

**REPUBLIC OF UGANDA**



**VOLUME 4-1: BOOK OF DRAWINGS  
(GENERAL DETAILS)**

**INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)**

**CONSTRUCTION OF TIRINYI, KIBUKU, KADAMA AND BUDAKA WATER  
SUPPLY AND SANITATION SYSTEM**

**CONTRACT NO: MWE/WRKS/21-22/00005/1**

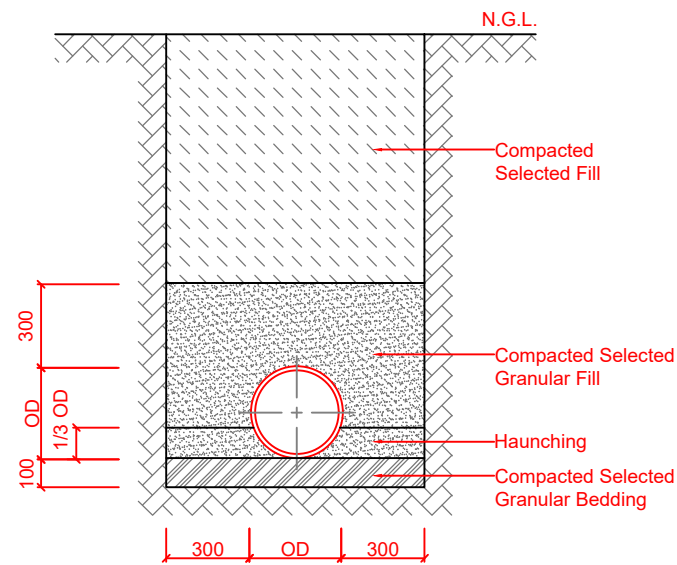
**SUBMITTED BY:**



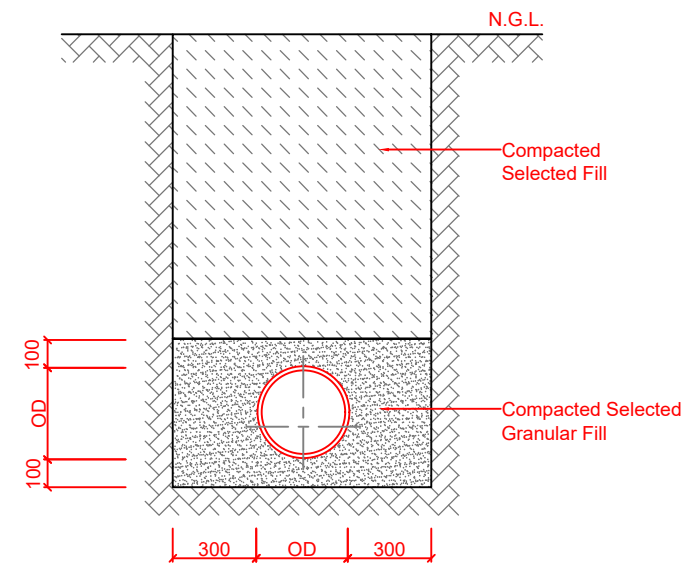
**JULY 2022**

**Notes**

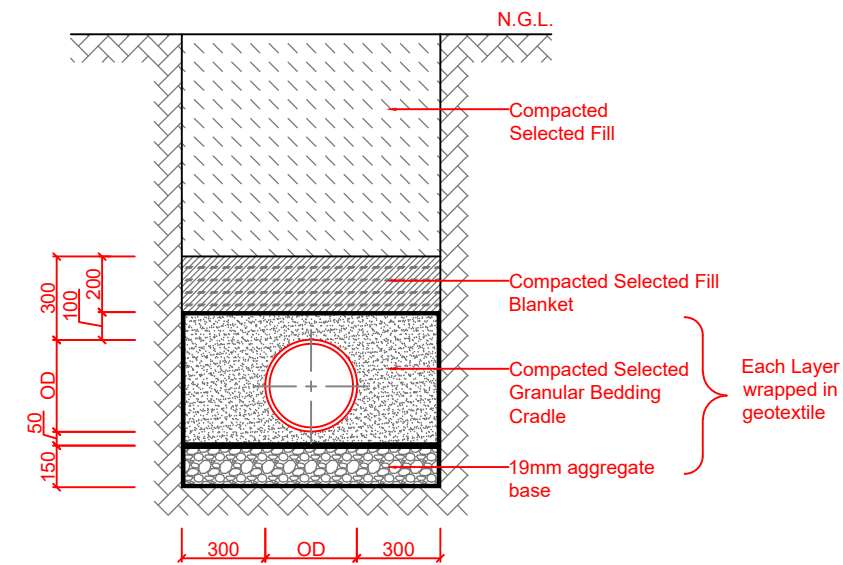
1. Clay lumps, debris and stones larger than 75 mm (20mm in pipe surround) shall be removed from the backfill area
2. Trench shall be kept free of water during the entire pipe installation process until sufficient pipe cover has been installed that prevents floatation of the pipeline
3. The surface of the trench bottom shall be free of any irregularities that can cause point loads at the pipe
4. Compaction equipment shall be selected in accordance with the pipe manufacturer's guidelines
5. Engineer's Approval to be sought before installation of extra-over items



