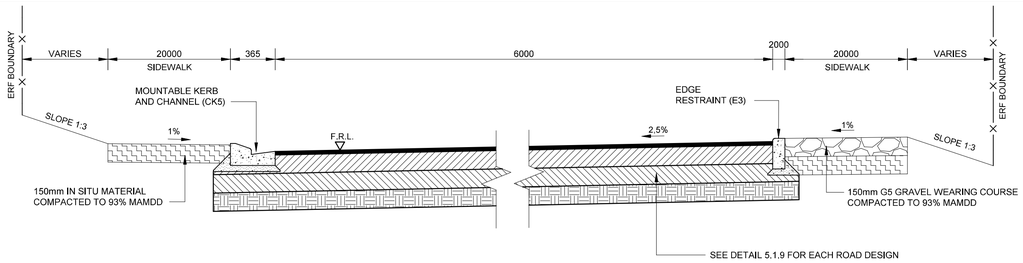
DRAWING DESCRIPTION

ROADS & STORM WATER: DETAIL PLAN 1

DRAWING NO.

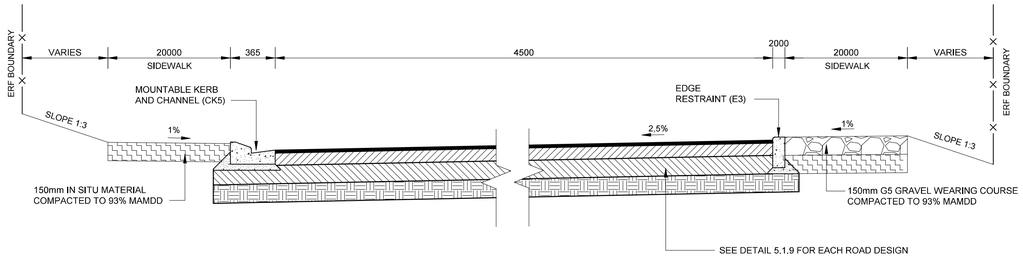
10438000-011

DESIGNED:	GRB		CHECKED:	GRB	
DRAWN:	GRB		SCALE:	AS SHOWN	A1
APPROVED:			DATE:	2018-08-15	
FILE PATH:	P:\Projects_George\10438000_Bonnievale Housing_Boekenhoutskloof\01 Inception\Draw\3-Working\				



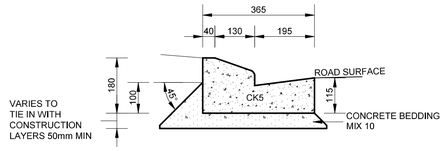
TYPICAL CROSS-SECTION OF BUS ROUTE

SCALE 1:25



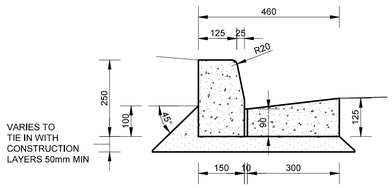
TYPICAL CROSS-SECTION OF INTERNAL ROADS

SCALE 1:25



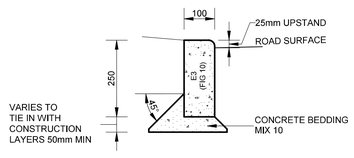
DETAIL S2.3.3 - COMBINATION KERB
(CK5-NEW PAROW INFALL)

SCALE 1:10



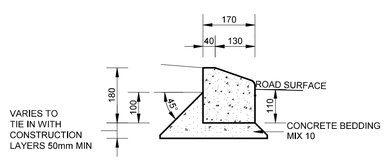
DETAIL S2.4.1 - COMBINED KERBS (BK2 + C1)

SCALE 1:10



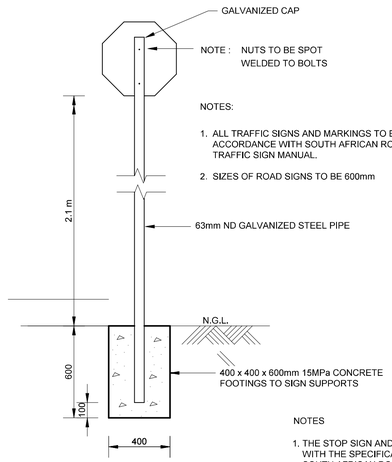
DETAIL S2.5.3 - EDGING WITH UPSTAND (E3)

SCALE 1:10



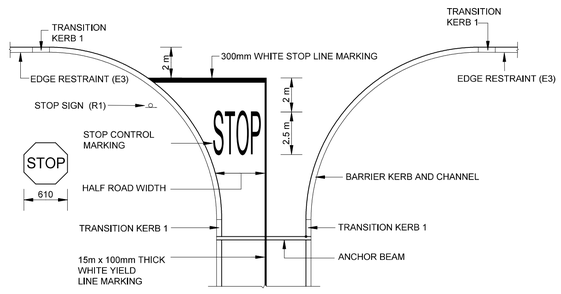
DETAIL S2.7.8 -MOUNTABLE KERB (MK10)

