



COUNTY GOVERNMENT OF KISUMU



KISUMU WATER AND SANITATION COMPANY LIMITED- KIWASCO



WATER SECTOR TRUST FUND

DEVELOPMENT OF THE WATER AND SANITATION SECTOR

Consulting Services to Develop Bankable Water and Sewerage Proposals for Water Service Providers for Commercial Financing: **Phase IV Lot2**

KISUMU WATER SUPPLY IMPROVEMENTS

AID ON DELIVERY- AOD PROJECT

Volume 3

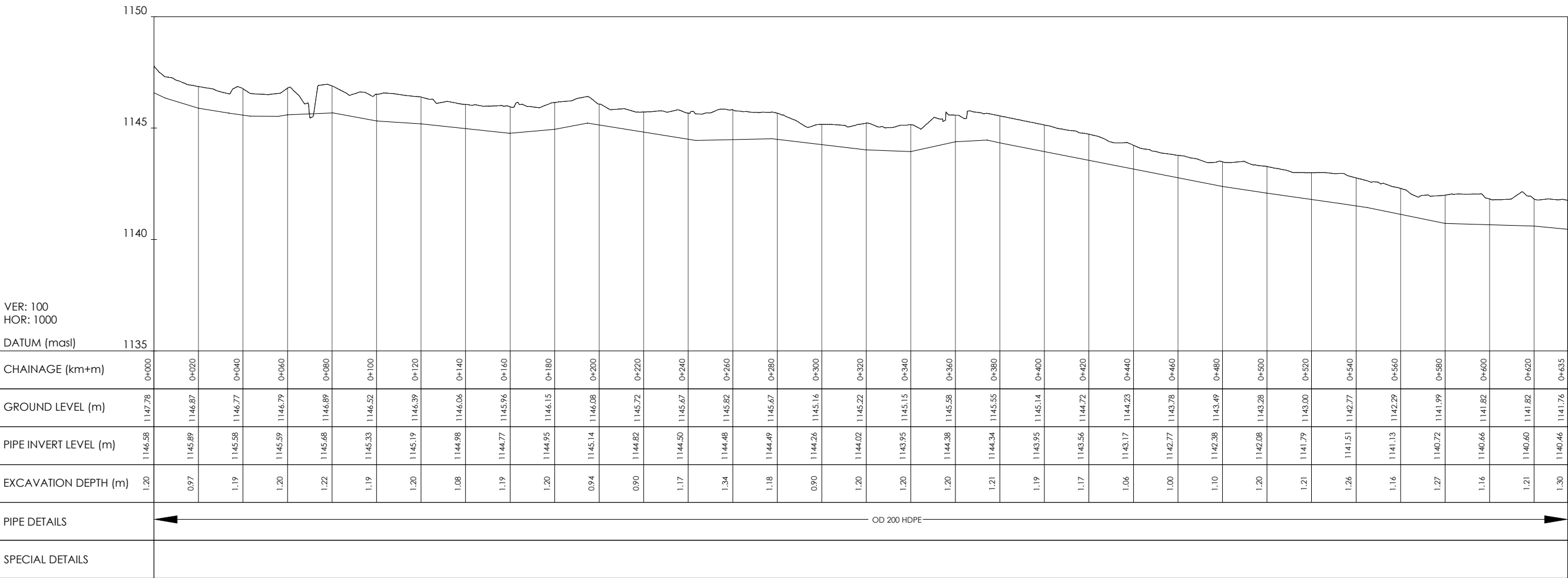
BOOK OF DRAWINGS



LAYOUT PLAN
SCALE 1:1000

- NOTES :**
1. VERTICAL EXAGGERATION IN PROFILE IS 10 TIMES THE HORIZONTAL SCALE.
 2. THIS DRAWING TO BE READ WITH ALL RELEVANT LAYOUTS PLAN AND STANDARD DRAWINGS
 3. PIPE ROUTE TO BE ALIGNED TO MATCH THE FINAL WAYLEAVE

- LEGEND :**
- PROPOSED WATER PIPE
 - KENHA BOUNDARY
 - NON RETURN VALVE (NRV)
 - PRESSURE REDUCING VALVE (PRV)
 - ISOLATING VALVE
 - AIR VALVE (AV)
 - WASHOUT (WO)
 - ZONAL METER
 - FIRE HYDRANT (FH)
 - BENCH MARK (BM)
 - HGL HYDRAULIC GRADE LINE
 - BUILDING



A1 - (1)-LONGITUDINAL PROFILE

REV	DESCRIPTION	DATE

KISUMU WATER AND SANITATION COMPANY

GERMAN DEVELOPMENT BANK

PROJECT:

KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

PLAN AND PROFILE
LINE A1

CONSULTANT:

Fifth Ngong, Avenue Office Suites,
Room T2, P.O Box 58438-00200
Nairobi, Kenya

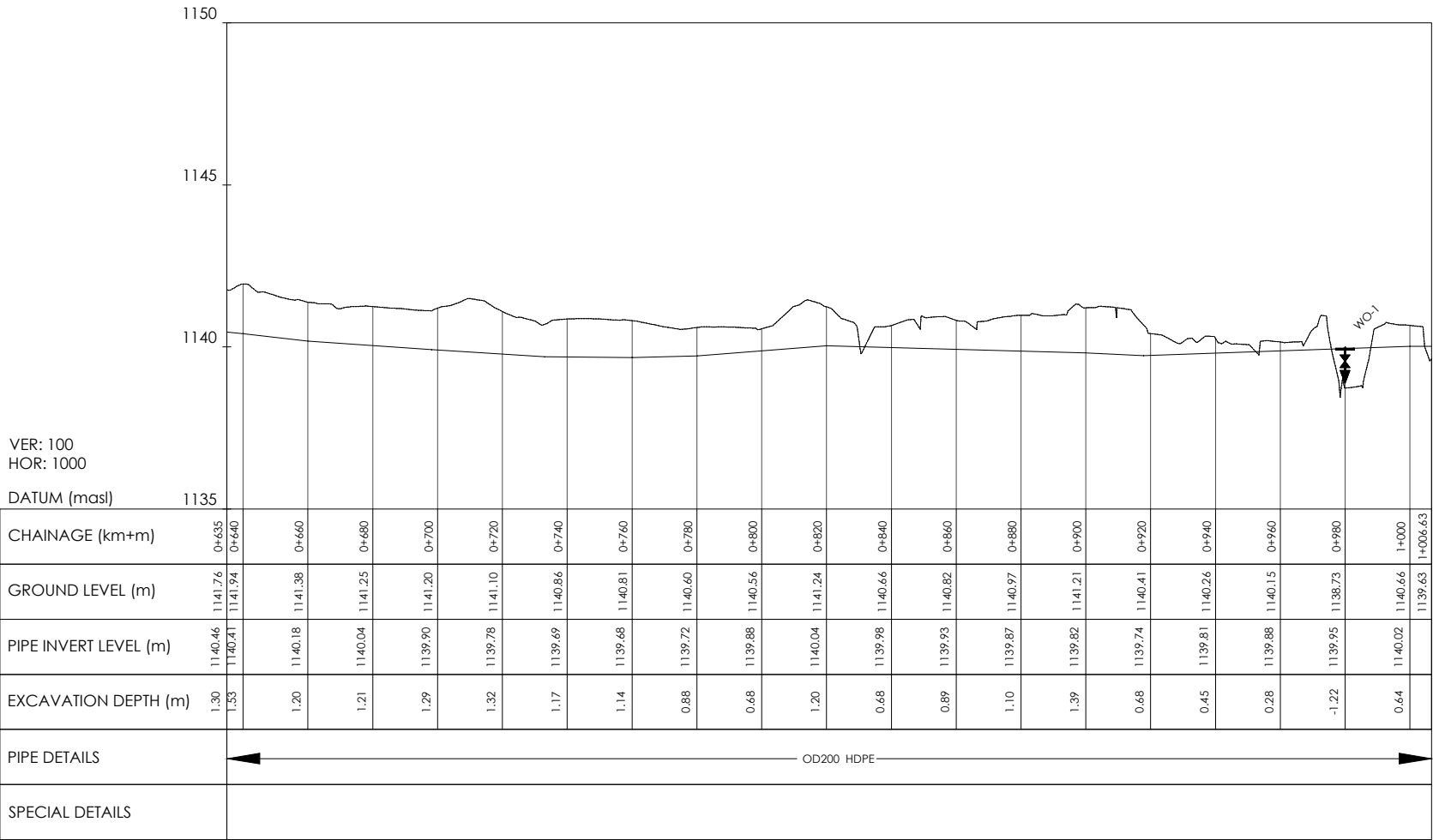
IN JOINT VENTURE WITH

Chabai Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET No:	1 OF 2
DRG No:	KSM/DS/A1/01	REV.	



LAYOUT PLAN
SCALE 1:1000



A1 - (1)-LONGITUDINAL PROFILE

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REV	DESCRIPTION	DATE


KISUMU WATER AND SANITATION COMPANY

 
GERMAN DEVELOPMENT BANK

PROJECT:
**KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT**

DETAILED DESIGN

DRAWING TITLE:
**PLAN AND PROFILE
LINE A1**

CONSULTANT:
 Fifth Ngong, Avenue Office Suites,
Room T2, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH
 Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET No:	2 OF 2
DRG No:	KSM/DS/A1/02	REV.	



LAYOUT PLAN
SCALE 1:1000

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 - ZONAL METER
 - FIRE HYDRANT (FH)
 - BENCH MARK (BM)
 - HGL HYDRAULIC GRADE LINE
 - BUILDING



A2-LONGITUDINAL PROFILE

ISSUED OF CONSTRUCTION	REV	DESCRIPTION	DATE
 KISUMU WATER AND SANITATION COMPANY			
 PROJECT: KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT			
 GERMAN DEVELOPMENT BANK			
DETAILED DESIGN			
DRAWING TITLE: PLAN AND PROFILE LINE A2			
CONSULTANT:  Fifth Ngong, Avenue Office Suites, Room 12, P.O Box 58438-00200 Nairobi, Kenya			
IN JOINT VENTURE WITH  Chalbi Drive 3734, Lavington, P.O. Box 49817-00100 Nairobi, Kenya			
DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET No:	3 OF 5
DRG No:	KSM/DS/A2/03	REV.	



LAYOUT PLAN
SCALE 1:1000



A2-LONGITUDINAL PROFILE

- NOTES :**
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 - ISOLATING VALVE
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 - WASHOUT (WO)
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 - BUILDING

REV	DESCRIPTION	DATE



KIWASCO
KISUMU WATER AND SANITATION COMPANY



GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE A2

CONSULTANT:

Fifth Ngong, Avenue Office Suites,
Room T2, P.O Box 58438-00200
Nairobi, Kenya

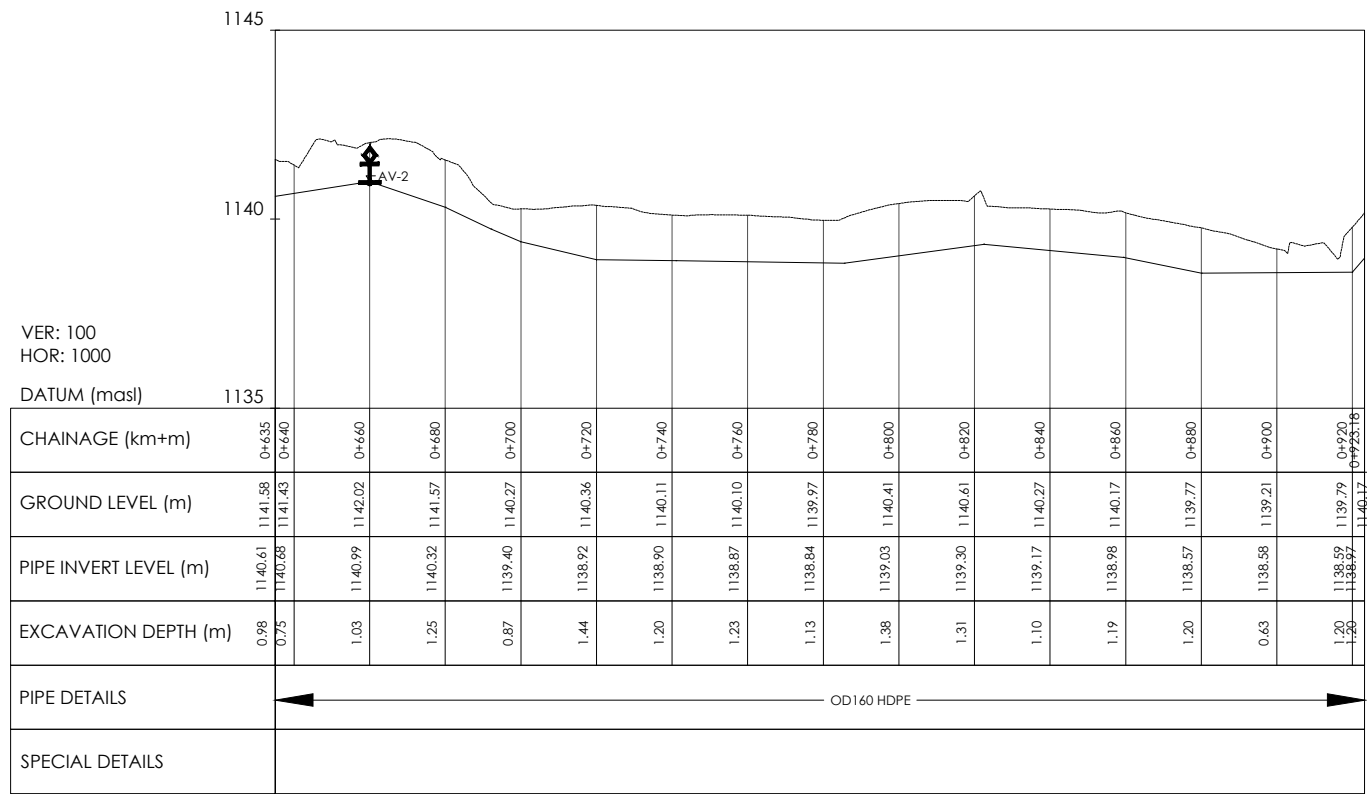
IN JOINT VENTURE WITH

Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET No:	5 OF 5
DRG No:	KSM/DS/A2/05	REV.	



LAYOUT PLAN
SCALE 1:1000



A3-LONGITUDINAL PROFILE

APPURTENANCE TABLE				
APPURTENANCE NAME	Y COORDINATES	X-COORDINATES	CHAINAGE	PIPE DIAMETER
AV-1	9987321.7	698896.4	1+680.00	DN180
AV-2	9985554.3	699713.1	0+660.00	DN160
WO-1	9988046.9	697467.3	0+980.00	DN200
WO-2	9987878.5	698262.3	0+800.00	DN180
WO-3	9985765.9	699653.3	0+440.00	DN160

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REV	DESCRIPTION	DATE


KISUMU WATER AND SANITATION COMPANY

 
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

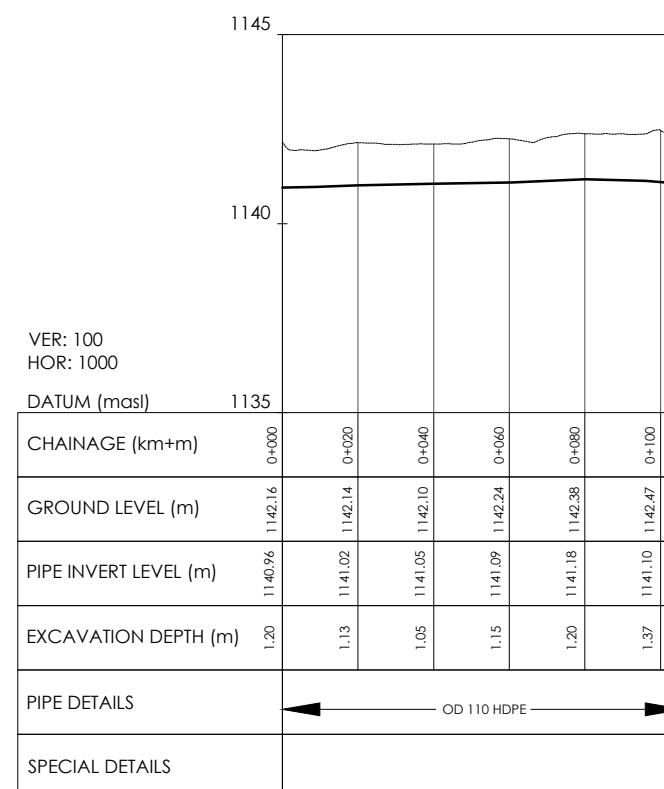
DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE A3

CONSULTANT:
 Fifth Ngong, Avenue Office Suites,
Room T2, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH
 Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

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SCALE: A3 SIZE: AS SHOWN	SHEET No: 2 OF 2
DRG No: KSM/DS/A3/02	REV.