**Typical Detail**  
Pipe Bedding of Rigid Pipes

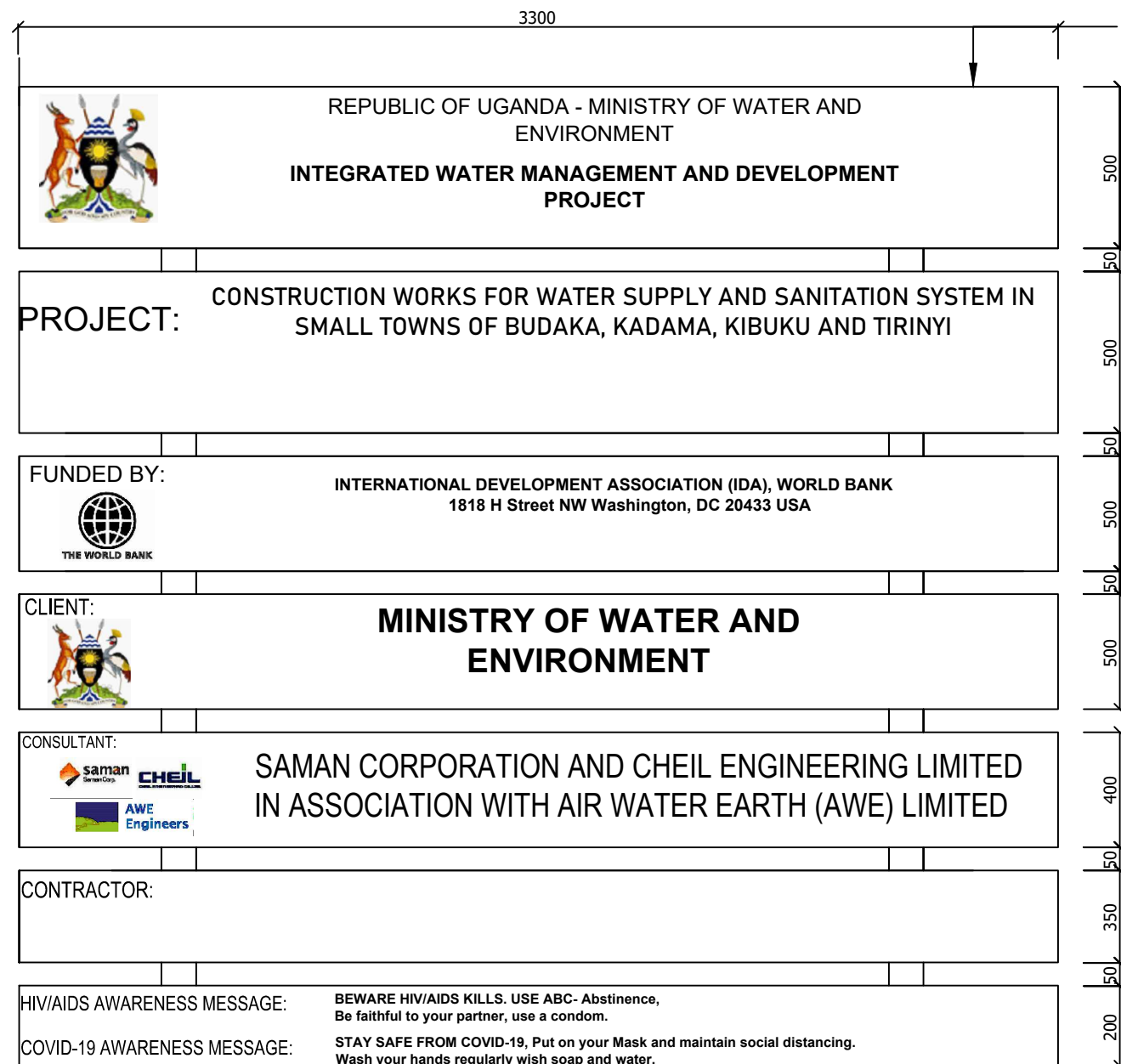


**Typical Detail**  
Pipe Bedding of Rigid Pipes

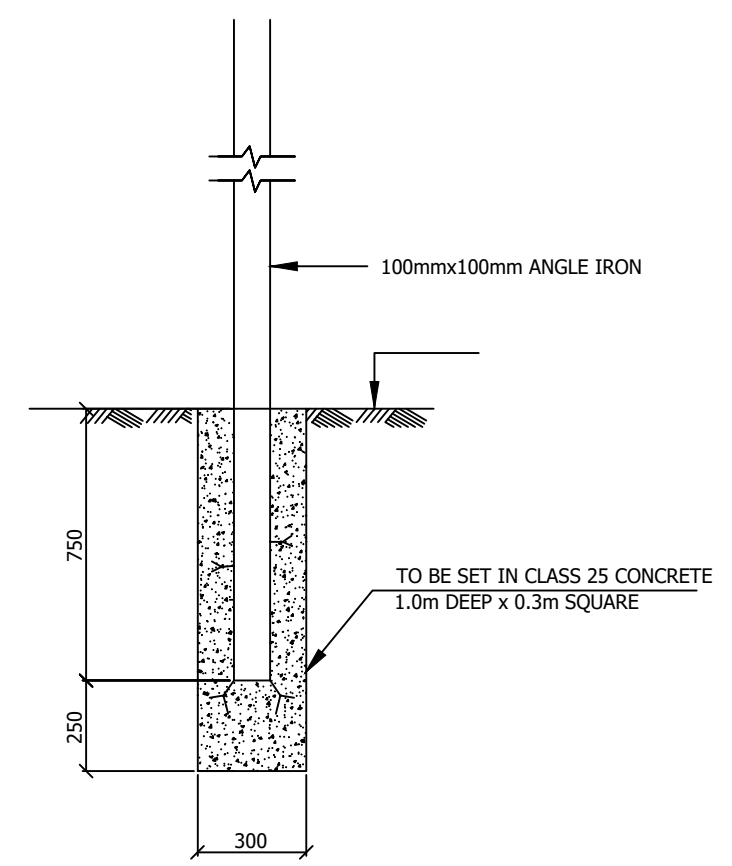


**Typical Detail**  
Trench in Swamp or Rice Field

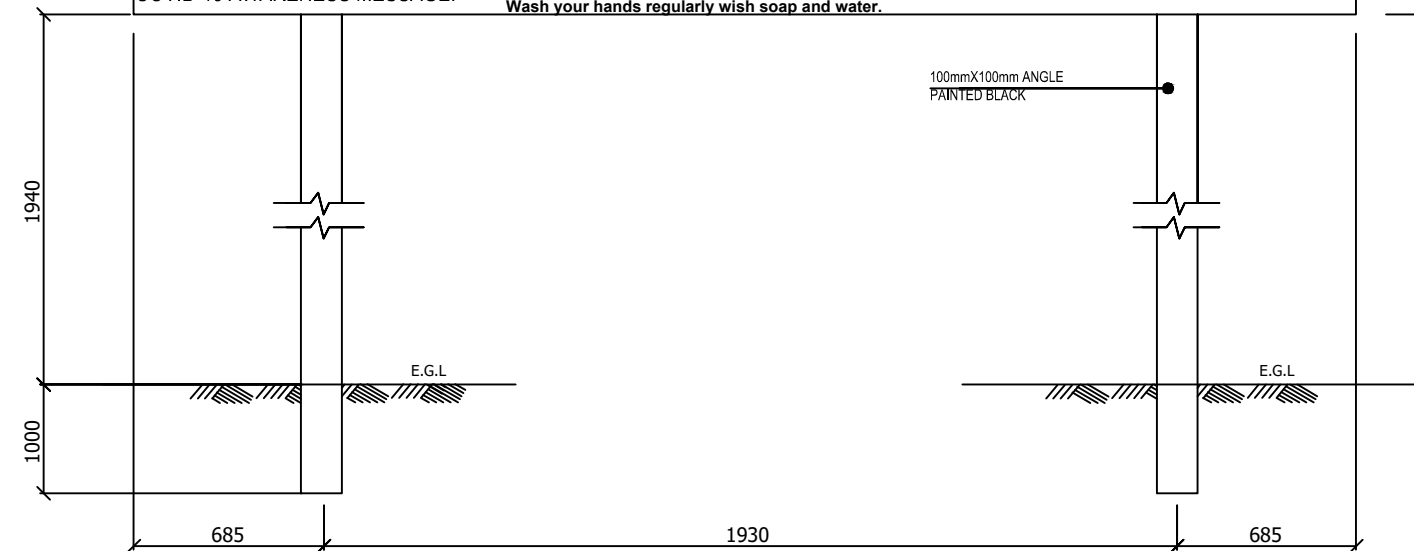
 CLIENT Government of Uganda Ministry of Water and Environment	 FUNDED BY WORLD BANK	 CONSULTANT saman Samen Corp. CHEIL CHEIL ENGINEERING CO. LTD.  AWE Engineers	PROJECT REFERENCE NUMBER : .... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI	DRAWING DESCRIPTION		DATE	13/12/2021	DRAWN:	Andrew Turyakira
				<b>STANDARD DETAIL PIPE TRENCH</b>		SHEET NUMBER	1 OF 1		DESIGNED:
CONSTRUCTION SUPERVISION		PIPE TRENCH SHEET 1 OF 1		DRAWING SCALE	H=1:1000 V=1:100	A3	CHECKED:	Ronald Musenze	
				CATEGORY	DETAIL		APPROVED:	OH Dongwoom	
				DRAWING NUMBER		IWMDP/MBA/1-D-001			