SCALE 1:10



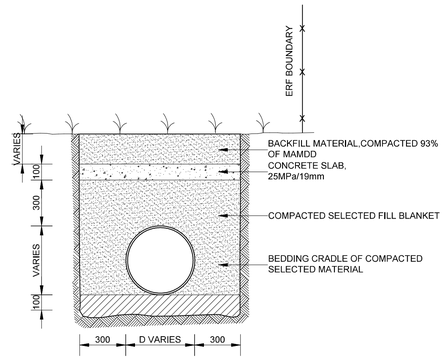
TYPICAL ROAD SIGN

SCALE 1:20



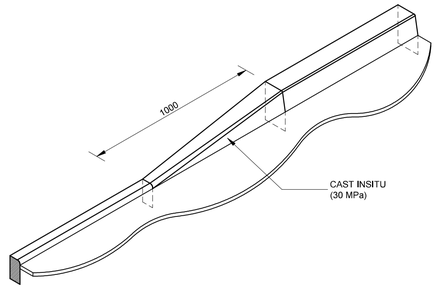
STOP CONTROLLED INTERSECTION

SCALE 1:100



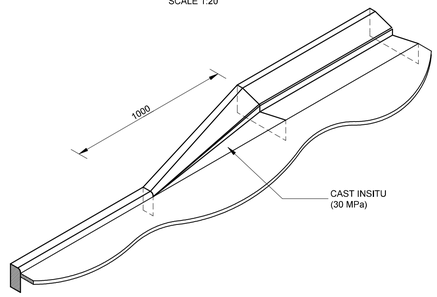
TYPICAL BEDDING DETAIL FOR SHALLOW STORMWATER
PIPE LINE

SCALE 1:20



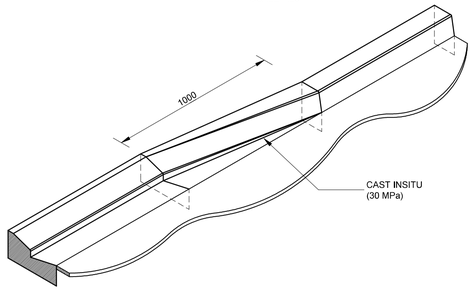
DETAIL S2.9.1 - ISOMETRIC VIEW OF TRANSITION KERB (BK2 - E3)

SCALE 1:20



DETAIL S2.9.2 - ISOMETRIC VIEW OF TRANSITION KERB (CK5 - E3)

SCALE 1:20



DETAIL S2.9.3 - ISOMETRIC VIEW OF TRANSITION KERB (BK2 - CK5)

SCALE 1:20

NOTES:

1. NO DIMENSIONS MAY BE SCALED FROM DRAWINGS.
2. ALL CONSTRUCTION MUST BE DONE IN ACCORDANCE WITH SANS 1200.
3. ABBREVIATIONS:

   C.O.S. - CONFIRM ON SITE
   E - EXISTING
   F - FUTURE

4. ALL MEASUREMENTS OF PIPES, CATCHPITS, JUNCTION BOXES ETC, NEED TO BE SURVEYED AND CONFIRMED ON SITE PRIOR TO COMMENCEMENT OF WORKS.
5. ALL STORMWATER PIPES TO BE CONCRETE SPIGOT AND SOCKET PIPES WITH RUBBER RING JOINTS, UNLESS OTHERWISE STATED, PIPE CLASS TO BE 75D EXCEPT AT ROAD CROSSINGS WHERE CLASS 100D WILL BE USED.
6. PIPES TO BE LAID ON CLASS B BEDDING.
7. SOFFITS OF INCREASED PIPE SIZE TO BE LAID AT THE SAME LEVEL IN THE DOWNSTREAM DIRECTION.
8. BACKFILL COMPACTED TO 98% MAASHTO DENSITY BELOW AREAS CARRYING TRAFFIC 90% MAASHTO DENSITY ELSEWHERE.
9. UNLESS OTHERWISE SPECIFIED ALL CONCRETE WORKS TO BE 30MPa.
10. WIDTHS FOR LAYERWORKS:

    THE SUBBASE SHALL EXTEND 150mm BEHIND THE BACK EDGE OF THE KERB. ALL SUBSEQUENT LAYERS SHALL BE STEPPED WITH 150mm INCREMENTS.

PRELIMINARY

(FOR DISCUSSION PURPOSES ONLY)

0 100

100 MILLIMETRES ON ORIGINAL DRAWING

(A) BEFORE CONTRACT COMMENCES

(A) AFTER CONTRACT HAS COMMENCED

Nr.	DATE	AMENDMENTS

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PROJECT

BONNIEVALE HOUSING:
BOEKENHOUTSKLOOF

DRAWING DESCRIPTION

ROADS & STORM WATER: DETAIL PLAN 2

DRAWING NO.

10438000-012

DESIGNED:	GRB		CHECKED:	GRB	
DRAWN:	GRB		SCALE:	AS SHOWN	A1
APPROVED:			DATE:	2018-08-15	
FILE PATH:	P:\Projects_George\10438000_Bonnievale Housing_Boekenhoutskloof\01 Inception\Draw\3-Working\				