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LEGEND :

	PROPOSED WATER PIPE
	NON RETURN VALVE (NRV)
	PRESSURE REDUCING VALVE (PRV)
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	AIR VALVE (AV)
	WASHOUT (WO)
	ZONAL METER
	FIRE HYDRANT (FH)
	BENCH MARK (BM)
	HGL
	HYDRAULIC GRADE LINE

	ISSUED OF CONSTRUCTION	
REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION
COMPANY



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AID PROJECT

DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE B1

CONSULTANT:

Design Master Plan

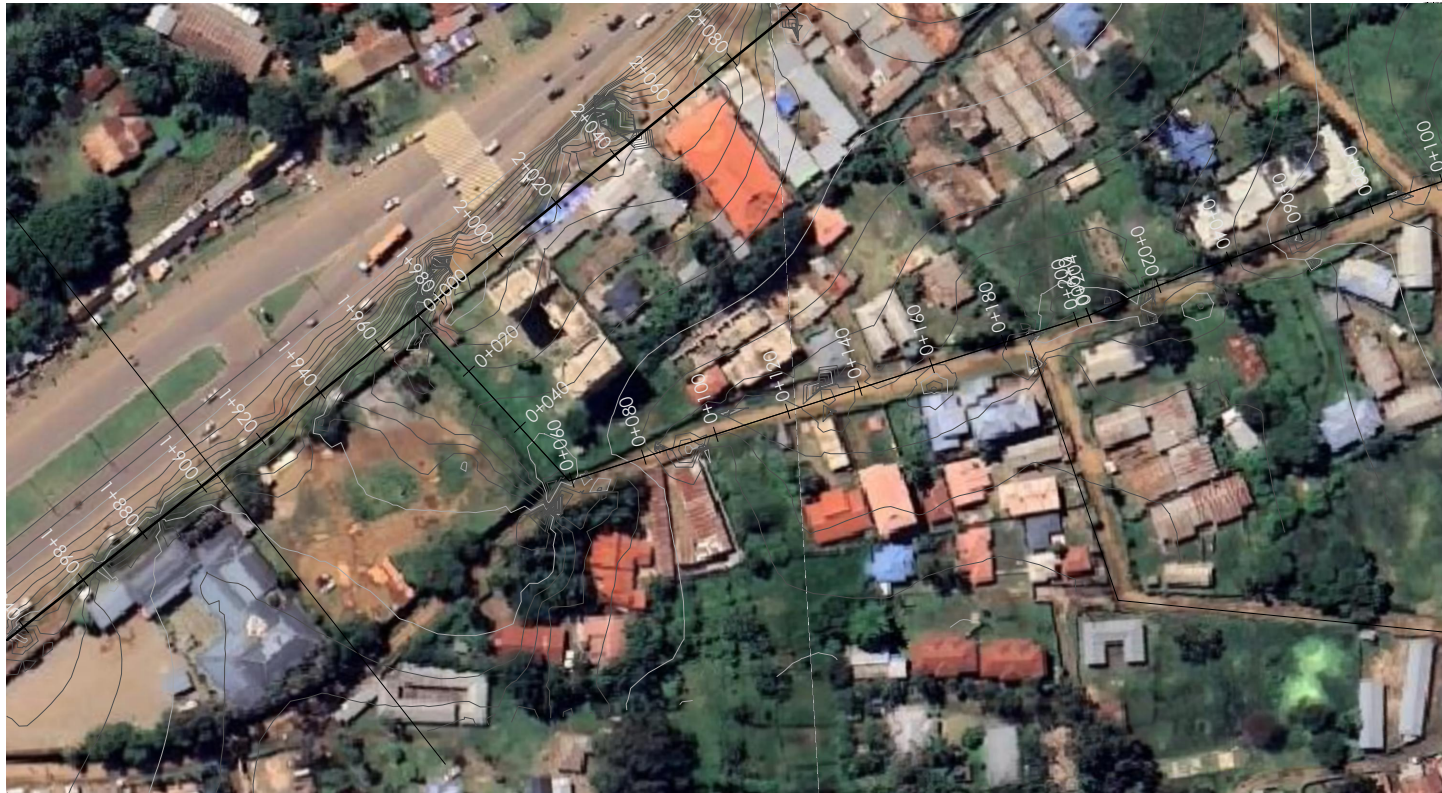
Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH

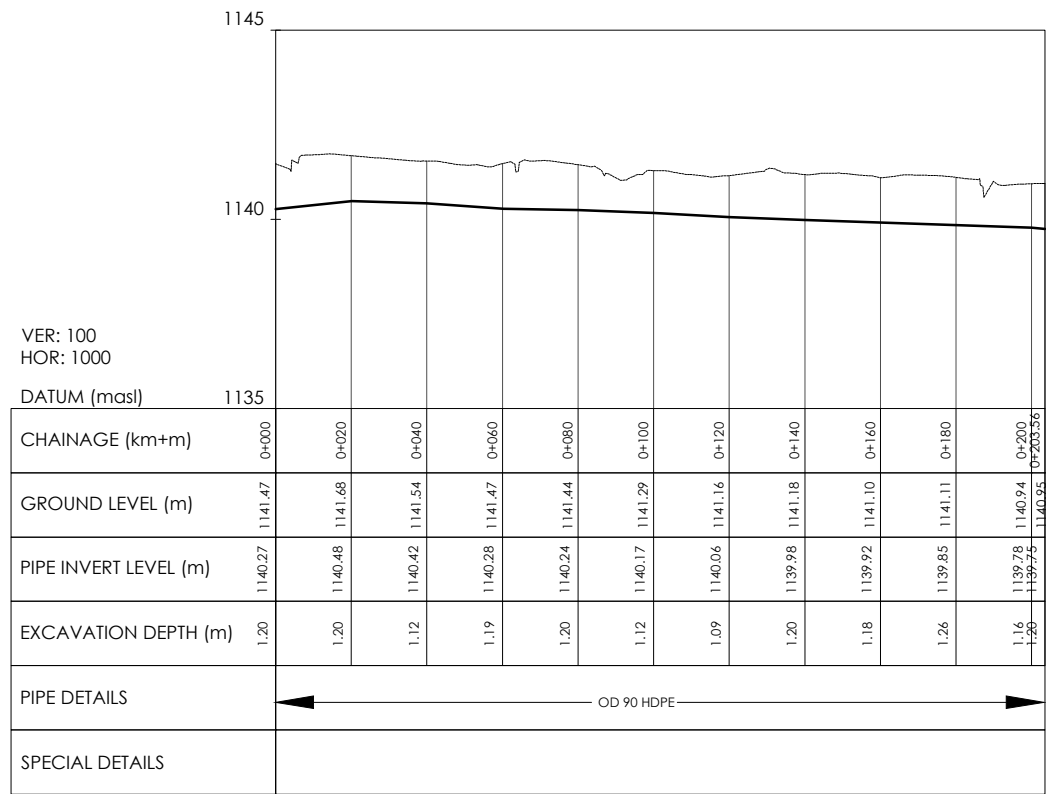
 **Gauff
Consultants
& Engineers**

Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET No:	1 OF 1
DRG No:	KSM/DS/B1/01		REV.



LAYOUT PLAN
SCALE 1:1000



C1-LONGITUDINAL PROFILE

NOTES :

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	FIRE HYDRANT (FH)
	BENCH MARK (BM)
	HGL

REV	DESCRIPTION	DATE


KISUMU WATER AND SANITATION COMPANY

 
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE C1

CONSULTANT:
 Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

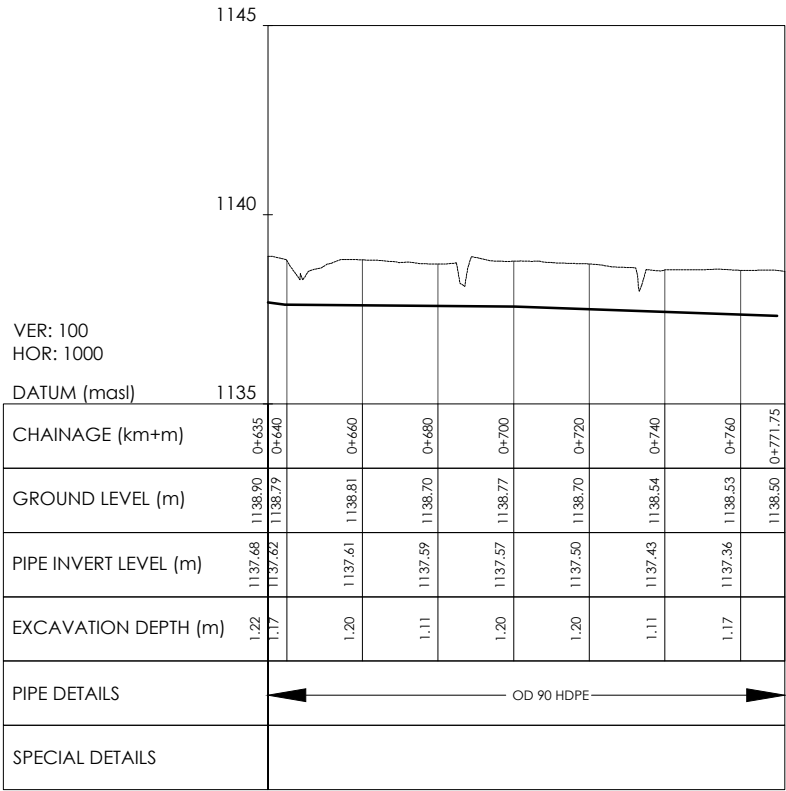
IN JOINT VENTURE WITH
 Chabisi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET NO:	1 OF 1
DRG No:	KSM/DS/C/1/01	REV.	

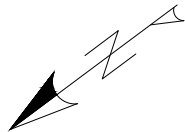




LAYOUT PLAN
SCALE 1:1000



C2-LONGITUDINAL PROFILE



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	ZONAL METER
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	BENCH MARK (BM)
HGL	HYDRAULIC GRADE LINE

ISSUED OF CONSTRUCTION		
REV	DESCRIPTION	DATE



KIWASCO
KISUMU WATER AND SANITATION COMPANY



WaterFund
Promoting the Water Sector



KfW
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE C2

CONSULTANT:


Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

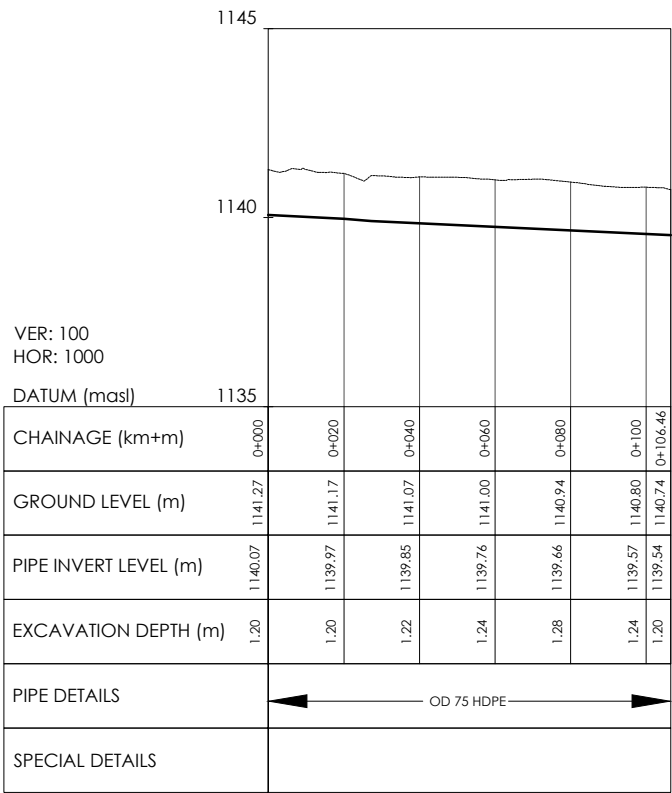
IN JOINT VENTURE WITH


Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
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SCALE:	A3 SIZE: AS SHOWN	SHEET No:	2 OF 2
DRG No:	KSM/DS/C2/02	REV.	



LAYOUT PLAN
SCALE 1:1000



D1-LONGITUDINAL PROFILE

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	FIRE HYDRANT (FH)
	BENCH MARK (BM)
HGL	HYDRAULIC GRADE LINE

ISSUED OF CONSTRUCTION		
REV	DESCRIPTION	DATE



KIWASCO
HydrusLife

KISUMU WATER AND SANITATION COMPANY



WaterFund
Powering the World's Water



KfW
GERMAN DEVELOPMENT BANK

PROJECT:

KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

PLAN AND PROFILE
LINE D1

CONSULTANT:



Design Master Plan
Powering the World's Water

Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH



Gauff Consultants Africa

Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

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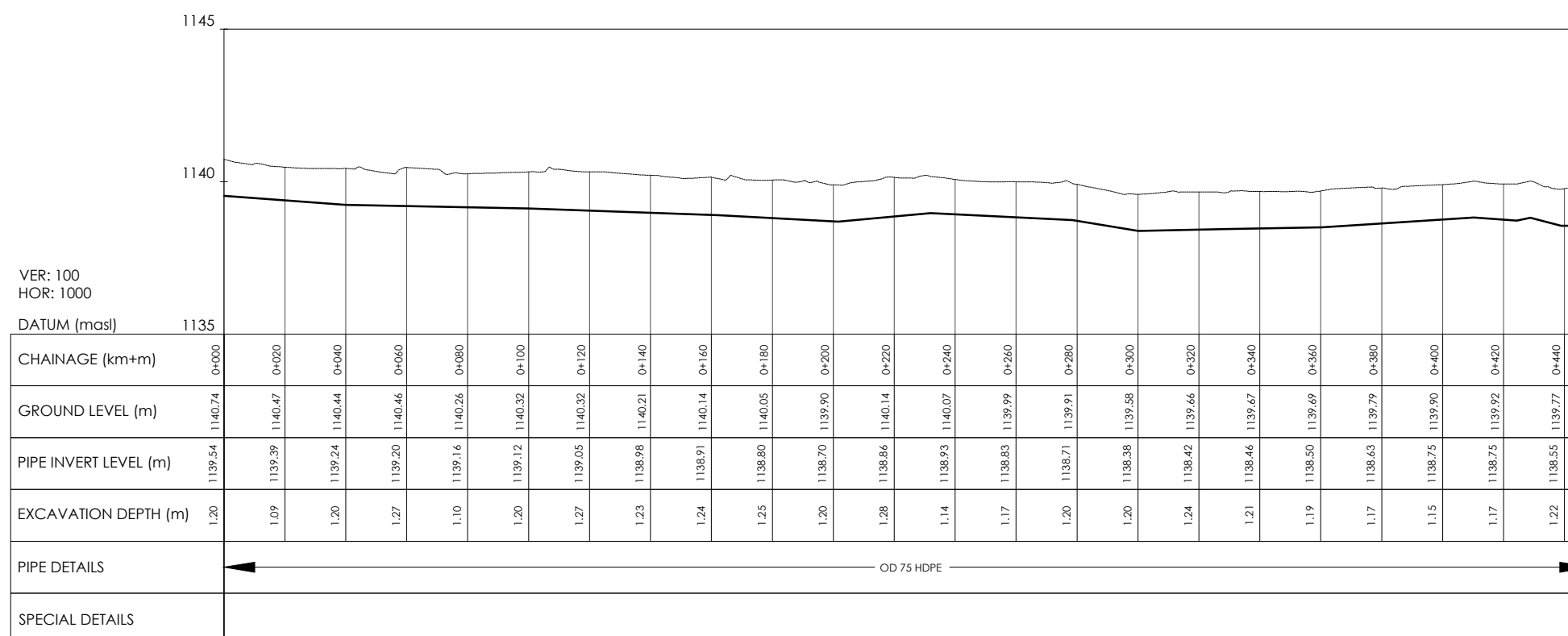


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D2-LONGITUDINAL PROFILE

	ISSUED OF CONSTRUCTION	
REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION
COMPANY



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AID PROJECT

DETAILED DESIGN

DRAWING TITLE:

PLAN AND PROFILE
LINE D2

CONSULTANT:

Design Master Plan

Fifth Ngong, Avenue Office Suite
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH

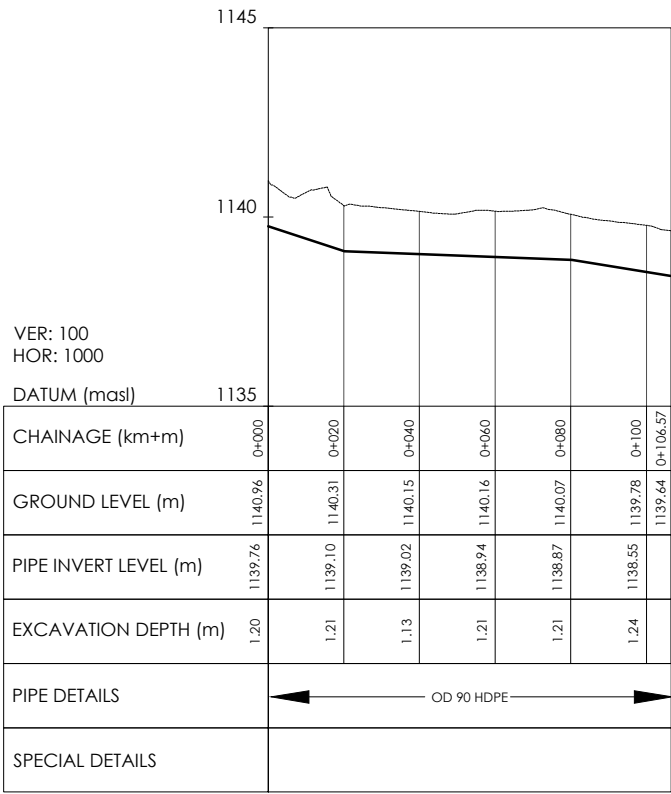
 **Gauff Consultants & Co.**

Chalbi Drive 3734, Lavington,
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Kenya

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DRG No:	KSM/DS/D2/01		REV.



LAYOUT PLAN
SCALE 1:1000



E1-LONGITUDINAL PROFILE

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ISSUED OF CONSTRUCTION		
REV	DESCRIPTION	DATE



KIWASCO
KISUMU WATER AND SANITATION COMPANY



WaterFund
Promoting the Water Sector



KfW
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE E1

CONSULTANT:


Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

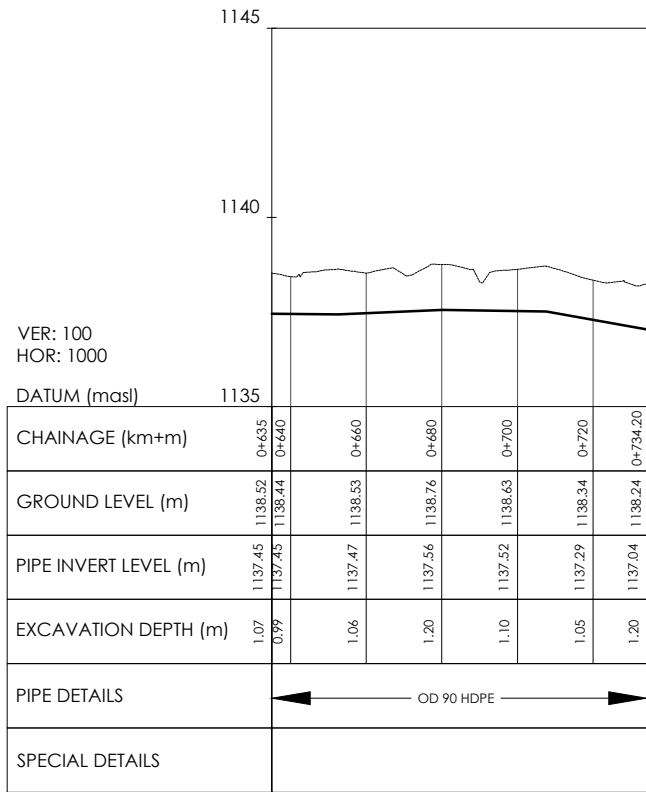
IN JOINT VENTURE WITH


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Kenya

DESIGNED BY:	JK	DRAWN BY:	MMG
CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: AS SHOWN	SHEET NO:	1 OF 1
DRG No:	KSM/DS/E1/01	REV.	