SIGNBOARD BACKGROUND COLOUR-WHITE  
LETTERS COLOUR-BLACK



SIGNBOARD FIXING DETAIL  
SCALE: 1:10

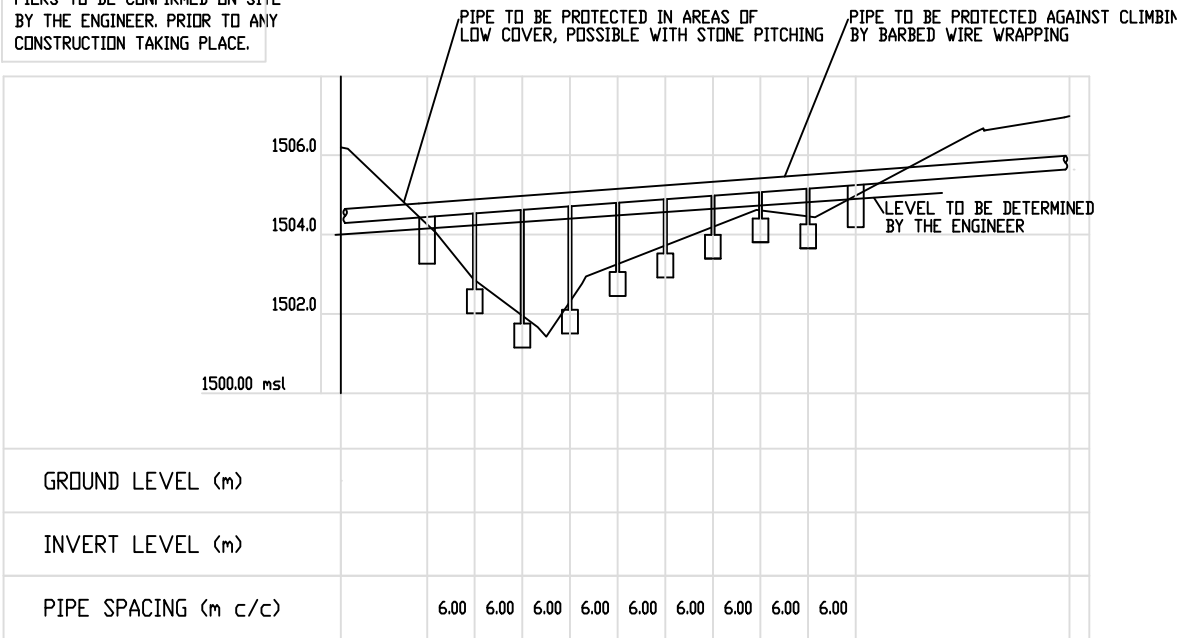


PROJECT PUBLICITY SIGNBOARD  
SCALE NTS

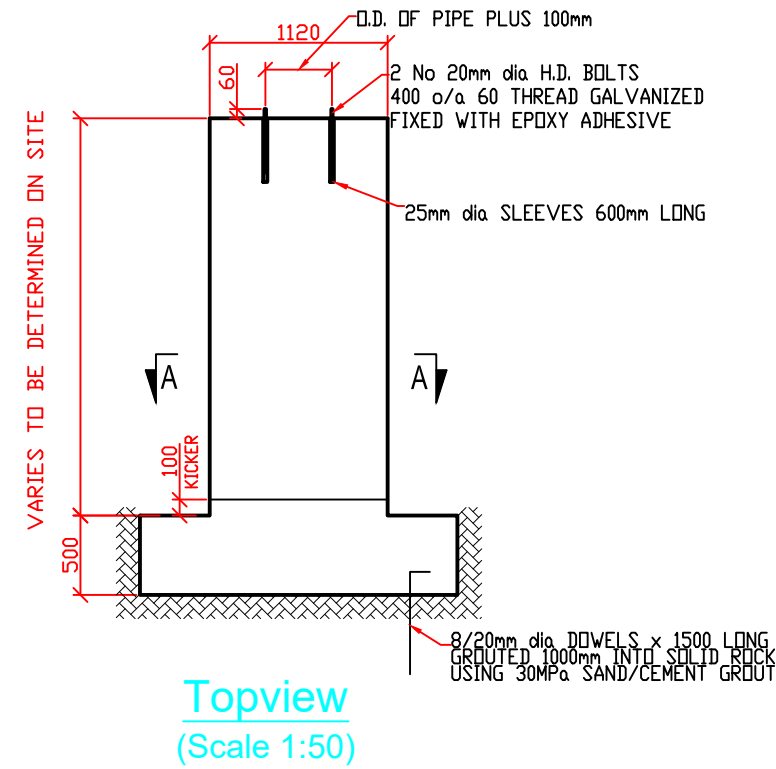
- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
  2. SPACING BETWEEN LINES TO BE 50mm.
  3. SPACING BETWEEN EDGE AND LINE TO BE 50mm.
  4. ALL STEEL POSTS TO BE TO BS 3049 CLASS 'A' (HOT ROLLED).
  5. THE FINISH TO BE HOT DIP GALVANIZED TO BS 729.
  6. ALL BOLTS SHALL BE BUTTON-HEADED AND GALVANISED.

 Government of Uganda Ministry of Water and Environment	 WORLD BANK	  	PROJECT REFERENCE NUMBER : NWSCHQ/SRVCS/2017-2018/16452	DRAWING DESCRIPTION <b>STANDARD DETAIL SIGN BOARD</b>		DATE 19/08/2021	DRAWN: Andrew Turyakira
			<b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b>  CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI	CONSTRUCTION SUPERVISION	SIGN BOARD SHEET 1 OF 1	SHEET NUMBER 1 OF 1	DRAWING SCALE 1:100
				DRAWING NUMBER <b>IWMDP/MBA/1-D-003</b>		CHECKED: Ronald Musenze	
						APPROVED: OH Dongwoom	

**NOTE**  
ALL PIPE LENGTHS AND POSITION OF PIERS TO BE CONFIRMED ON SITE BY THE ENGINEER. PRIOR TO ANY CONSTRUCTION TAKING PLACE.



**TYPICAL LONGITUDINAL SECTION**  
**(FOR DUCTILE IRON PIPES ABOVE GROUND)**  
(Scale 1:75)



**GENERAL**

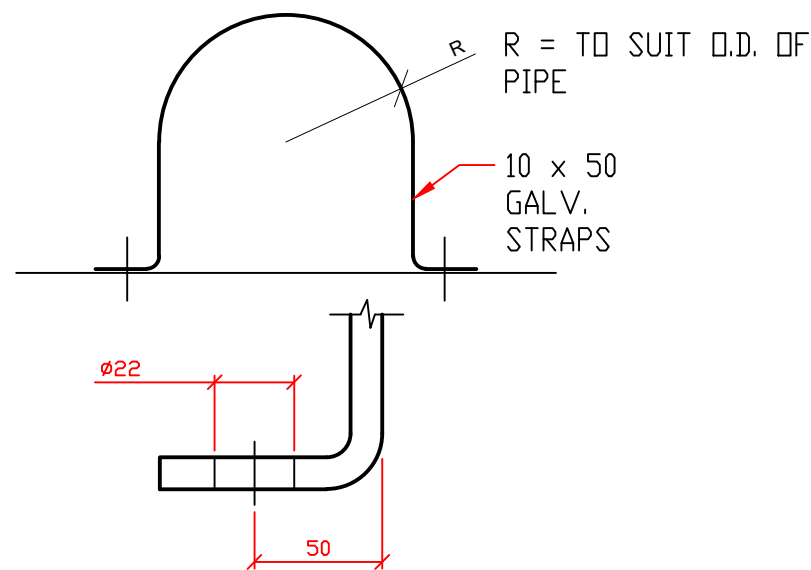
- PIERS SHALL NOT BE HIGHER THAN 4m AND FOUNDATION SHALL BE ON ROCK. OTHERWISE ENGINEER SHALL INSTRUCT.

**PIPEWORK & COUPLINGS**

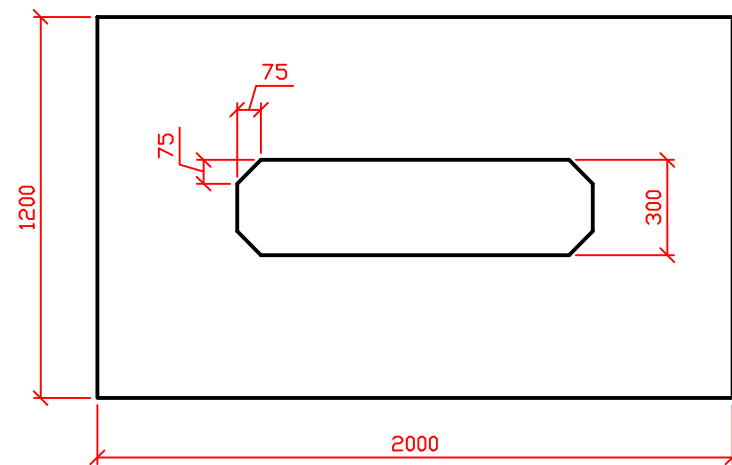
- HOT-DIP GALVANISED IN ACCORDANCE WITH BS ISO 1451
- 8mm THICK RUBBER LINING AROUND PIPES WHERE SUPPORTED OR STRAPPED.

**CONCRETE**

- ALL REINFORCED CONCRETE SHALL BE OF GRADE C30/19
- EXPOSED CONCRETE CORNERS TO BE CAST WITH 20 x 20mm CHAMFER
- 50mm BLINDING TO BE POURED BENEATH FOUNDATION
- NO CONCRETE SHALL BE POURED WITHOUT PRIOR INSPECTION OF THE ENGINEER



**Pipe Straps**

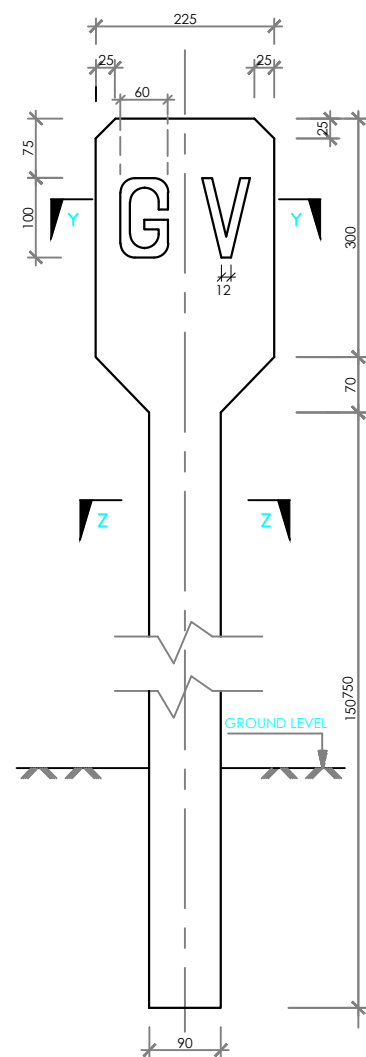


**Section A-A**  
(Scale 1:25)

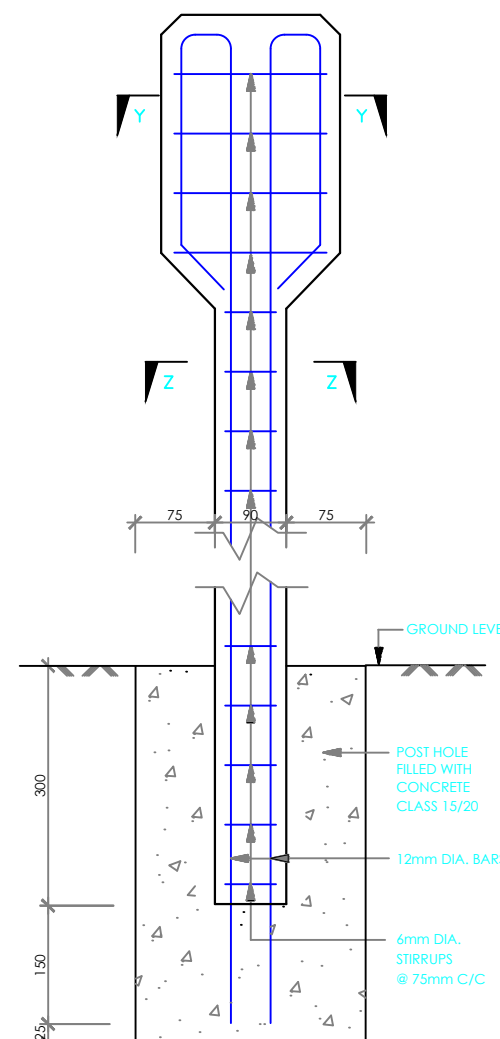
 CLIENT Government of Uganda Ministry of Water and Environment	 FUNDED BY WORLD BANK	 CONSULTANT saman Saman Corp. CHEIL CHEIL ENGINEERING CO. LTD.  AWE Engineers	PROJECT REFERENCE NUMBER : ... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU AND TIRINYI	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN:	Andrew Turyakira	
				<b>STANDARD DETAIL PIPE BRIDGE</b>		SHEET NUMBER	1 OF 1		DESIGNED:	Ceaser Kisa Wakiibi
CONSTRUCTION SUPERVISION		PIPE BRIDGE SHEET 1 OF 1		DRAWING SCALE	H=1:1000 V=1:100 A3	CATEGORY		DETAIL	CHECKED:	Ronald Musenze
				DRAWING NUMBER		IWMDB/MBA/1-D-005		APPROVED:	OH Dongwoom	