LAYOUT PLAN
SCALE 1:1000



E2-LONGITUDINAL PROFILE

NOTES :

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	AIR VALVE (AV)
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	BENCH MARK (BM)
HGL	HYDRAULIC GRADE LINE

ISSUED OF CONSTRUCTION		
REV	DESCRIPTION	DATE



KIWASCO
HydrusLife

KISUMU WATER AND SANITATION COMPANY



WaterFund
Powering the World's Water



KfW
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:
PLAN AND PROFILE
LINE E2

CONSULTANT:



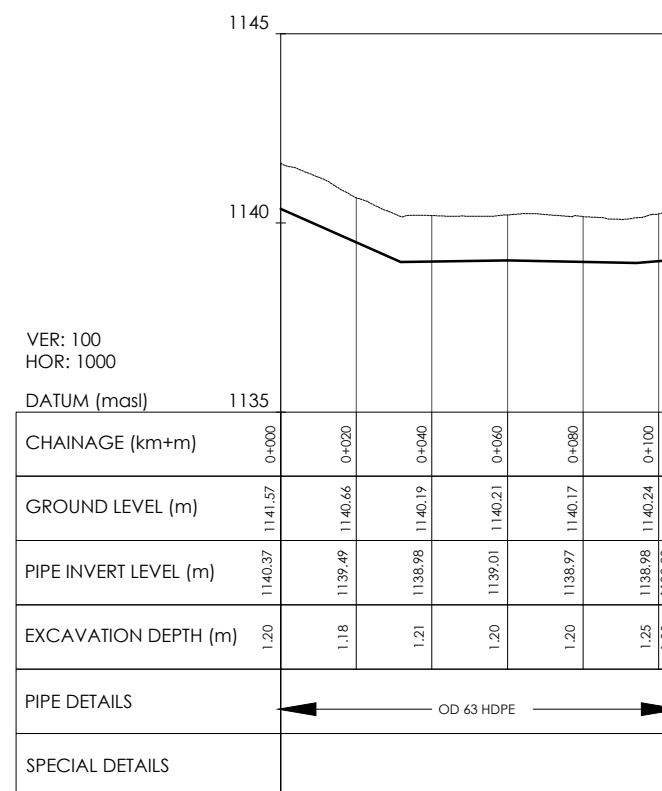
Design Master Plan
Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH



Gauß Consultants Africa
Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

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REV	DESCRIPTION	DATE



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

PLAN AND PROFILE
LINE F1

CONSULTANT:

Design Master Plan

Fifth Ngong, Avenue Office Suites,
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Nairobi, Kenya

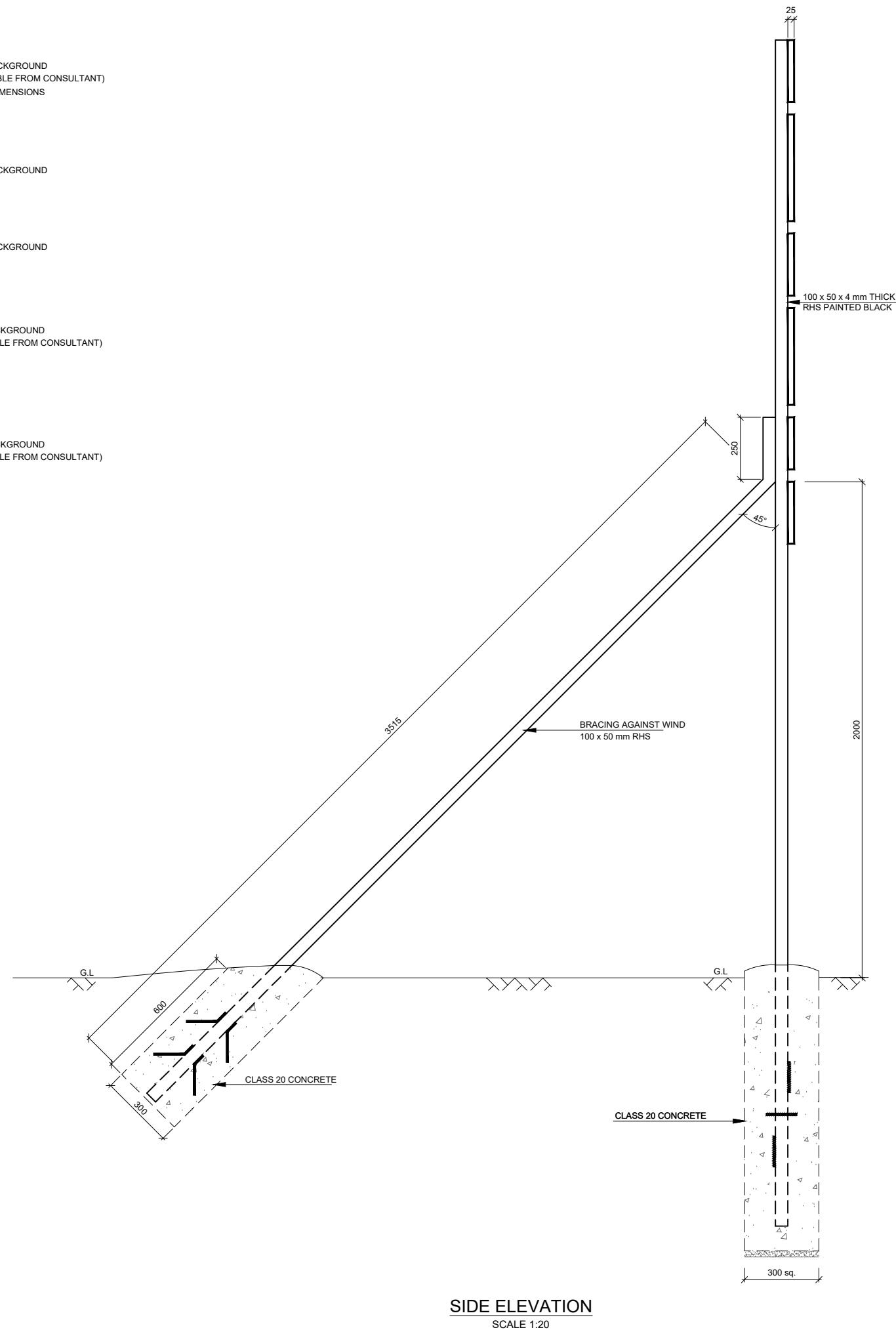
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 **Gauff Consultants Africa**

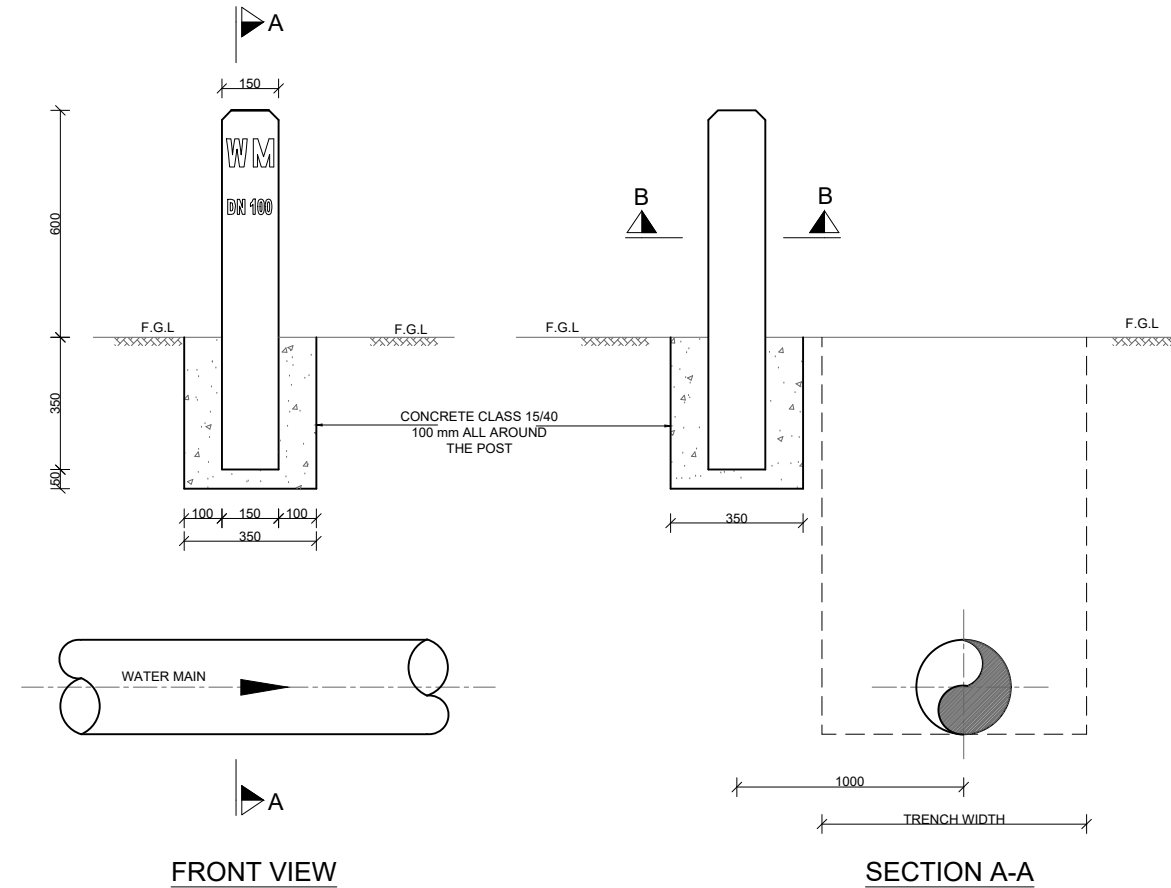
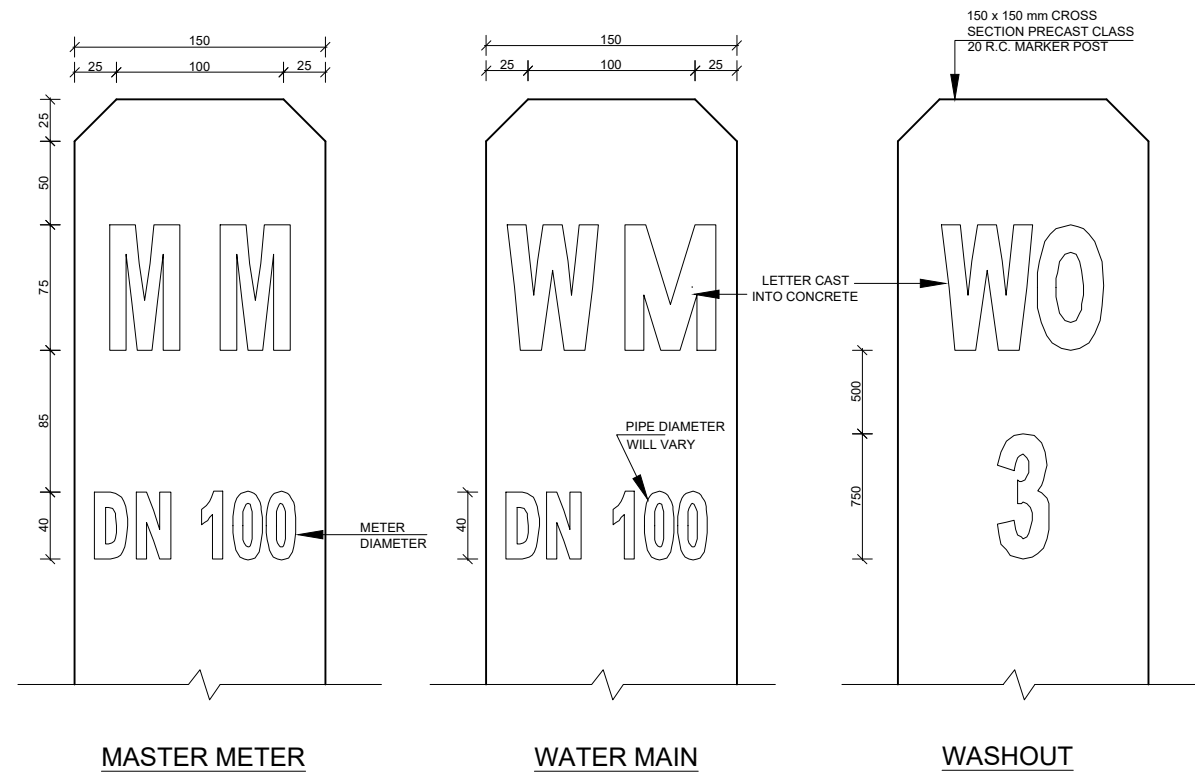
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CHECKED BY:	MG	DATE:	DEC 2024
SCALE:	A3 SIZE: A3 SHOWN	SHEET No:	1 OF 1
DRG No:	KSM/DS/F1/01		REV.

General Location			
1	KSM-GL-01	Project Overview Map	1 Sheet
Distribution System			
1	KSM-DS-GL	General Layout	1 Sheet
2	KSM-DS-A1	Line A1	2 Sheets
3	KSM-DS-A2	Line A2	5 Sheets
4	KSM-DS-A3	Line A3	2 Sheets
5	KSM-DS-B1	Line B1	1 Sheet
6	KSM-DS-C1	Line C1	1 Sheet
7	KSM-DS-C2	Line C2	2 Sheets
8	KSM-DS-D1	Line D1	1 Sheet
9	KSM-DS-D2	Line D2	1 Sheet
10	KSM-DS-E1	Line E1	1 Sheet
11	KSM-DS-E2	Line E2	2 Sheets
12	KSM-DS-F1	Line F1	1 Sheet
13	KSM-DS-G1	Line G1	1 Sheet
Standard Drawings			
1	KSM-SD-01	Signboard Details	1 Sheet
2	KSM-SD-02	Marker Post Details	1 Sheet
3	KSM-SD-03	Air Valve Details	1 Sheet
4	KSM-SD-04	Washout Details TYPE A	1 Sheet
	KSM-SD-04	Washout Details TYPE B	1 Sheet
5	KSM-SD-05	Fire Hydrant Details	1 Sheet
6	KSM-SD-06	Valve Surface Box Details	1 Sheet
7	KSM-SD-07	Valve Chamber Details	1 Sheet
8	KSM-SD-08	Bulk Meter Chamber for Turbine Meter	1 Sheet
9	KSM-SD-09	Consumer Connection details	1 Sheet
10	KSM-SD-10	Pipe Bedding Details	1 Sheet
11	KSM-SD-11	Tank Level Indicator,Ladder,Handrail and Step Iron Details	1 Sheet
12	KSM-SD-12	Access Road Details Concrete Paving Stones&Murram	2 Sheets
13	KSM-SD-13	Steel Elevated Tank 500m3	1 Sheets

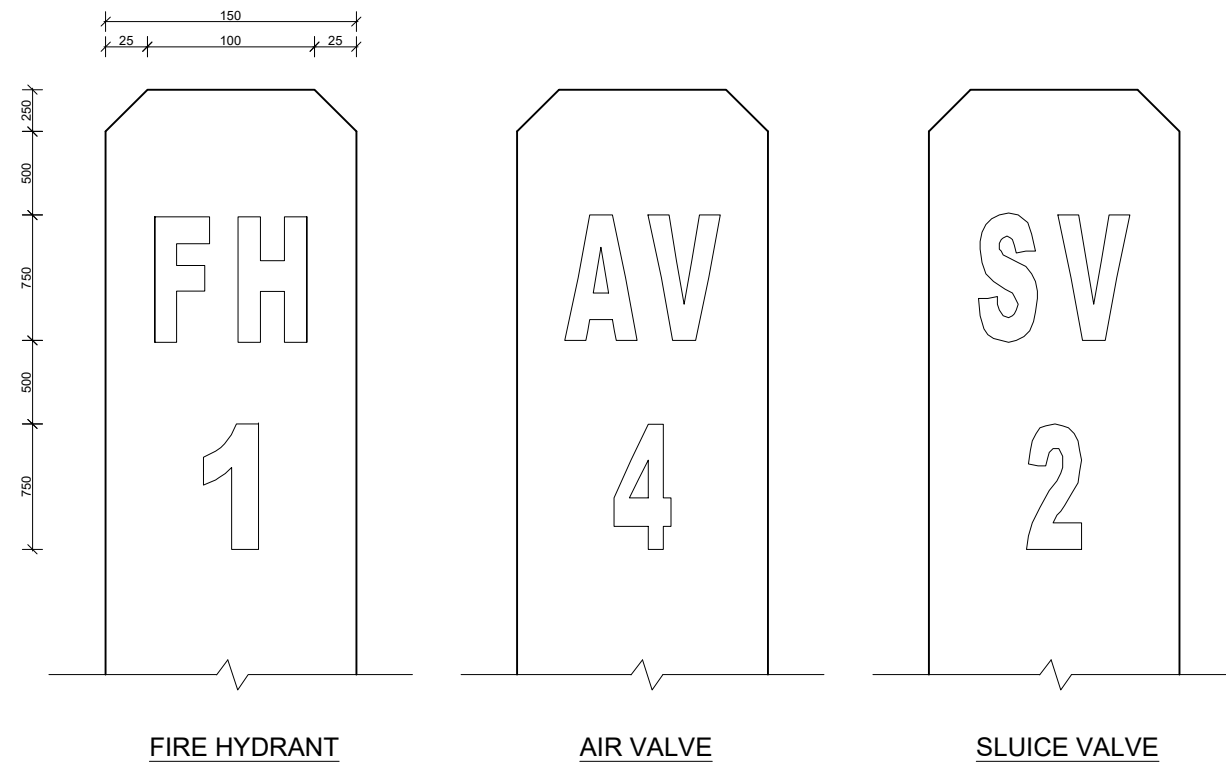


DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1
DRG No:	KSM/SD/01		REV.