## Notes

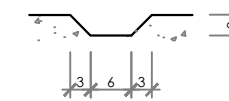
1. CONCRETE TO BE C25/20
2. ALL MARKER POSTS TO BE PAINTED WITH 2 COATS BLUE OIL BASED PAINT AND WHITE LETTERING TO ENGINEER'S APPROVAL



**GATE VALVE INDICATOR POST**  
SCALE 1:10



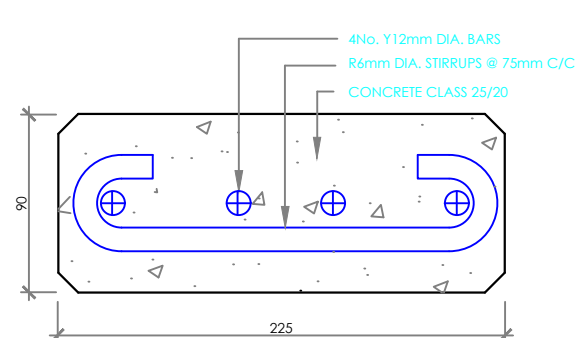
**INDICATOR POST REINFORCEMENT DETAILS**  
SCALE 1:10



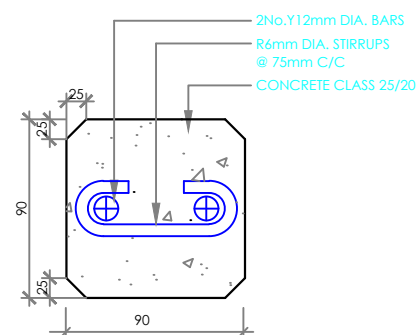
**SECTION X-X**  
N.T.S.

LETTERING TO BE AS FOLLOWS:

FOR	USE
GATE VALVE	GV
AIR VALVE	AV
WASHOUT	WO
WATER MAIN	WM
BULK METER	M
'Y'- JUNCTION	Y



**SECTION Y-Y**  
SCALE 1:4



**SECTION Z-Z**  
SCALE 1:4

**INDICATOR POST DETAILS**

CLIENT



Government of Uganda  
Ministry of Water and  
Environment

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WORLD BANK

CONSULTANT



PROJECT REFERENCE NUMBER : ....

**INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)**

CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI

DRAWING DESCRIPTION

**GENERAL DETAILS  
MARKER POSTS**

CONSTRUCTION  
SUPERVISION

MARKER POSTS  
SHEET 1 OF 1

DATE 19/08/2021

SHEET NUMBER 1 OF 1

DRAWING SCALE H=1:1000 V=1:100 A3

CATEGORY DETAIL

DRAWING NUMBER

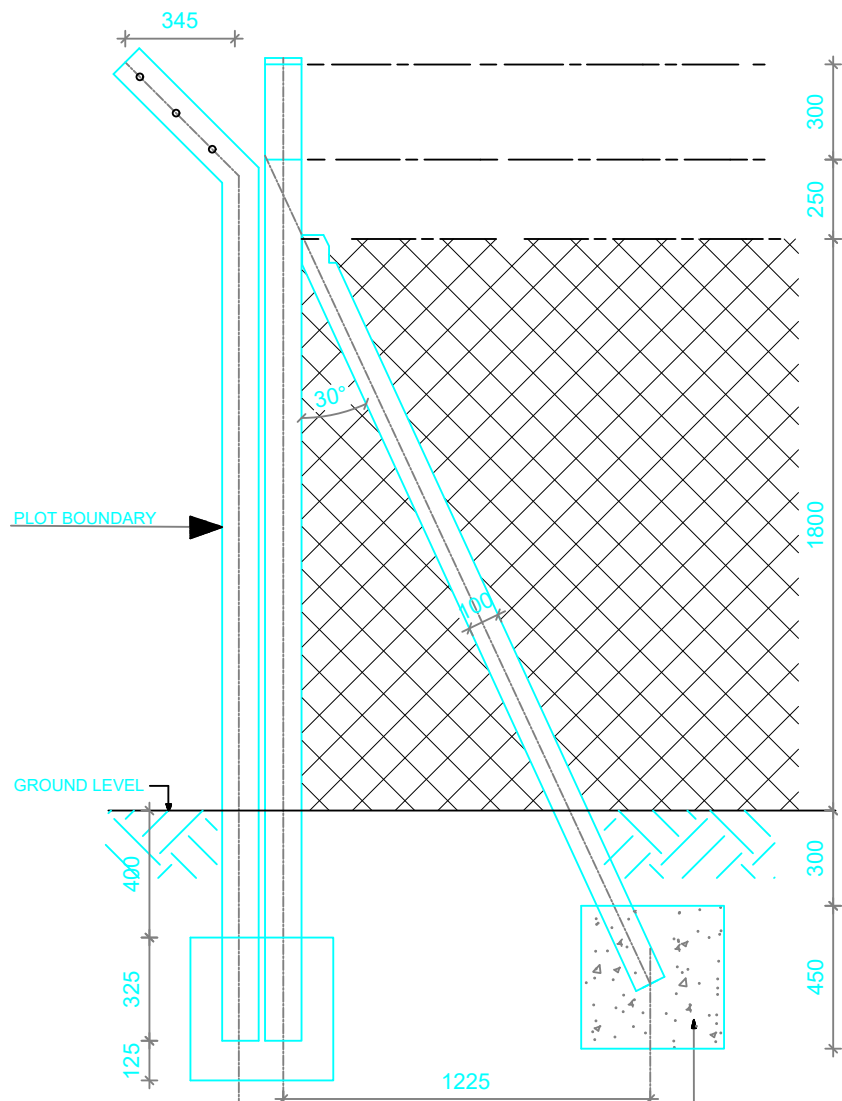
**IWMDP/MBA/1-D-007**

DRAWN: Andrew Turyakira

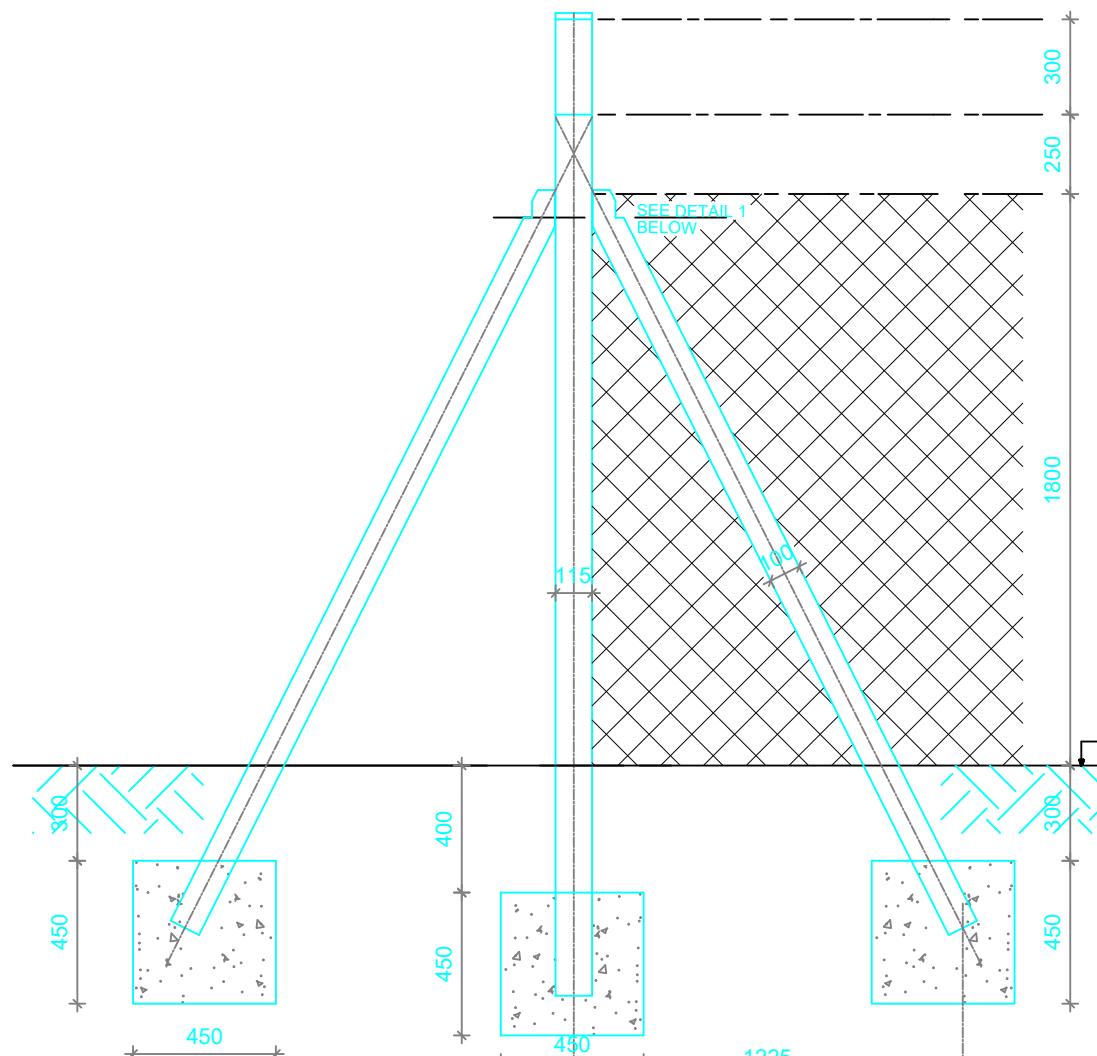
DESIGNED: Ceaser Kisa Wakiibi

CHECKED: Ronald Musenze

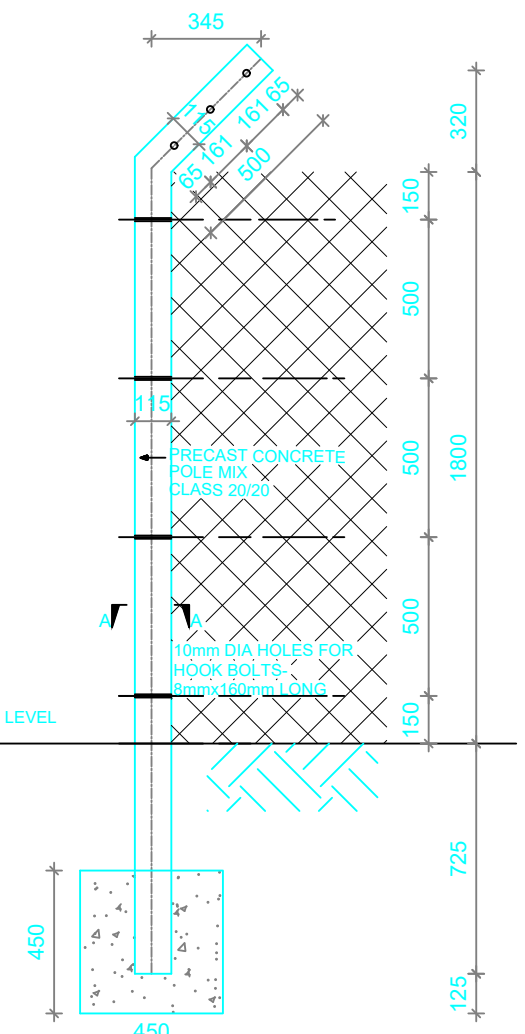
APPROVED: OH Dongwoom



**DETAILS OF CORNER POSTS**  
Scale:1:25

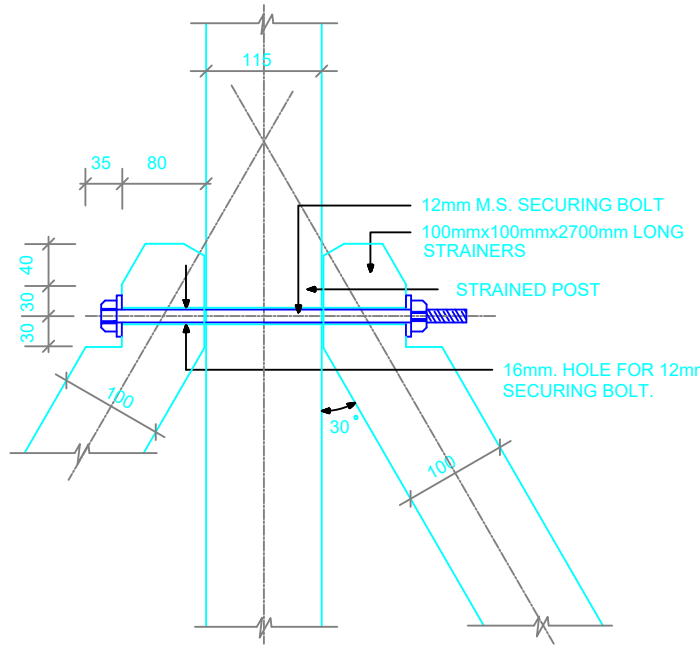


**DETAILS OF STRAINING POST FOR CHAIN LINK FENCE AT 33.3m CENTERS.**  
Scale:1:25

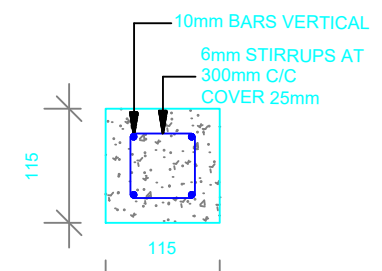


**DETAILS OF SINGLE P.C.C. POST AT 3.30m CENTERS.**  
Scale:1:25

- NOTES**
- a) ALL CORNER POSTS AND EVERY 10 SINGLE POST TO HAVE 2No. STAYS
  - b) POSTS TO BE AT 3000mm CENTRES
  - c) TOP OF ALL POSTS TO BE KEPT IN UNIFORM LINE
  - d) EXTENT OF FENCING IS SHOWN ON THE LAYOUT PLAN