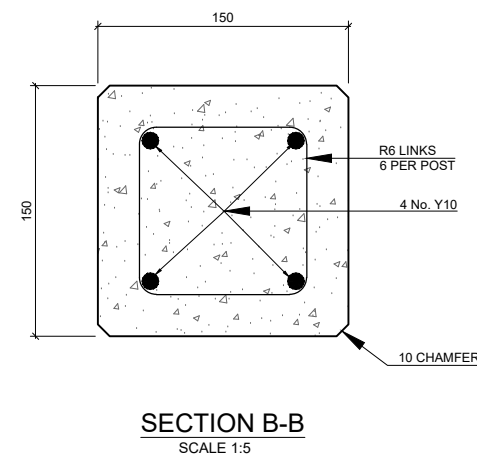
PIPELINE MARKER POST POSITION

SCALE 1:20



MARKER POST DETAILS

SCALE 1:5



BAR BENDING SCHEDULE			
BAR	No. OFF	TYPE	LENGTH
Y10	4	STRAIGHT	1000
R6	6		500

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE
 - THE RESPECTIVE INSCRIPTION TO BE MADE ONLY ON ONE FACE OF INDICATOR POST FACING THE ACCESS ROAD.
 - ALL STRUCTURAL CONCRETE TO BE CLASS 20 ALL OTHER CONCRETE TO BE CLASS 15.
 - INDICATOR POST TO BE PLACED AT ALL APPURTENANCE LOCATIONS, AND AT INTERVALS OF 250 m ALONG WATER MAINS.
 - LETTERS TO BE INSCRIBED ON INDICATOR POLES SHOULD FACE ACCESS ROAD AND READ AS FOLLOWS:
- | | |
|----|-------------------|
| AV | FOR AIR VALVE |
| SV | FOR SECTION VALVE |
| WO | FOR WASHOUT |
| FH | FOR FIRE HYDRANT |
| MM | FOR MASTER METER |
| WM | FOR WATER MAIN |

REV	DESCRIPTION	DATE

KISUMU WATER AND SANITATION COMPANY

GERMAN DEVELOPMENT BANK

PROJECT:

KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

GENERAL DRAWINGS
MARKER POST DETAILS

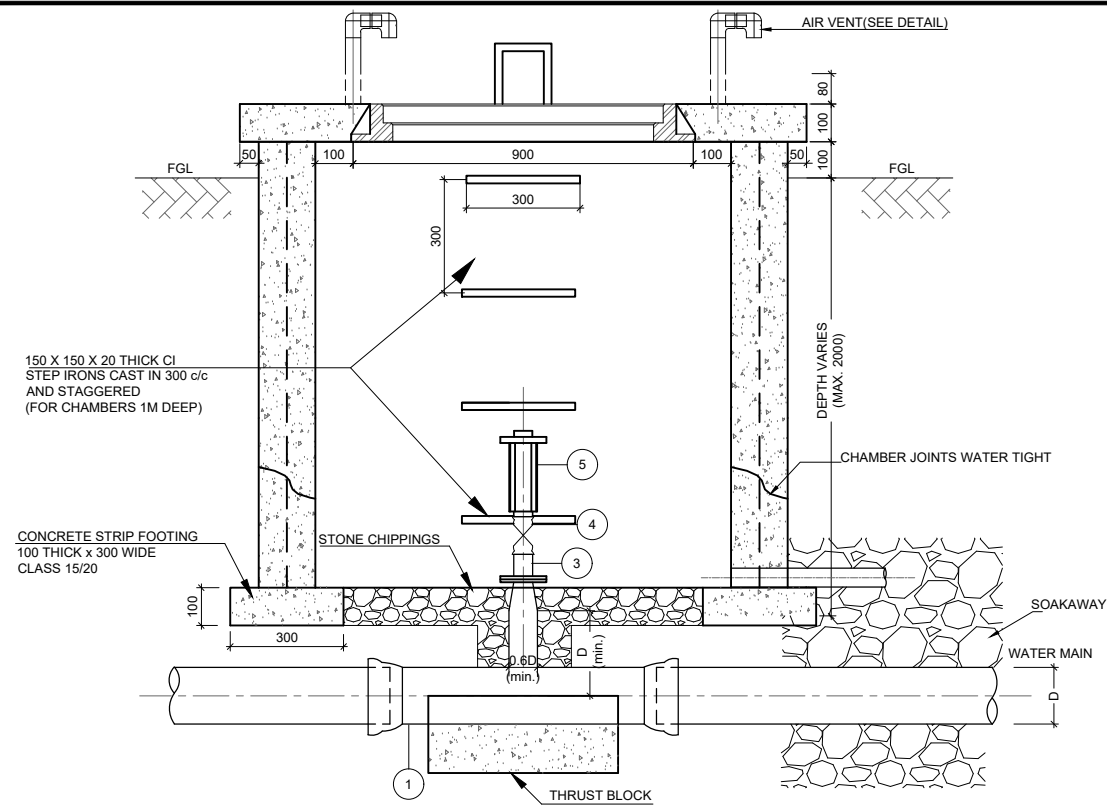
CONSULTANT:

Fifth Ngong, Avenue Office Suites, Room 12, P.O Box 58438-00200 Nairobi, Kenya

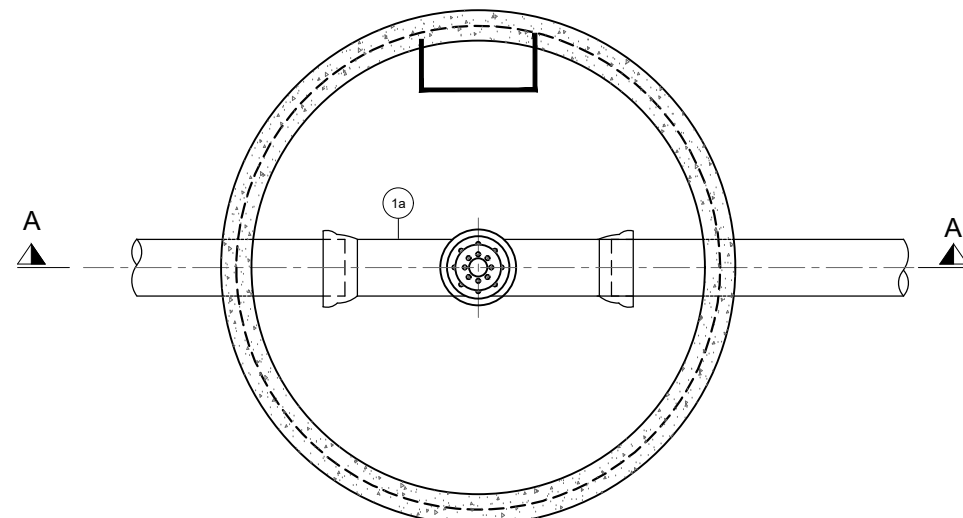
IN JOINT VENTURE WITH

Chalbi Drive 3734, Lavington, P.O. Box 49817-00100 Nairobi, Kenya

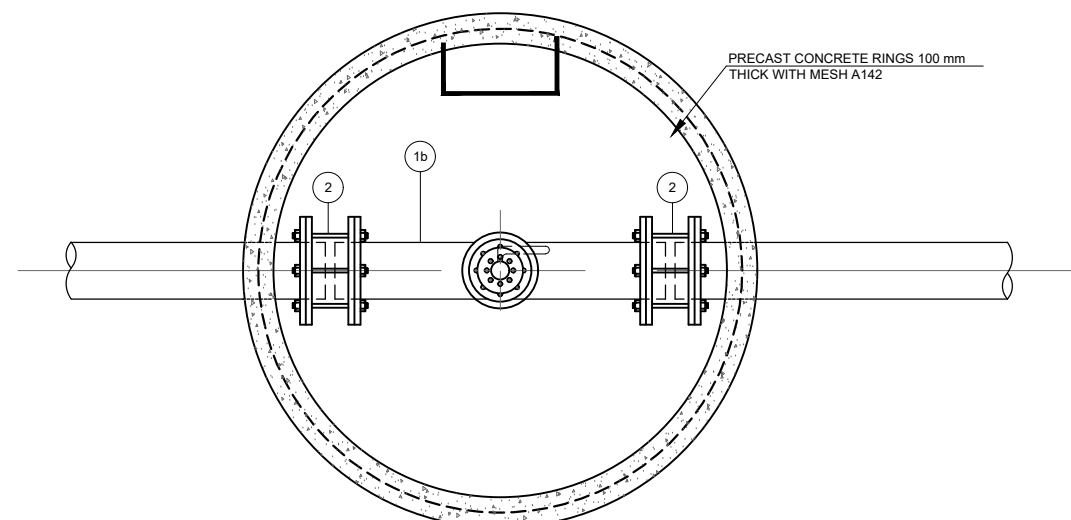
DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1
DRG No:	KSM/SD/02	REV:	



SECTION A - A
SCALE 1:20



PLAN
(Proposed Pipeline)
SCALE 1:20

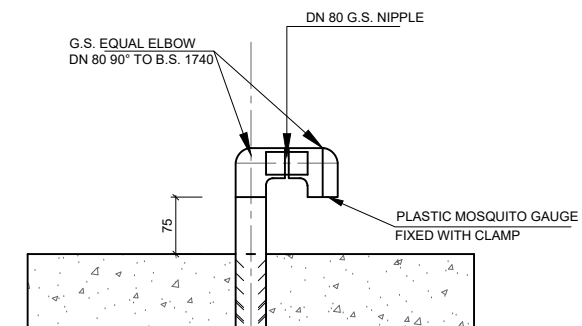


PLAN
(Existing Pipeline)
SCALE 1:20

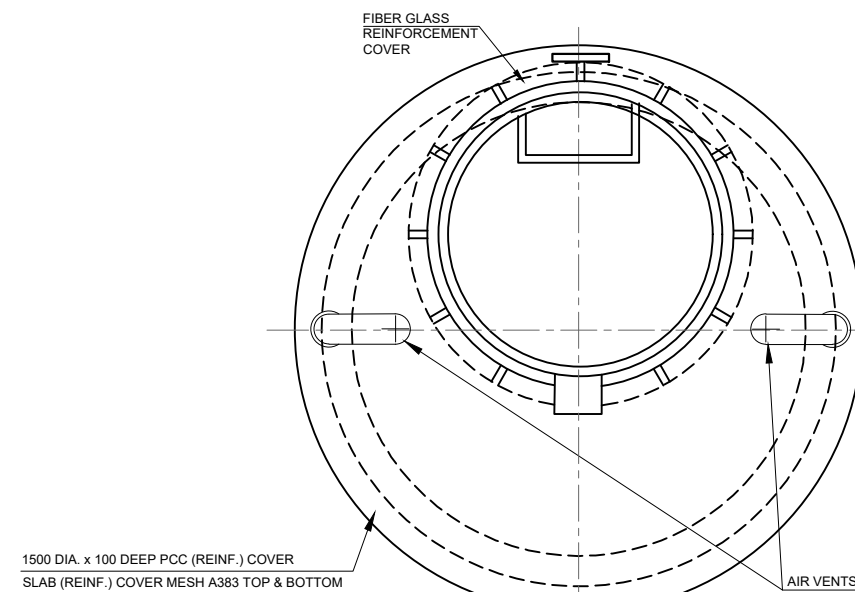
SCHEDULE OF PIPEWORK & FITTINGS (DN 25 & 50)

ITEM	DESCRIPTION	DIAMETER	No.
1a	SOCKETED TEE WITH FLANGED BRANCH (NEW PIPELINES) *	D/0.6D (min.)	1
1b	PLAIN ENDED TEE WITH FLANGED BRANCH (EXISTING PIPELINE) **	D/0.6D (min.)	1
2	STEPPED COUPLING TO SUIT EXISTING PIPELINES **	D	2
3	THREADED AIR VALVE FLANGE ADAPTOR PIECE	0.6D/50(or 25)	1
4	FEMALE THREADED STOP COCK/ISOLATOR	50(or 25)	1
5	THREADED ANTI-SHOCK ANTI-SURGE AIR VALVE	50(or 25)	1

* Proposed



DETAILS OF AIR VENT IN CHAMBER
SCALE 1:10



PLAN OF CHAMBER
SCALE 1:20

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED
- EXCEPT WHERE NOTED OTHERWISE, CONCRETE CLASS: BASES AND BEAMS = 25/20 LEAN CONCRETE = 15/20
- ENSURE THAT THE SURFACE AREA OF THE VENT HOLES ARE LARGER THAN THAT OF THE AIR VALVE

LEGEND:

FGL FINISHED GROUND LEVEL

REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION COMPANY



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

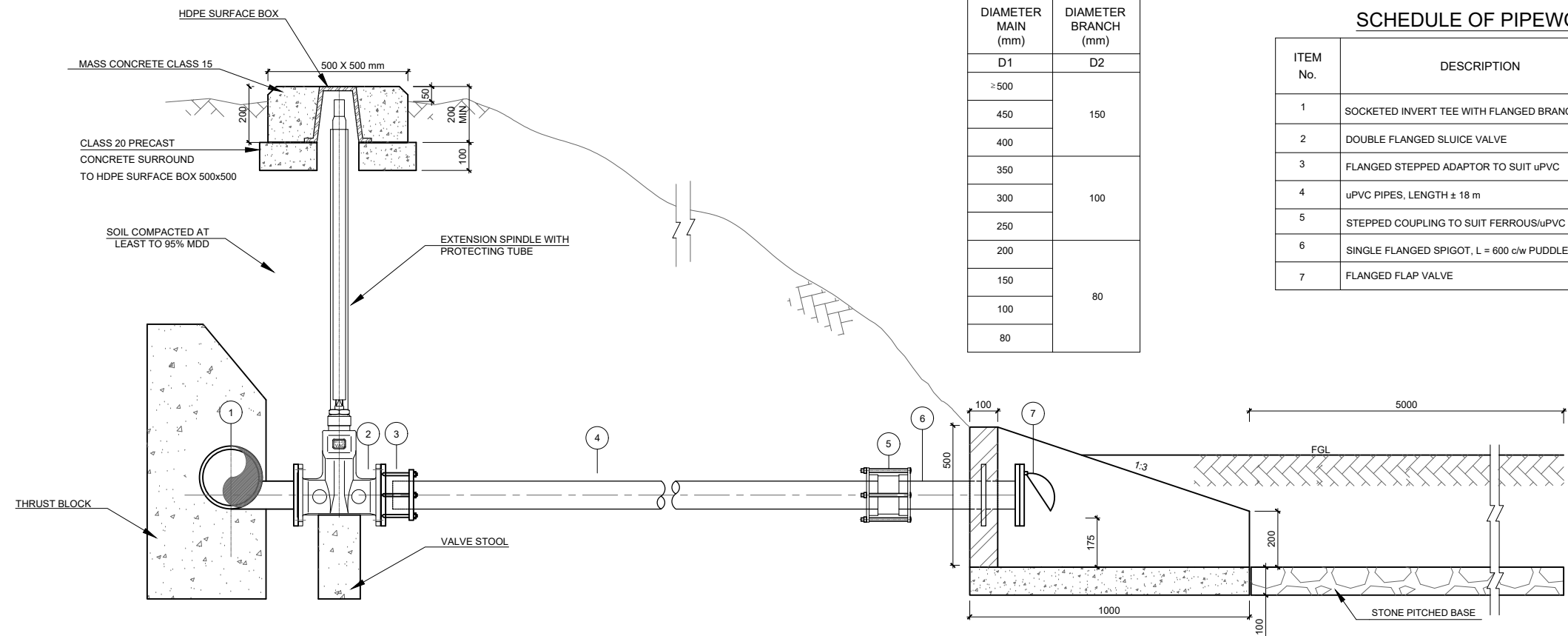
DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS
AIR VALVE DETAILS
(DN 25 AND DN 50)

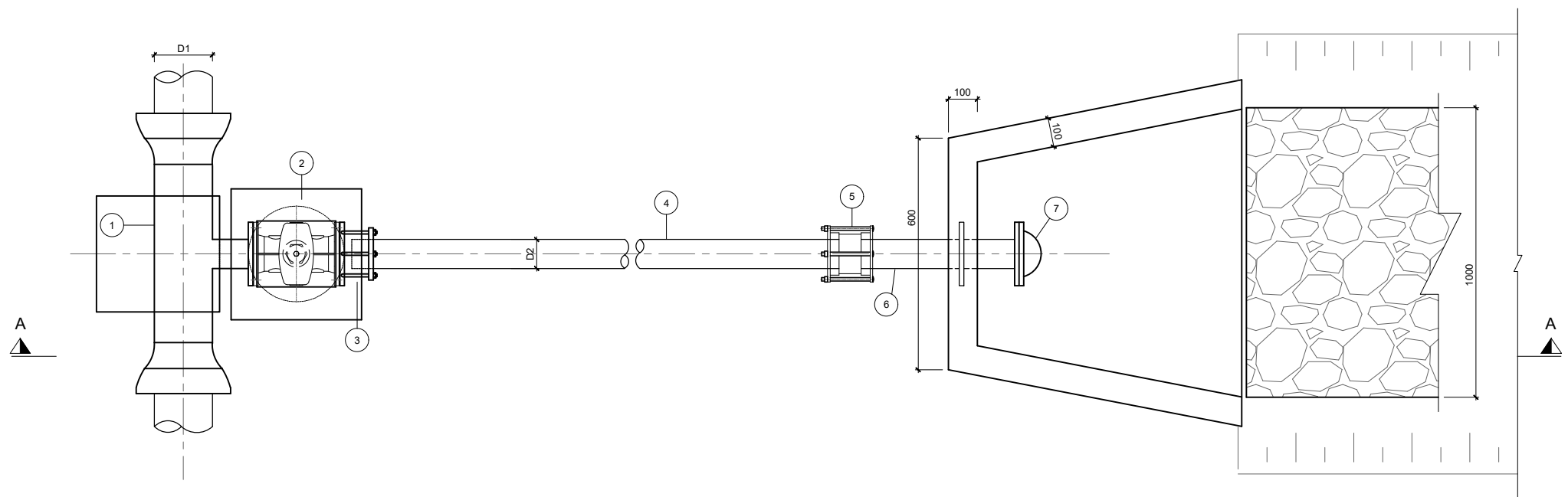
CONSULTANT:
Design Master Plan
Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH
Gouff Consultants Africa
Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1
DRG No:	KSM/SD/03	REV.	