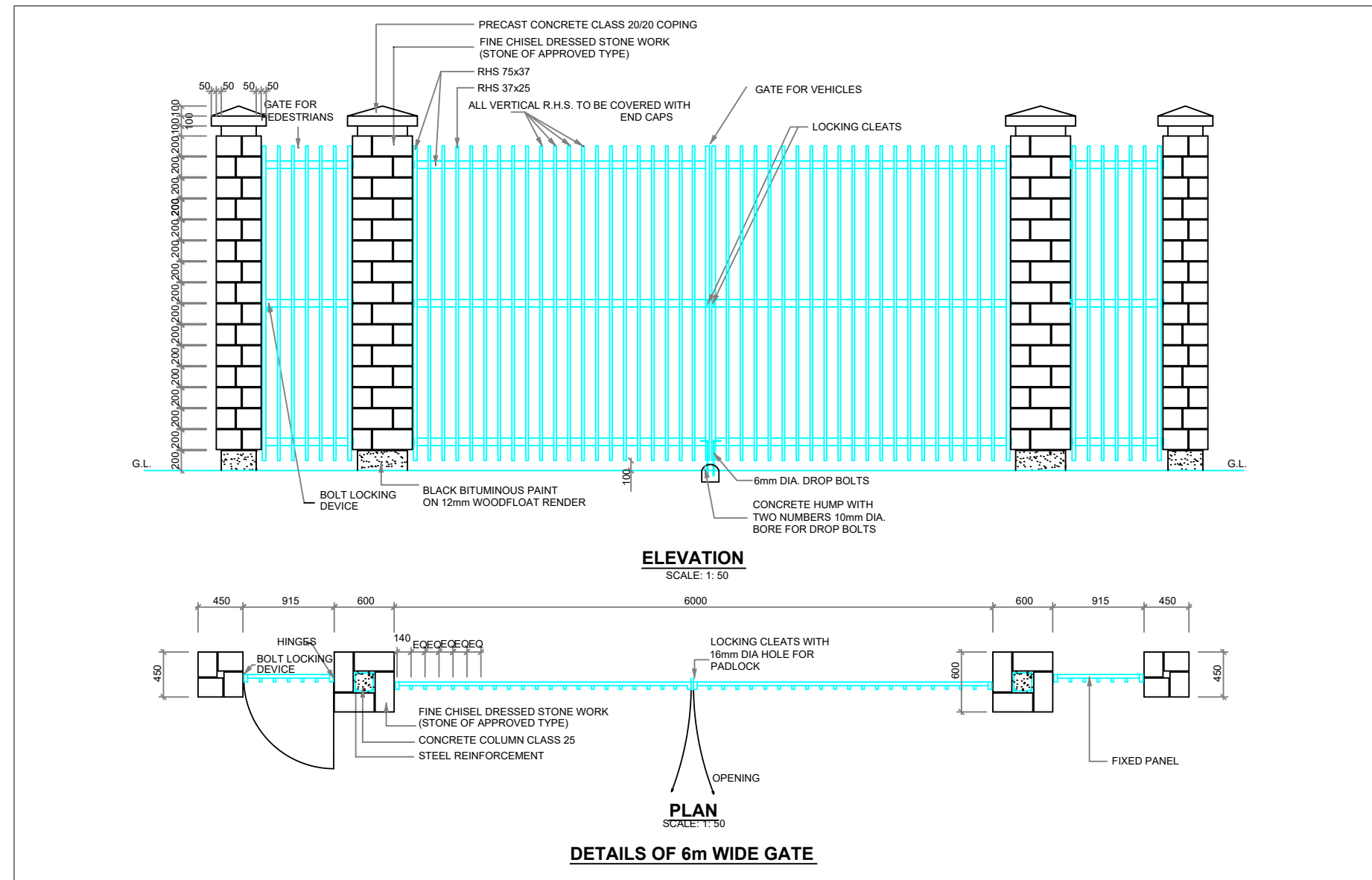
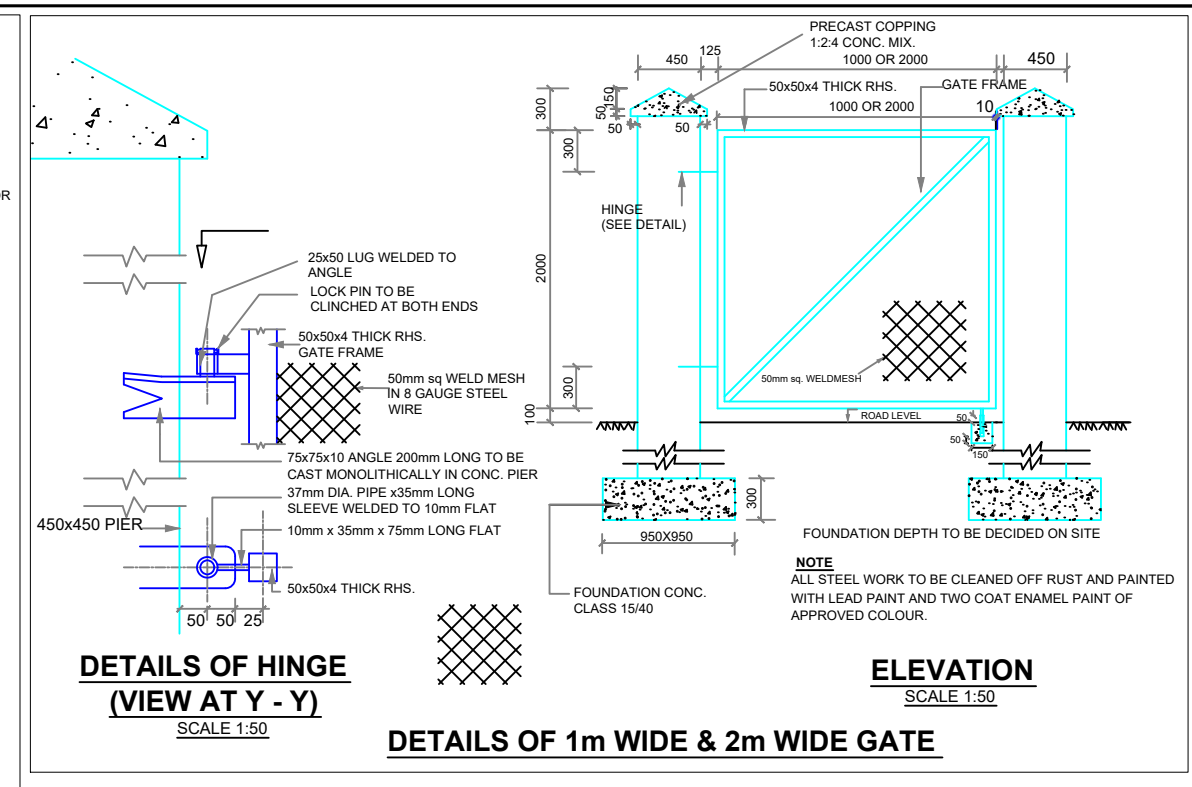
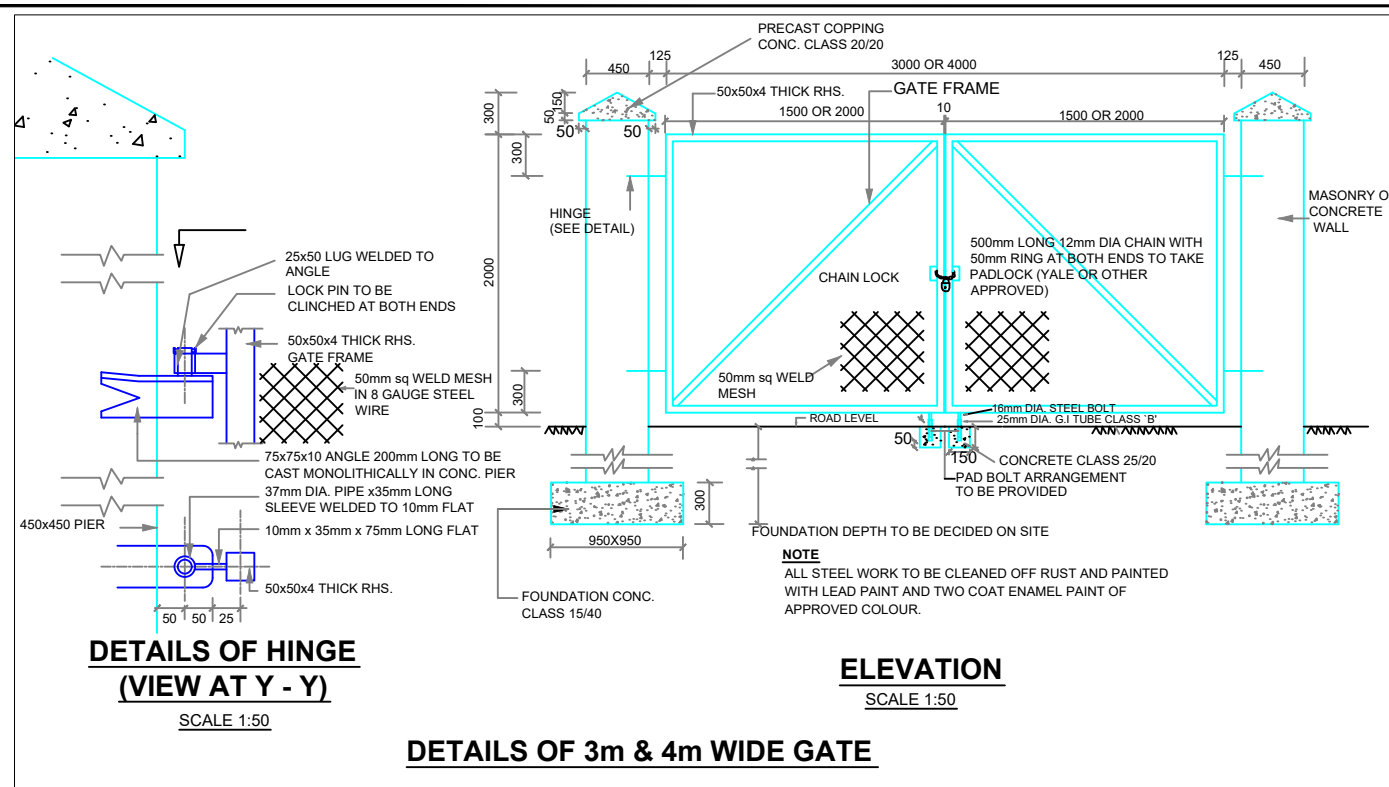
**DETAIL 1**  
Scale:1:8