SECTION A-A
SCALE 1:20



PLAN-WASHOUT TYPE A
SCALE 1:20

SCHEDULE OF WASHOUTS

DIAMETER MAIN (mm)	DIAMETER BRANCH (mm)
D1	D2
≥ 500	150
450	
400	
350	100
300	
250	
200	80
150	
100	
80	

SCHEDULE OF PIPEWORK & FITTINGS

ITEM No.	DESCRIPTION	DIAMETER	No.
1	SOCKETED INVERT TEE WITH FLANGED BRANCH	D1/D2	1
2	DOUBLE FLANGED SLUICE VALVE	D2	1
3	FLANGED STEPPED ADAPTOR TO SUIT uPVC	D2	1
4	uPVC PIPES, LENGTH ± 18 m	D2	-
5	STEPPED COUPLING TO SUIT FERROUS/uPVC	D2	1
6	SINGLE FLANGED SPIGOT, L = 600 c/w PUDDLE FLANGE	D2	1
7	FLANGED FLAP VALVE	D2	1

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE
- EXCEPT WHERE NOTED OTHERWISE, CONCRETE CLASS:
BASES AND BEAMS = 25/20
LEAN CONCRETE = 15/20

LEGEND:

FGL FINISHED GROUND LEVEL

REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION COMPANY




PROJECT:
KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT

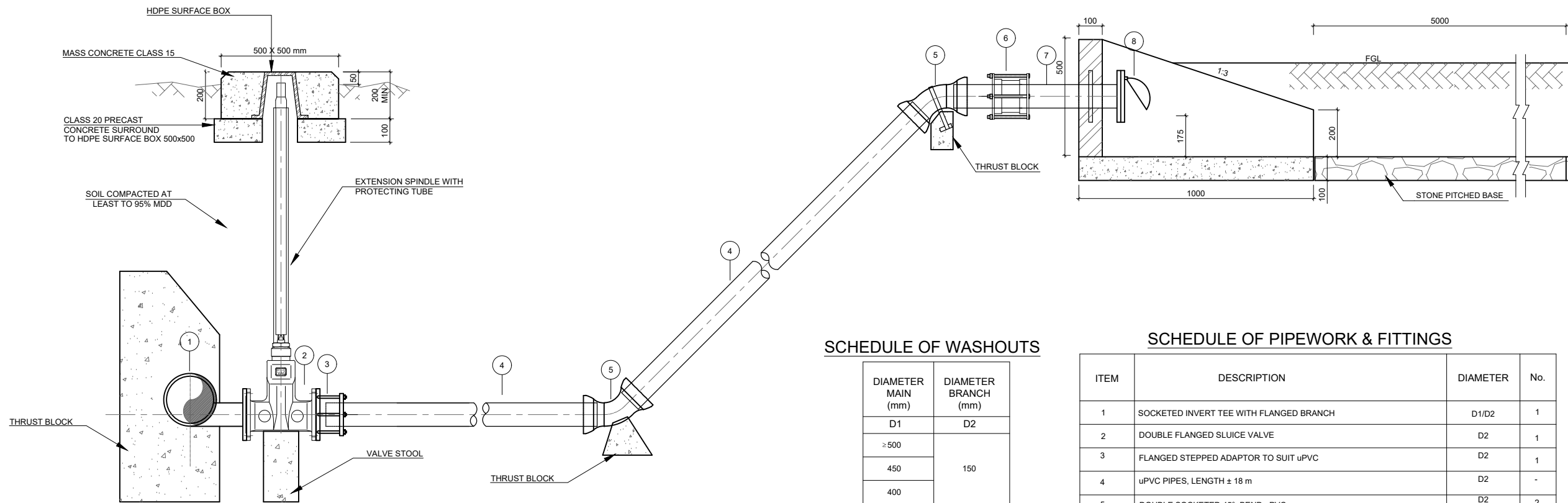
DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS WASHOUT DETAILS (TYPE A)

CONSULTANT:
Design Master Plan
Fifth Ngong, Avenue Office Suites, Room 12, P.O Box 58438-00200 Nairobi, Kenya

IN JOINT VENTURE WITH
Gauff Consultants Africa
Chalbi Drive 3734, Lavington, P.O. Box 49817-00100 Nairobi, Kenya

DESIGNED BY: M.G	DRAWN BY: G.M
CHECKED BY: J.K	DATE: DEC. 2024
SCALE: A3 SIZE:	SHEET No: 1 OF 2
DRG No: KSM/SD/04	REV:



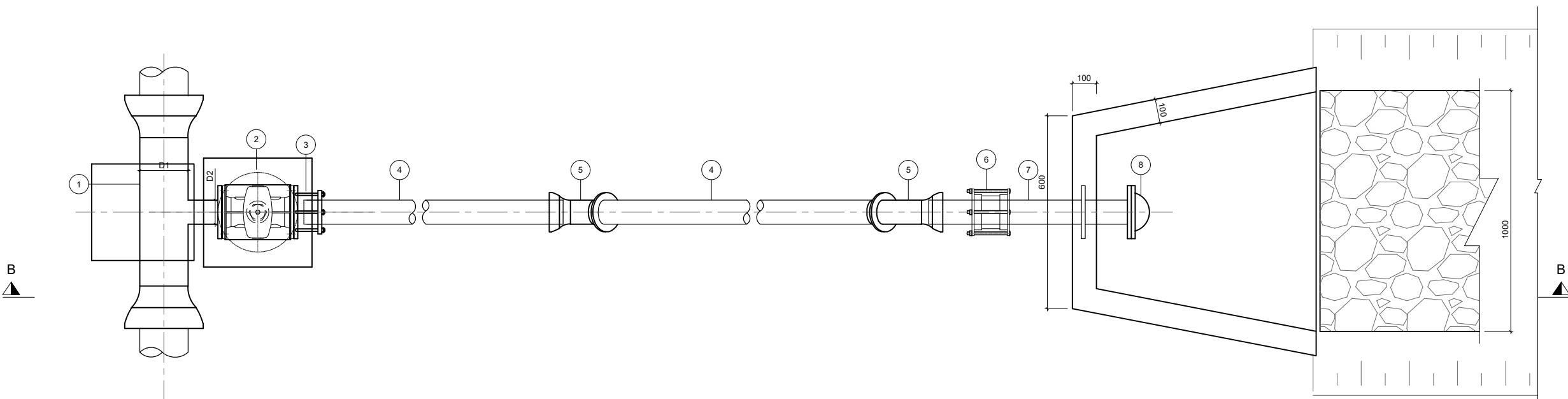
SECTION B - B
SCALE 1:20

SCHEDULE OF WASHOUTS

DIAMETER MAIN (mm)	DIAMETER BRANCH (mm)
D1	D2
≥ 500	
450	150
400	
350	
300	100
250	
200	
150	80
100	
80	

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	DIAMETER	No.
1	SOCKETED INVERT TEE WITH FLANGED BRANCH	D1/D2	1
2	DOUBLE FLANGED SLUICE VALVE	D2	1
3	FLANGED STEPPED ADAPTOR TO SUIT uPVC	D2	1
4	uPVC PIPES, LENGTH ± 18 m	D2	-
5	DOUBLE SOCKETED 45° BEND uPVC	D2	2
6	STEPPED COUPLING TO SUIT FERROUS/uPVC	D2	1
7	SINGLE FLANGED SPIGOT, L = 600 c/w PUDDLE FLANGE	D2	1
8	FLANGED FLAP VALVE	D2	1



PLAN-WASHOUT TYPE B
SCALE 1:20

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
- EXCEPT WHERE NOTED OTHERWISE, CONCRETE CLASS:
BASES & BEAMS = 25/20
LEAN CONCRETE = 15/20
- THE TYPE OF WASHOUT TO BE CONFIRMED ON SITE AS DIRECTED BY THE ENGINEER.

LEGEND:

FGL FINISHED GROUND LEVEL

REV	DESCRIPTION	DATE



KIWASCO
KISUMU WATER AND SANITATION COMPANY




PROJECT:
KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT

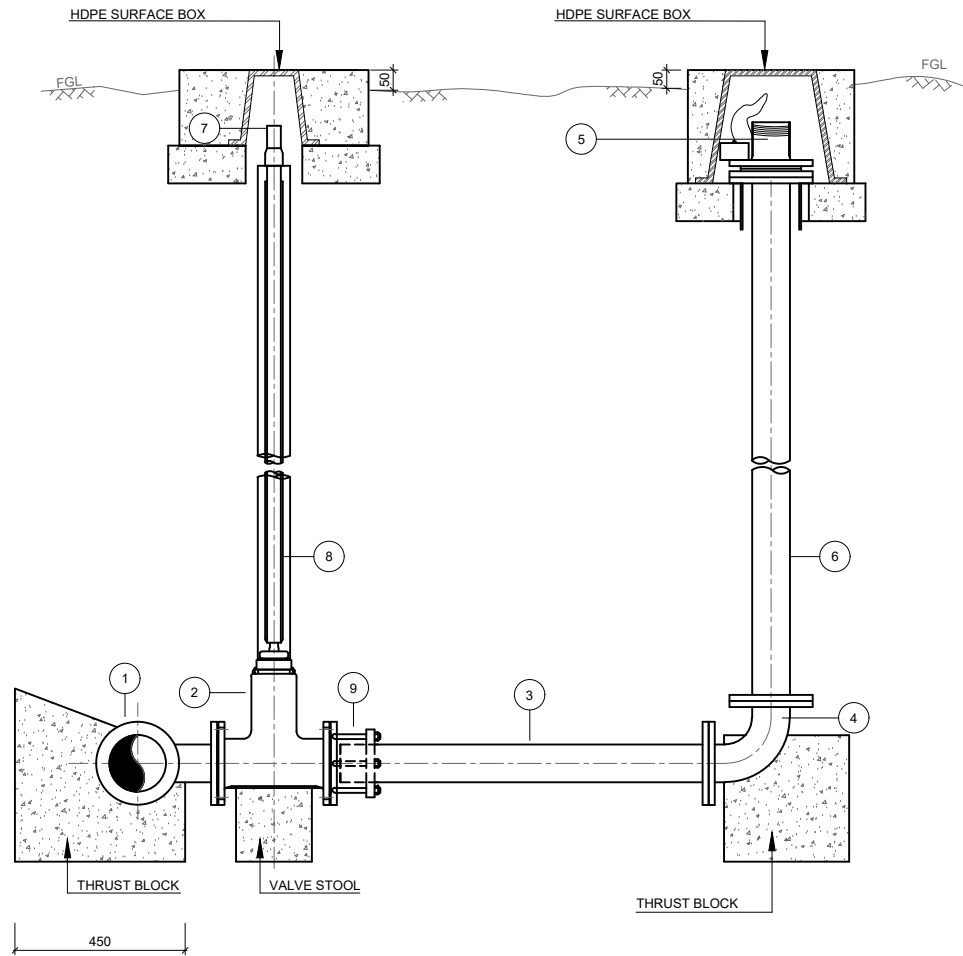
DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS WASHOUT DETAILS (TYPE B)

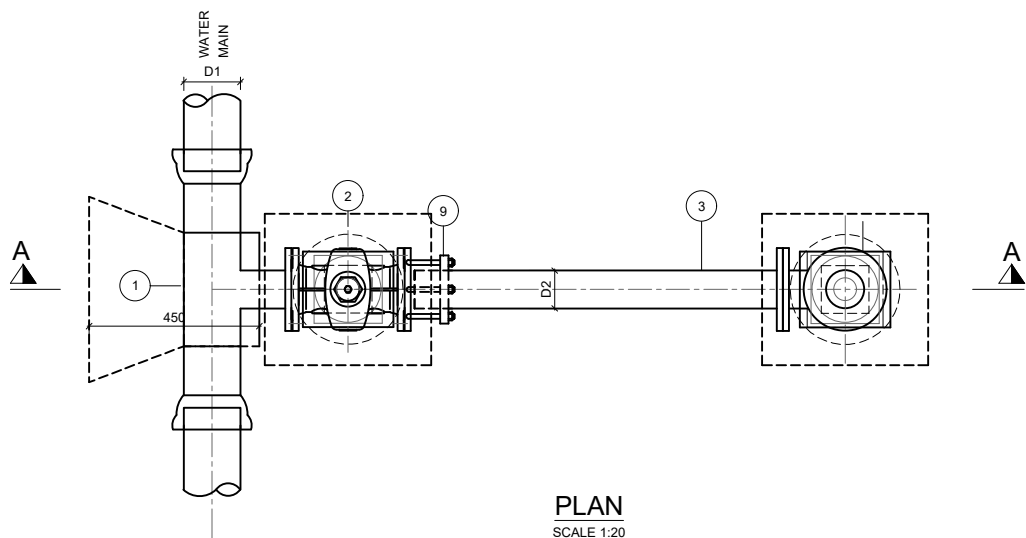
CONSULTANT:
Design Master Plan
Fifth Ngong, Avenue Office Suites, Room 12, P.O Box 58438-00200 Nairobi, Kenya

IN JOINT VENTURE WITH
Gauff Consultants Africa
Chalbi Drive 3734, Lavington, P.O. Box 49817-00100 Nairobi, Kenya

DESIGNED BY: M.G	DRAWN BY: G.M
CHECKED BY: J.K	DATE: DEC. 2024
SCALE: A3 SIZE:	SHEET No: 2 OF 2
DRG No: KSM/SD/04	REV:



SECTION A - A
SCALE 1:20



PLAN
SCALE 1:20

SCHEDULE OF PIPEWORK & FITTINGS PER HYDRANT

ITEM	DESCRIPTION	DIAMETER	QTY.
1	SOCKETED TEE WITH FLANGED BRANCH	D1/D2	1
2	FLANGED GATE VALVE	D2	1
3	SINGLE FLANGED PIPE PIECE , LENGTH = 1m TO 2m	D2	1
4	FLANGED BEND, LONG RADIUS 90°	D2	1
5	FLANGED HYDRANT WITH CAP	D2	1
6	DOUBLE FLANGED PIPE PIECE LENGTH NOT EXCEEDING 1m	D2	1
7	SPINDLE CAP	-	1
8	EXTENSION SPINDLE AND PROTECTING TUBE	-	1
9	FLANGE ADAPTOR	D2	1

SCHEDULE OF FIRE HYDRANT

DIAMETER MAIN (mm)	DIAMETER HYDRANT (mm)
D1	D2
300	80
250	
200	
150	
100	50
80	

NOTES :

- TOP OF SLUCE VALVE SPINDLE CAP TO BE A MINIMUM DISTANCE OF 150 mm BELOW TOP OF SURFACE BOX.
- HYDRANTS TO BE LOCATED ON WATER MAINS ABOVE 150 mm DIA. AS DIRECTED BY THE ENGINEER.
- HYDRANT TO SSRN No. 509 TYPE OR EQUIVALENT AND TO BE APPROVED BY LOCAL AUTHORITY.

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH OTHER LAYOUT DRAWINGS.
- CONCRETE CLASS:
BASES AND BEAMS = 25/20
LEAN CONCRETE = 15/20

LEGEND:

FGL - FINISHED GROUND LEVEL

REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION COMPANY



GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

GENERAL DRAWINGS
FIRE HYDRANT DETAILS

CONSULTANT:

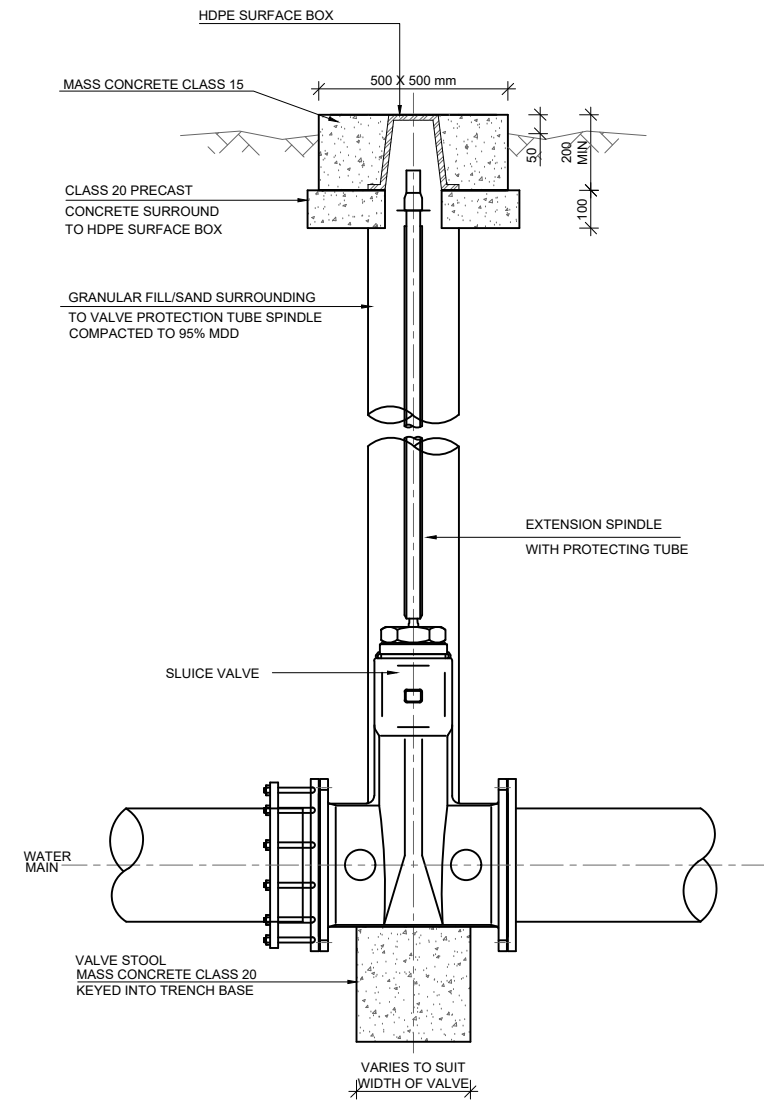

Fifth Ngong. Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH

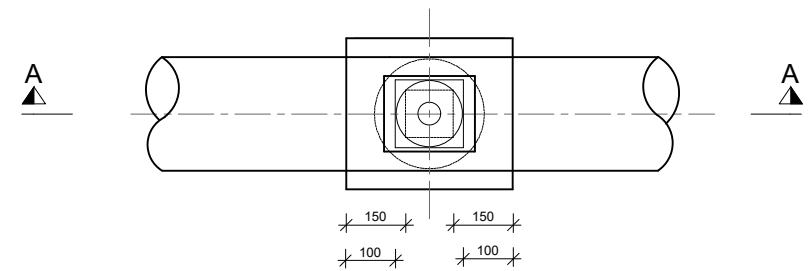

Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY: M.G
CHECKED BY: J.K
SCALE: A3 SIZE:
DRG No: KSM/SD/05

DRAWN BY: G.M
DATE: DEC. 2024
SHEET No: 1 OF 1
REV:



SECTION A - A
SCALE 1:20



PLAN VIEW
SCALE 1:20

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION COMPANY



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

GENERAL DRAWINGS
VALVE SURFACE BOX

CONSULTANT:
Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH
Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1
DRG No:	KSM/SD/06		REV.



SECTION B-B
SCALE 1:20



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH OTHER LAYOUT DRAWINGS.

LEGEND:

FGL FINISHED GROUND LEVEL

REV	DESCRIPTION	DATE



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:

GENERAL DRAWINGS
VALVE CHAMBER DETAILS

CONSULTANT:

Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

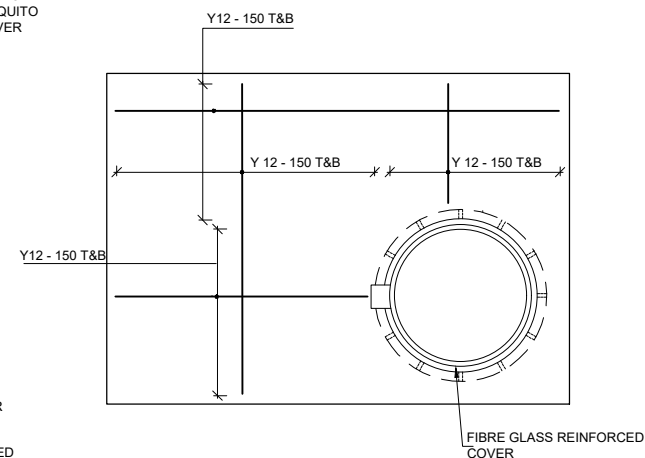
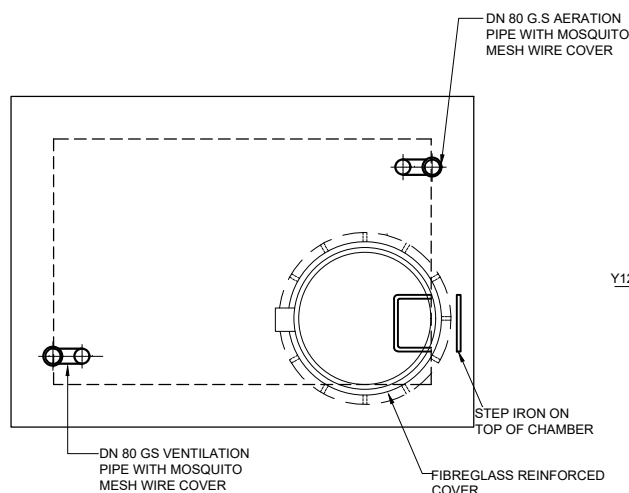
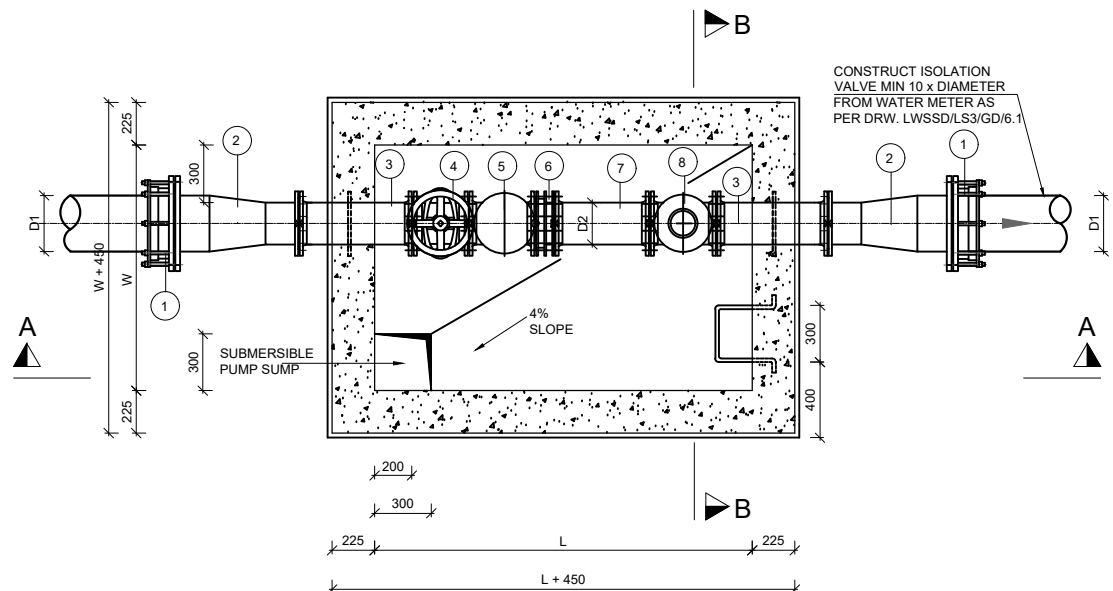
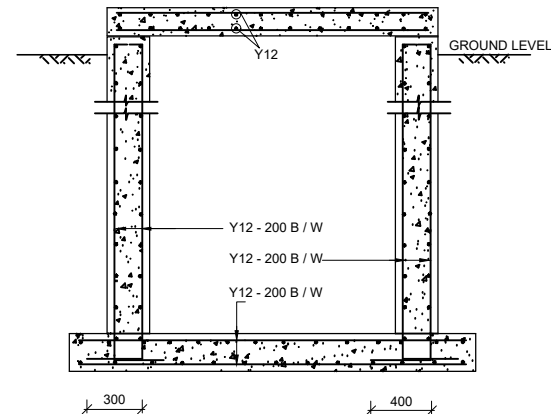
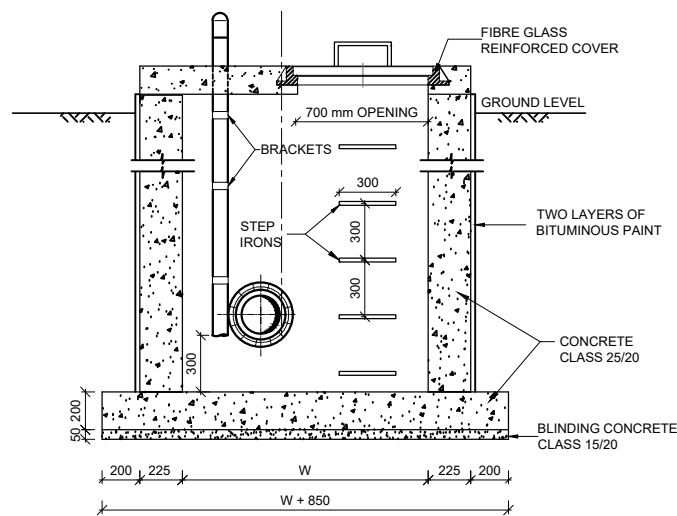
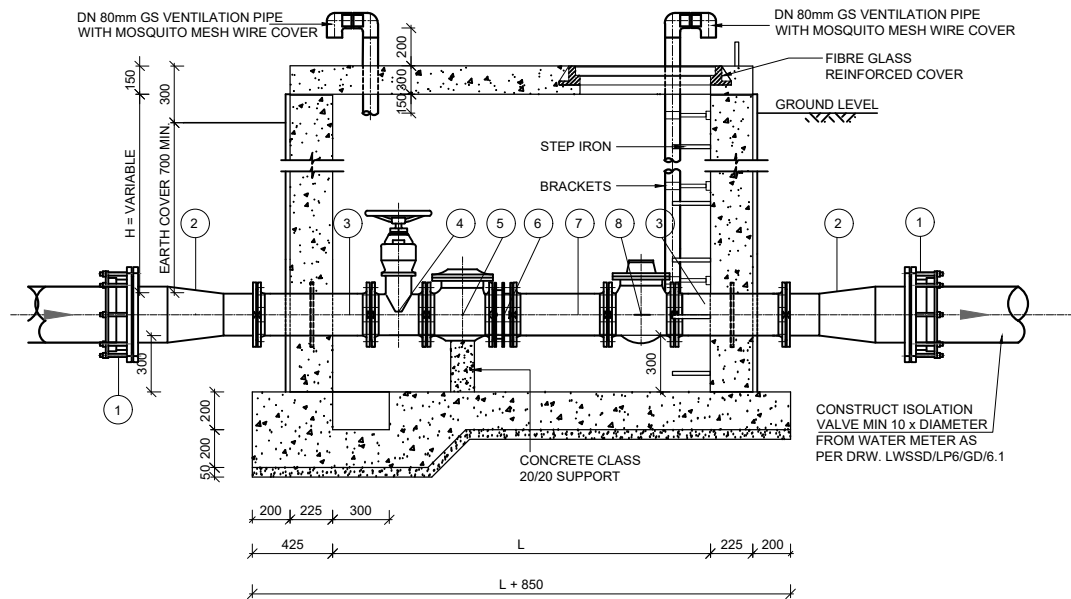
IN JOINT VENTURE WITH

Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY: M.G	DRAWN BY: G.M
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CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1

DRG No:	KSM/SD/07	REV.
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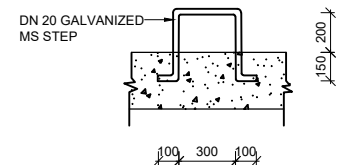
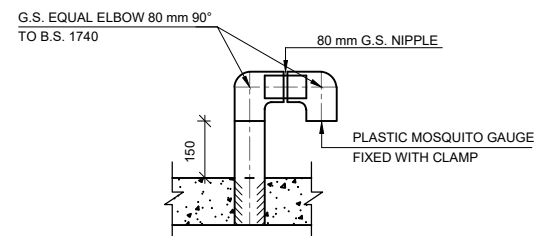
SCHEDULE OF PIPEWORK & FITTINGS

ITEM No.	DESCRIPTION	DIAMETER	QTY
1	FLEXIBLE FLANGE ADAPTOR TO SUIT EXISTING PIPE MATERIAL	D1	2
2	DOUBLE FLANGED CONCENTRIC TAPER	D1/D2	2
3	DOUBLE FLANGED PIPE WITH PUDDLE FLANGE LENGTH = 600mm or 3 x D2 When D2 > 200mm	D2	2
4	DOUBLE FLANGED GATE VALVE HAND WHEEL OPERATED	D2	1
5	STRAINER	D2	1
6	DISMANTLING PIECE	D2	1
7	DOUBLE FLANGED PIPE LENGTH = 5 x D2	D2	1
8	BULK WATER METER	D2	1

DIA. VARIES

D1	D2
80	50
100	80
150	100
200	150
250	200
300	250
350	300

METER SIZE	L mm	W mm
300	4600	1500
250	3500	1000
200	3170	1000
150	2630	1000
100	2100	1000
80	1870	1000
50	1560	1000



TURBINE METER (WOLTMAN TYPE)

NOTES:

- HEIGHT OF THE CHAMBER "H" DEPENDS ON PIPE DEPTH. DIMENSION "H" TO BE DETERMINED BY THE CONTRACTOR ON THE SITE AND APPROVED BY THE ENGINEER.
- DIMENSIONS "L" AND "W" DEPENDS ON PIPE DIAMETER. DIMENSIONS "L" AND "W" TO BE DETERMINED BY THE CONTRACTOR ON THE SITE AND APPROVED BY THE ENGINEER.
- PIPE WORK AND VALVE SUPPORT TO BE CONSTRUCTED AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
- PROVIDE MARKER POSTS FOR FITTINGS AS PER STANDARD DRAWINGS.

DN	NOMINAL DIAMETER
GS	GALVANISED STEEL
T&B	TOP & BOTTOM
MS	METAL SHEET

REV	DESCRIPTION	DATE



KISUMU WATER AND SANITATION COMPANY



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS
BULK METER CHAMBER
TURBINE METER (WOLTMAN TYPE)

CONSULTANT:
Design Master Plan
Fifth Ngong, Avenue Office Suites,
Room 12, P.O. Box 58438-00200
Nairobi, Kenya

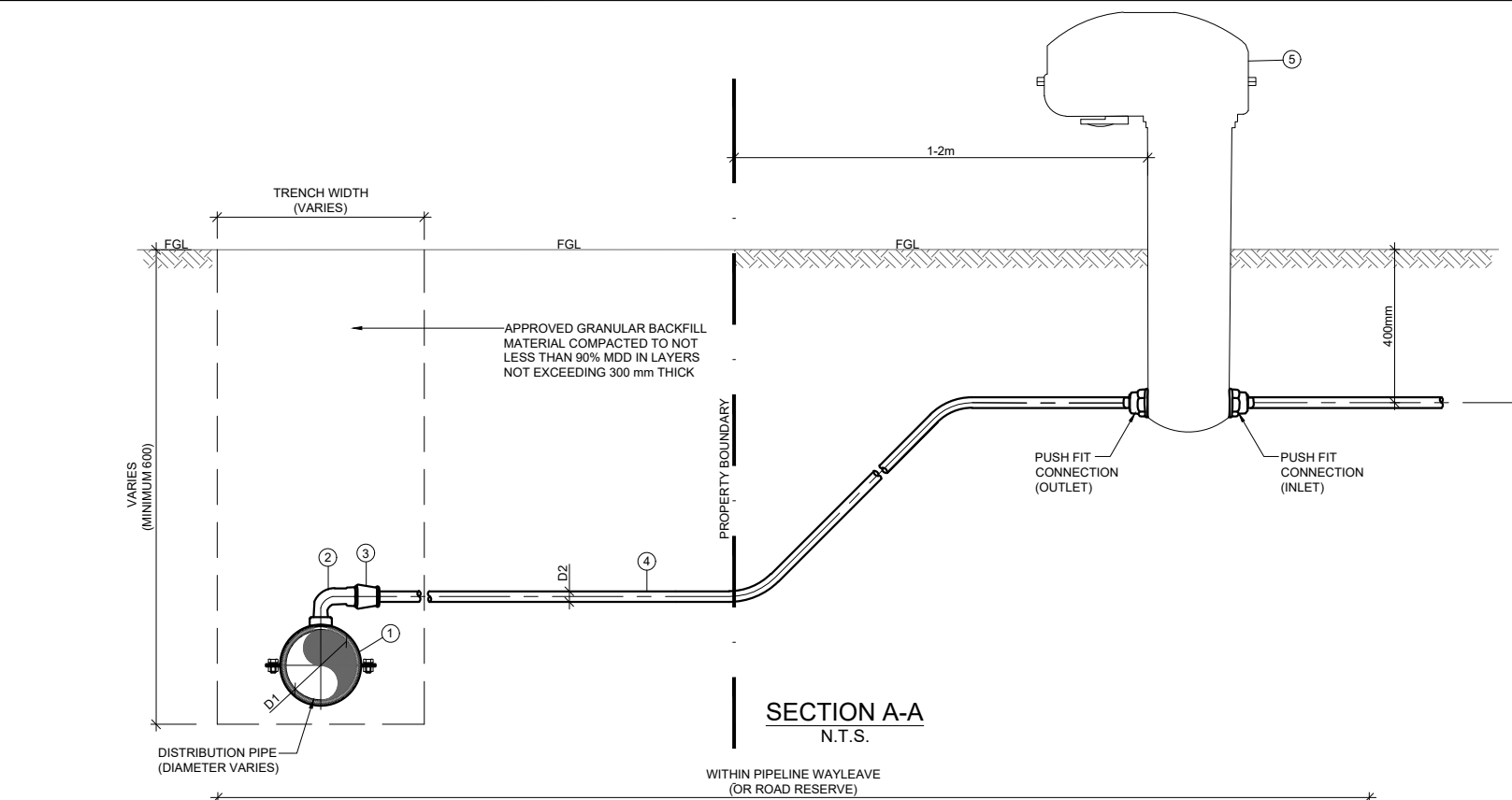
IN JOINT VENTURE WITH
Gaufr Consultants
Africa
Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY: M.G. DRAWN BY: G.M.

CHECKED BY: J.K. DATE: DEC. 2024

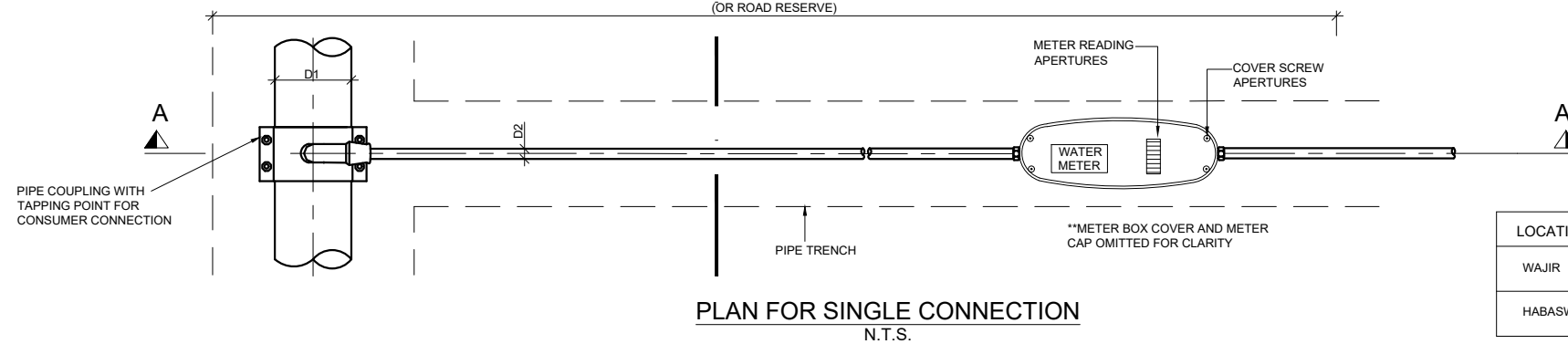
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DRG No: KSM/SD/08 REV.

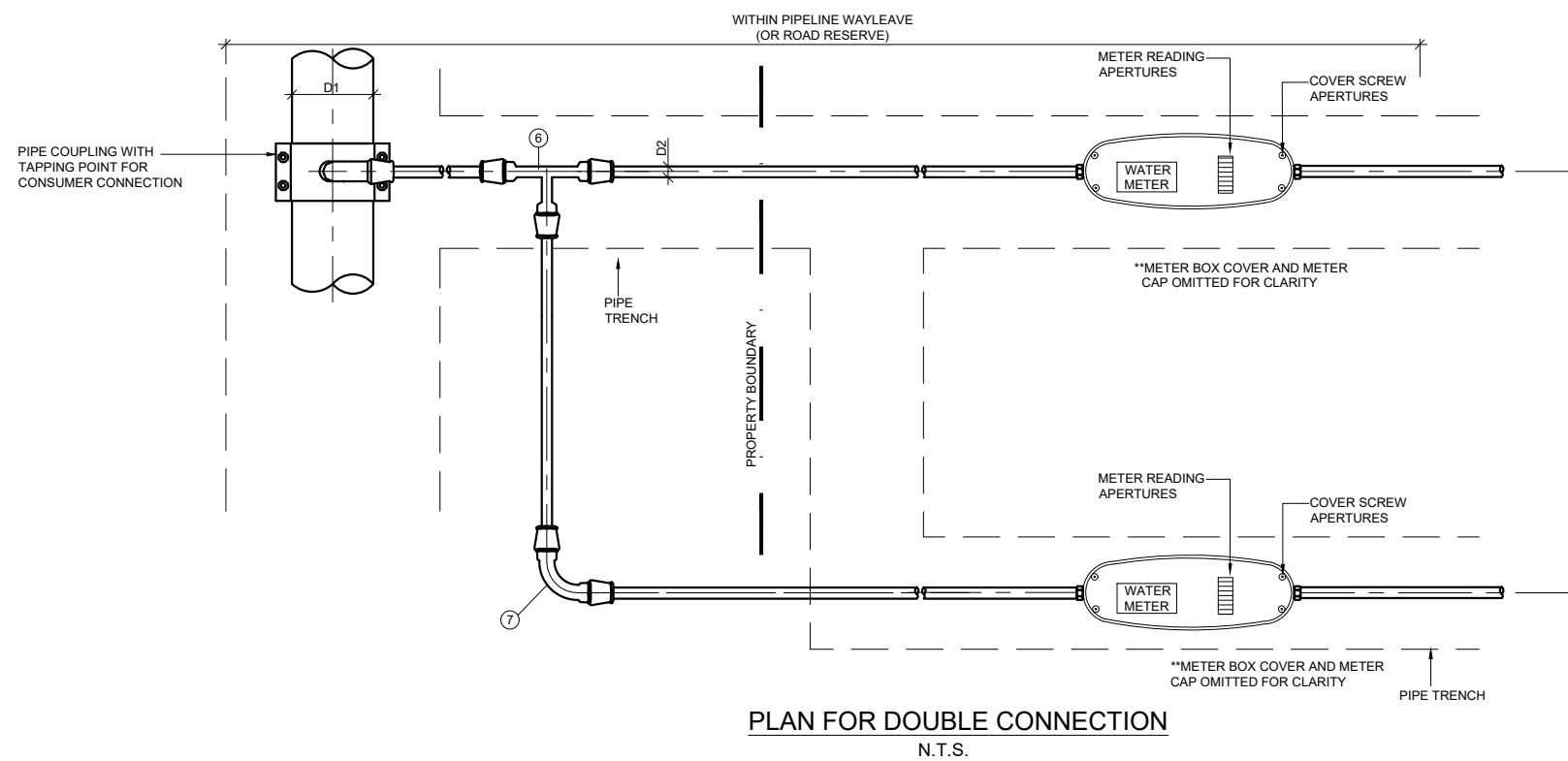


SCHEDULE OF PIPEWORK & FITTINGS

ITEM No.	DESCRIPTION	DIAMETER	QTY
1	SADDLE CLAMP	D1	1
2	90° MALE HDPE BEND	D2	1
3	HDPE FERRULE ADAPTOR	D2	1
4	HDPE CONSUMER CONNECTION PIPE	D2	1
5	PREPAID METER ACCORDING TO SPECIFICATIONS	D2	1
6	ALL SOCKETED TEE	D2	1
7	90° DOUBLE SOCKETED BEND	D2	1



LOCATION	DIAMETER	NO. OF CONSUMER CONNECTION
WAJIR	D1 VARIES D2 - OD 20	60
HABASWEIN	D1 VARIES D2 - OD 20	200



PREPAID METER

NOTES:
FGL FINISHED GROUND LEVEL

REV	DESCRIPTION	DATE



PROJECT:
KISUMU WATER SUPPLY
IMPROVEMENT AID ON DELIVERY-
AOD PROJECT

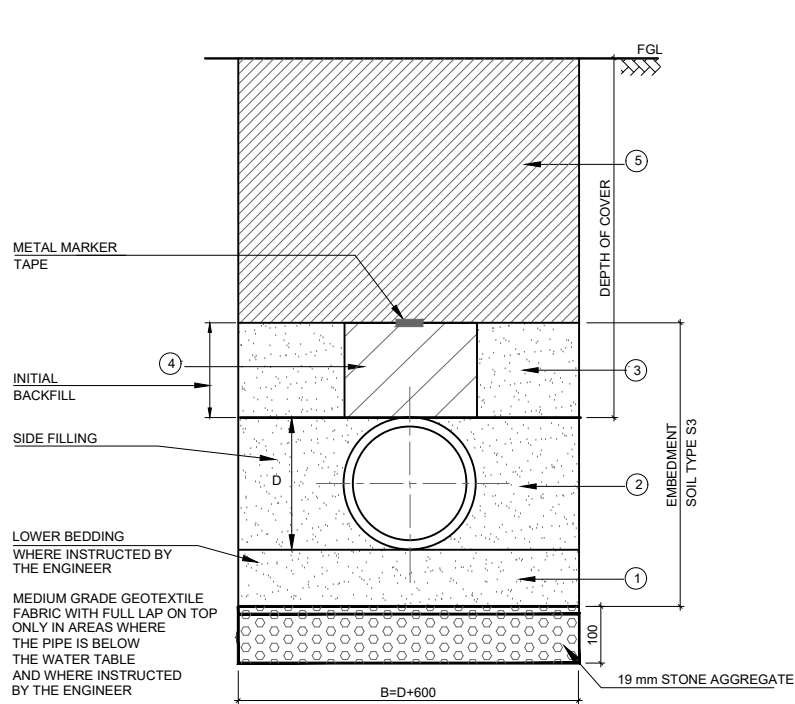
DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS
CONSUMER CONNECTION DETAILS
(PRE-PAID WATER METER)

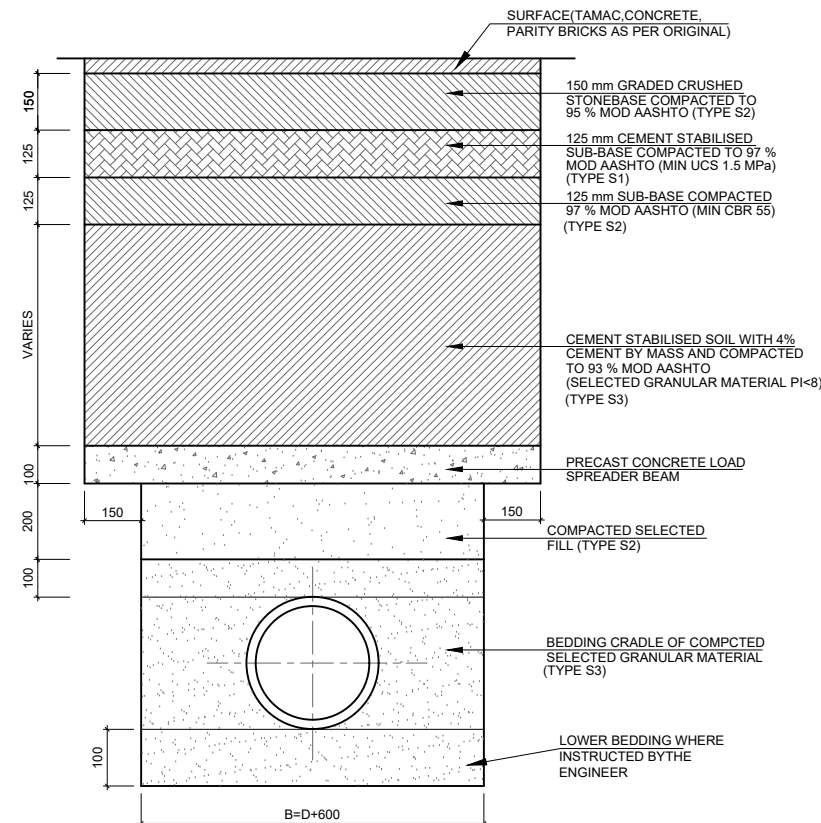
CONSULTANT:
Design Master Plan
Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya

IN JOINT VENTURE WITH
Gauß Consultants Africa
Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

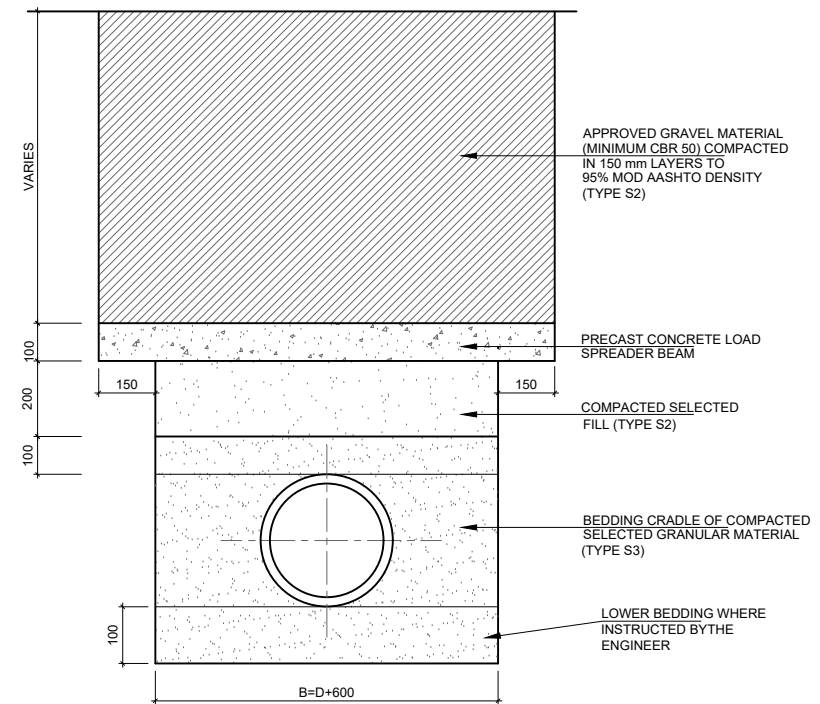
DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1
DRG No:	KSM/SD/09	REV:	



TYPICAL TRENCH EXCAVATION AND BACKFILLING FOR PE/uPVC PIPES
SCALE N.T.S



PIPE PROTECTION AT SURFACED ROAD CROSSING
SCALE N.T.S



PIPE PROTECTION AT UNSURFACED ROAD CROSSING
SCALE N.T.S

LEGEND :

- D PIPE OUTSIDE DIAMETER
B TRENCH WIDTH (SEE TABLE)
- ① LOWER BEDDING COMPRISING OF APPROVED GRANULAR BEDDING MATERIAL (SAND) COMPACTED TO 90 % MPD IN 50 mm LAYERS TO A THICKNESS OF 100 mm (min.) OR AS DIRECTED BY THE ENGINEER'S REPRESENTATIVE.
- ② APPROVED GRANULAR BEDDING MATERIAL TYPE S3 COMPACTED IN LAYERS AS PER NOTE 2. CAREFUL TAMPING ON EITHER SIDE OF THE PIPE SHOULD BE MAINTAINED TO ENSURE EQUAL PRESSURE ON BOTH SIDES OF THE PIPE.
- ③ APPROVED GRANULAR BEDDING MATERIAL TYPE S3 COMPACTED IN SHALLOW LAYERS TO A MAXIMUM OF 150 mm THICK.
- ④ AS IN ③ ABOVE, BUT EXCESSIVE TAMPING TO BE AVOIDED.
- ⑤ NORMAL BACKFILL MATERIAL PROPERLY RAMMED IN LAYERS. NOT EXCEEDING 150 mm THICK.
- ⑥ APPROVED GRANULAR BACKFILL MATERIAL COMPACTED TO 90% MPD IN LAYERS AS PER NOTE 2.

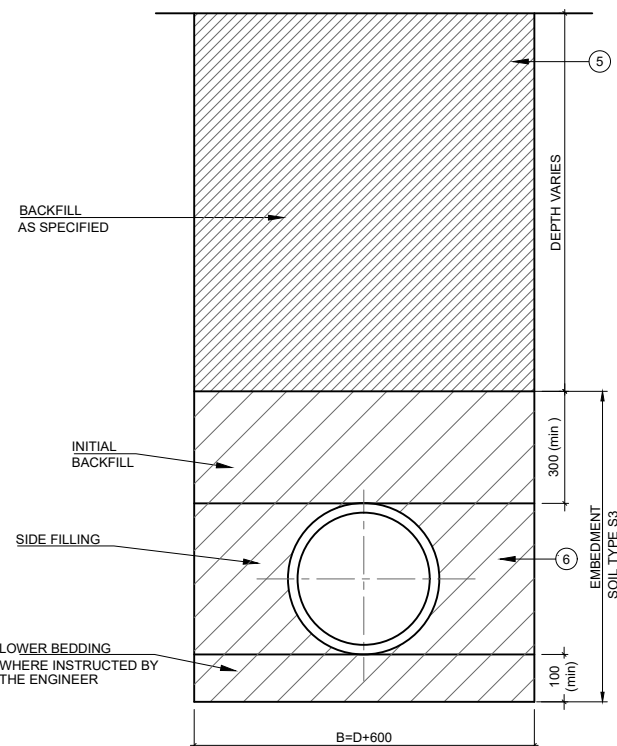
PRECAST CONCRETE LOAD SPREADER BEAM

TABLE 1 : MATERIAL DESCRIPTION CHART

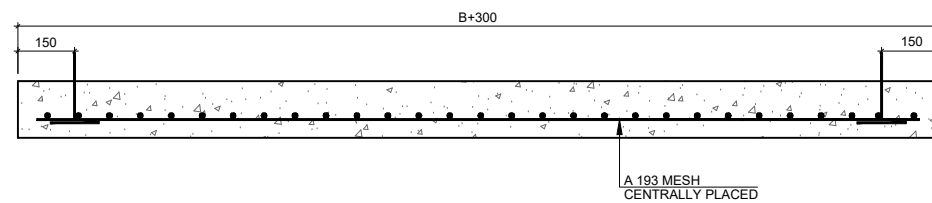
SOIL TYPE	DESCRIPTION	GROUP SYMBOL
S1	GRAVEL - SINGLE SIZE	GW
S2	GRAVEL - GRADED	GP
S3	SAND AND COARSE GRAINED SOILS WITH LESS THAN 12% FINES.	GF

TABLE 2 : COMPACTION CHART GUIDE

% MPD	SOIL TYPE	COMPACTION METHOD	
		THICKNESS OF LAYER (max.)	No. OF PASSES
90	S1	150	1
	S2	150	2
	S3	50	2



TYPICAL TRENCH EXCAVATION AND BACKFILLING FOR FERROUS PIPES
SCALE N.T.S



SECTION THROUGH SPREADER BEAM
SCALE N.T.S



PLAN-LOAD SPREADER BEAM (PCC)
SCALE N.T.S

NOTE

INSTEAD OF A CONCRETE SPREADER BEAM, A CONCRETE OR STEEL PIPE WITH SUFFICIENT INTERNAL BORE TO FACILITATE INSERTION OF PIPES SHOULD BE USED IF INSTRUCTED BY THE ENGINEER.

TYPICAL TRENCH WIDTHS FOR PIPES

NOMINAL DIAMETER D (mm)	80	100	160	200	250	300	500
WIDTH OF TRENCH B (m)	0.70	0.70	0.76	0.80	0.85	0.90	1.10

B = D + 0.6 m (LIMITED TO A MINIMUM OF 0.6 m)

NOTES:

- MINIMUM TRENCH WIDTH TO BE NORMAL PIPE DIAMETER PLUS 600 mm.
- THE LOWER BEDDING AND THE SIDE FILL SHALL BE COMPACTED IN LAYERS WHOSE DEPTH SHALL NOT EXCEED 50 mm NOR HALF THE NOMINAL PIPE DIAMETER WHICHEVER IS THE LESSER.
- IN GENERAL, THE METHOD OF ATTAINING THE REQUIRED COMPACTION WILL BE ASCERTAINED AS FOLLOWS :
(i) THE ENGINEER'S REPRESENTATIVE WILL IDENTIFY, CLASSIFY AND AGREE THE SOIL TYPE OF EMBEDMENT MATERIAL AVAILABLE FROM THE TRENCH.
(ii) THE SITE SOIL TYPE WILL BE COMPARED WITH THOSE ON THE MATERIAL DESCRIPTION CHART [SEE TABLE 1]
(iii) THE COMPACTION METHOD REQUIRED IS THEN SELECTED FROM THE COMPACTION CHART FOR THE APPROPRIATE SOIL TYPE AND CLASS OF EMBEDMENT [SEE TABLE 2]
- NOT ALL SOILS ARE GIVEN IN TABLE 1. IT SHOULD BE NOTED THAT :
(i) FINED GRAINED SOILS WITH HIGH PLASTICITY MAY NOT BE USED AS BACKFILL.
(ii) FINED GRAINED SOILS WITH LOW PLASTICITY MAY BE CONDEMNED FOR USE AS BACKFILL IF THE CONTRACTOR HAS DIFFICULTY IN ATTAINING THE REQUIRED COMPACTION.
- WHERE SITE MATERIAL IS CONDEMNED, IMPORTED MATERIAL SHALL BE USED. THIS SHALL BE A WELL GRADED SOIL FROM FINES UPTO 20 mm GRAVEL OR AS APPROVED BY THE ENGINEER'S REPRESENTATIVE.
- WHERE SOME DOUBT EXISTS AS TO THE COMPACTIBILITY OF THE SOIL AS DEFINED ABOVE, RECOURSE SHALL BE MADE TO THE MODIFIED PROCTOR DENSITY TEST. THE SITE AND LABORATORY TESTS SHALL BE CARRIED OUT TO TESTS 14 B AND 12 RESPECTIVELY TO SSRN 601.
- IF STONES OR ROCK ARE PRESENT, IMPORTED BEDDING MATERIAL OF MIN. 150 mm THICK SHALL BE REQUIRED AS APPROVED BY THE ENGINEER'S REPRESENTATIVE. AT DESIGNATED ROAD CROSSINGS, THE BEDDING SHALL HAVE A MINIMUM THICKNESS OF 150 mm.
- THE BACKFILL SHALL BE PLACED IN LAYERS AS DEFINED ABOVE. EACH LAYER SHALL BE RAMMED WITH A SMALL VIBRATORY RAMMER. THE LIKELY REQUIRED NUMBER OF PASSES OF THE RAMMER IS GIVEN IN TABLE 2. HOWEVER 90% MPD SHALL BE ACHIEVED AT ALL TIMES.
- ONLY WHEN THERE IS 300 mm COVER OVER THE PIPE MAY HEAVIER COMPACTION EQUIPMENT BE USED. THE REMAINDER OF THE BACKFILL SHALL BE SUITABLY COMPACTED IN KEEPING WITH THE REINSTATEMENT OF THE GROUND UPON WITH THE ENGINEER'S REPRESENTATIVE.

REV	DESCRIPTION	DATE

KIWASCO
KISUMU WATER AND SANITATION COMPANY

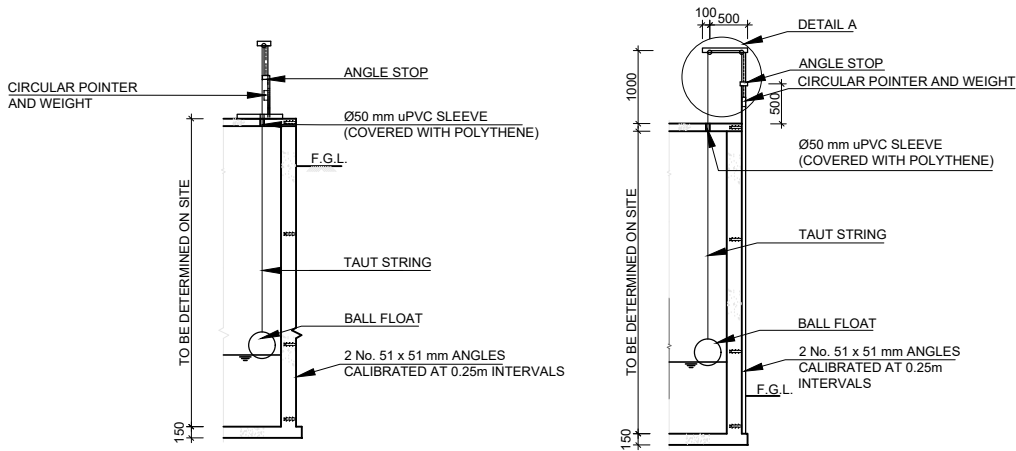
WaterFund **KFW**
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT
DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS PIPE BEDDING DETAILS

CONSULTANT:
Design Master Plan
Fifth Ngong, Avenue Office Suites, Room 12, P.O Box 58438-00200 Nairobi, Kenya
IN JOINT VENTURE WITH
Gauff Consultants Africa
Chalbi Drive 3734, Lavington, P.O. Box 49817-00100 Nairobi, Kenya

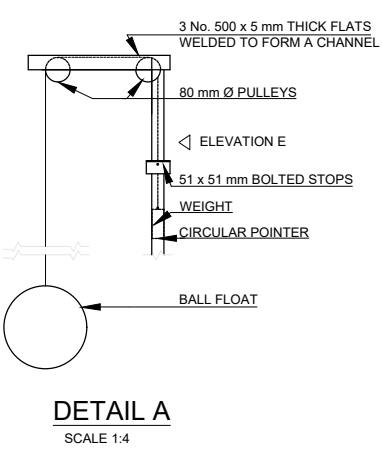
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CHECKED BY: J.K	DATE: DEC. 2024
SCALE: A3 SIZE:	SHEET No: 1 OF 1
DRG No: KSM/SD/10	REV:



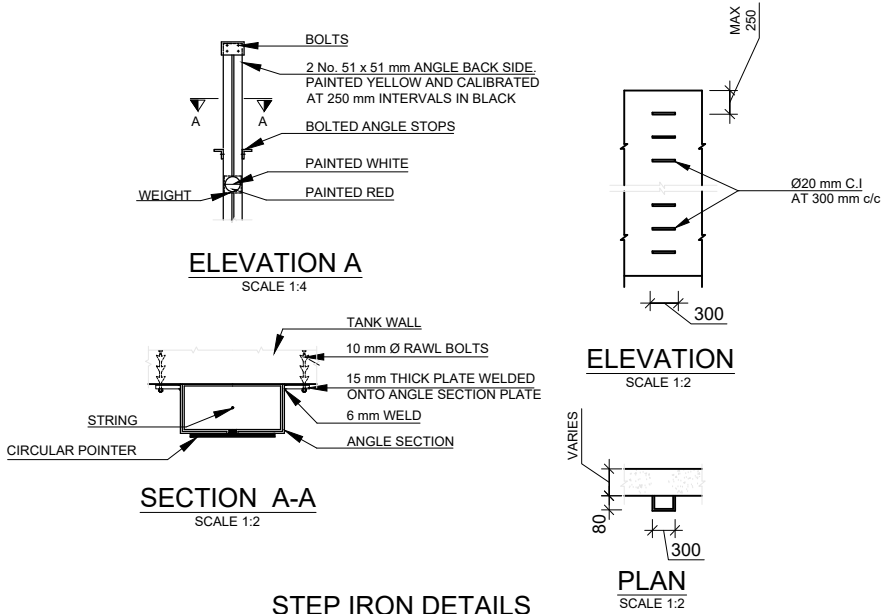
SECTIONAL ELEVATION
SCALE 1:4

SECTIONAL ELEVATION
SCALE 1:4

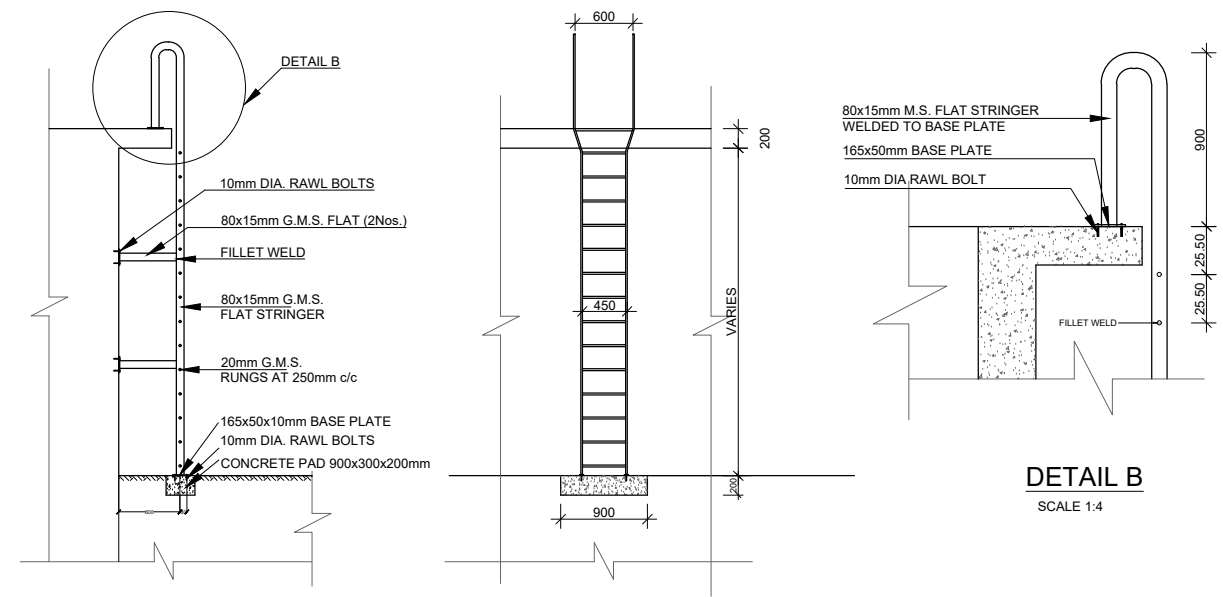
TANK LEVEL INDICATOR



DETAIL A
SCALE 1:4

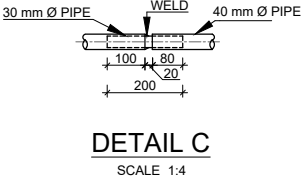
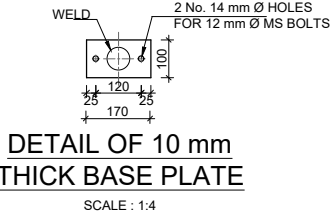
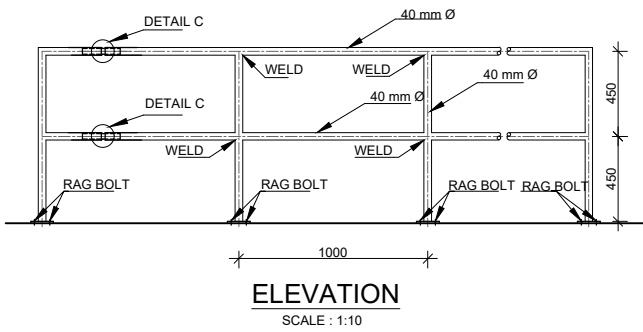


STEP IRON DETAILS



DETAILS OF G.M.S LADDER
SCALE 1:4

DETAIL B
SCALE 1:4



DETAILS OF HANDRAIL

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

REV	DESCRIPTION	DATE


KISUMU WATER AND SANITATION COMPANY


PROJECT: KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT
DETAILED DESIGN

DRAWING TITLE:
GENERAL DRAWINGS
TANK LEVEL INDICATOR , LADDER,
HANDRAIL AND STEP IRON DETAILS

CONSULTANT:

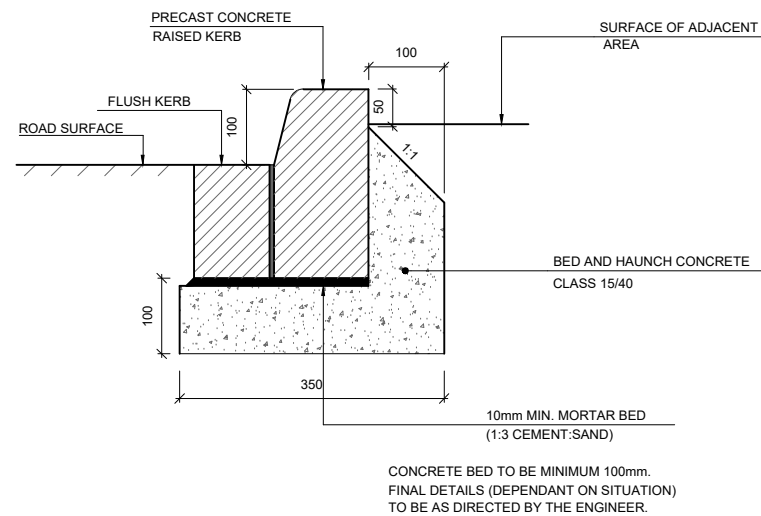
Fifth Ngong, Avenue Office Suites,
Room 12, P.O Box 58438-00200
Nairobi, Kenya
IN JOINT VENTURE WITH

Chalbi Drive 3734, Lavington,
P.O. Box 49817-00100 Nairobi,
Kenya

DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	1 OF 1
DRG No:	KSM/SD/11	REV:	

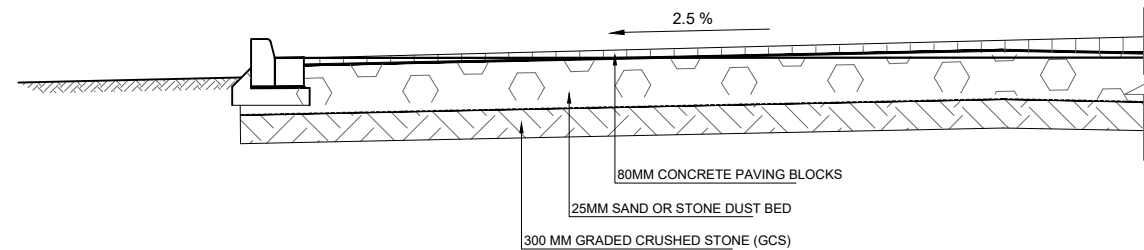


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CHECKED BY:	J.K	DATE:	DEC. 2024
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DRG No:	KSM/SD/12		REV.



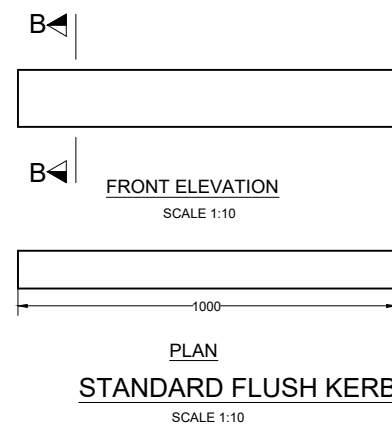
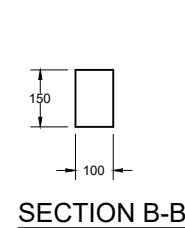
BEDDING AND HAUNCHING TO PRECAST KERB

SCALE 1:5



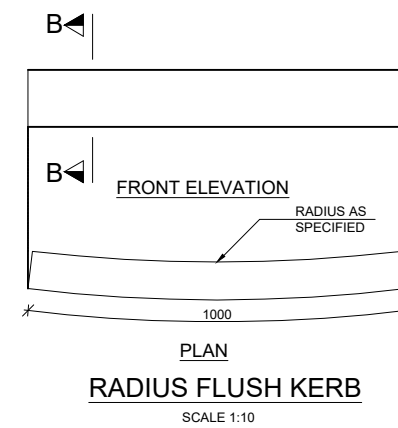
ACCESS ROAD DETAIL

SCALE 1:20



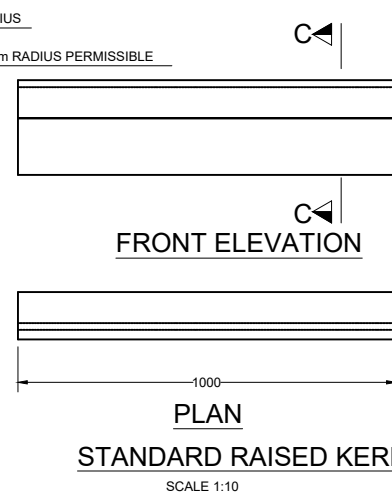
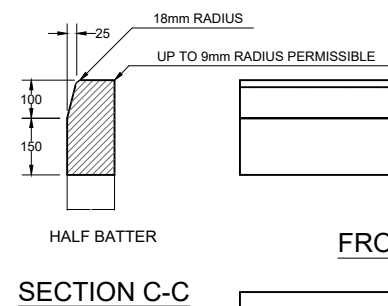
STANDARD FLUSH KERB

SCALE 1:10



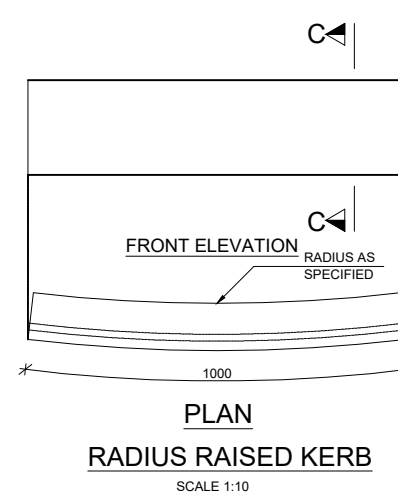
RADIUS FLUSH KERB

SCALE 1:10



STANDARD RAISED KERB

SCALE 1:10



RADIUS RAISED KERB

SCALE 1:10

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. GAPS TO BE PROVIDED AT 10-15m INTERVALS TO PASS WATER FROM THE CARRIAGEWAY TO THE DRAINAGE.

REV	DESCRIPTION	DATE


KISUMU WATER AND SANITATION COMPANY

 
GERMAN DEVELOPMENT BANK

PROJECT:
KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY-AOD PROJECT

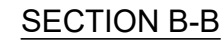
DETAILED DESIGN

DRAWING TITLE:
**GENERAL DRAWINGS
ACCESS ROAD
CONCRETE PAVING STONES**

CONSULTANT:
 Fifth Ngong, Avenue Office Suites,
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Nairobi, Kenya

IN JOINT VENTURE WITH
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Kenya

DESIGNED BY:	M.G	DRAWN BY:	G.M
CHECKED BY:	J.K	DATE:	DEC. 2024
SCALE:	A3 SIZE:	SHEET No:	2 OF 2
DRG No:	KSM/SD/12	REV.	



REV	DESCRIPTION	DATE
 KISUMU WATER AND SANITATION COMPANY		
  GERMAN DEVELOPMENT BANK		
PROJECT: KISUMU WATER SUPPLY IMPROVEMENT AID ON DELIVERY- AOD PROJECT DETAILED DESIGN		
DRAWING TITLE: GENERAL DRAWINGS STEEL ELEVATED TANK 300m³ PLAN AND SECTIONS		
CONSULTANT:  IN JOINT VENTURE WITH  Fifth Ngong, Avenue Office Suites, Room 12, P.O Box 58438-00200 Nairobi, Kenya Chalbi Drive 3734, Lavington, P.O. Box 49817-00100 Nairobi, Kenya		
DESIGNED BY: E.R CHECKED BY: D.L SCALE: A3 SIZE:		DRAWN BY: S.O DATE: OCT. 2025 SHEET No: 1 OF 1
DRG No: KSM/SD/13		REV.