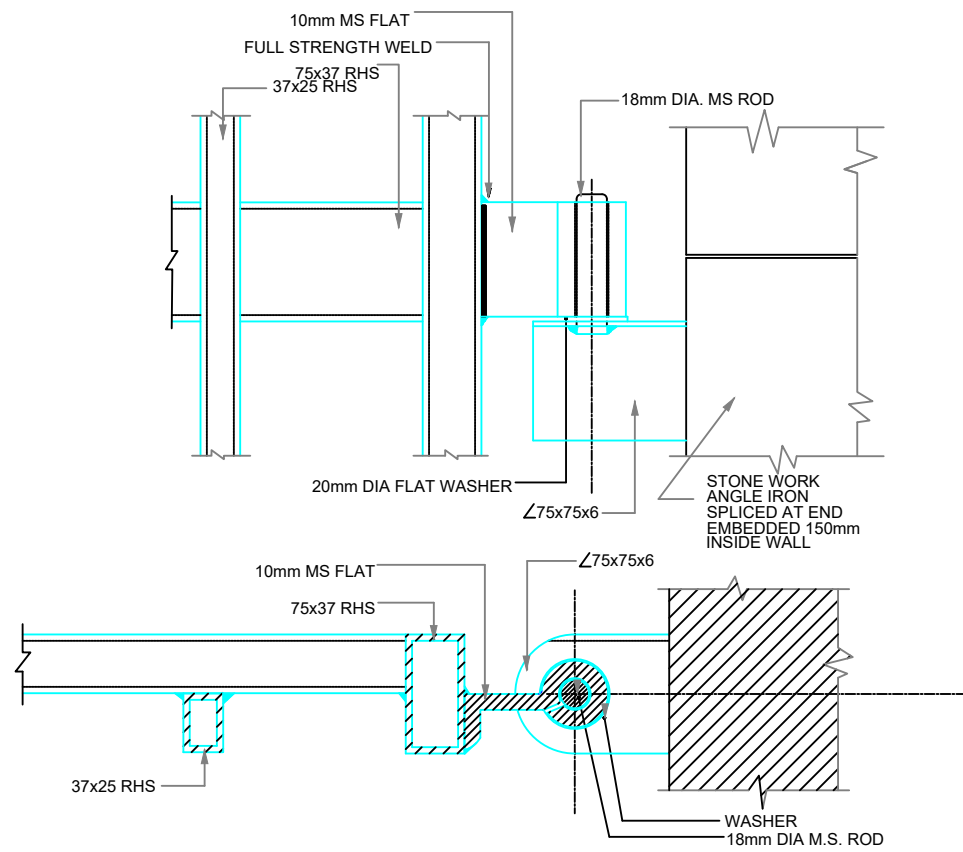
**SECTION A - A**  
Scale:1:8

**NOTE:**  
CONCRETE EDGES OF POSTS TO HAVE 25x25mm CHAMFER

<p>Government of Uganda Ministry of Water and Environment</p>	<p>FUNDED BY</p>	<p>CONSULTANT</p>	<p>PROJECT REFERENCE NUMBER : ...</p> <p><b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b></p> <p>CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU AND TIRINYI</p>	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN:	Andrew Turyakira
				<p><b>STANDARD DRAWINGS FENCING</b></p>		SHEET NUMBER	1 OF 3		DESIGNED:
CONSTRUCTION SUPERVISION		FENCING SHEET 1 OF 3		DRAWING SCALE	H=1:1000 V=1:100 A3	CATEGORY	DETAIL	CHECKED:	
				DRAWING NUMBER			<p><b>IWMDP/MBA/1-D-008</b></p>		APPROVED:

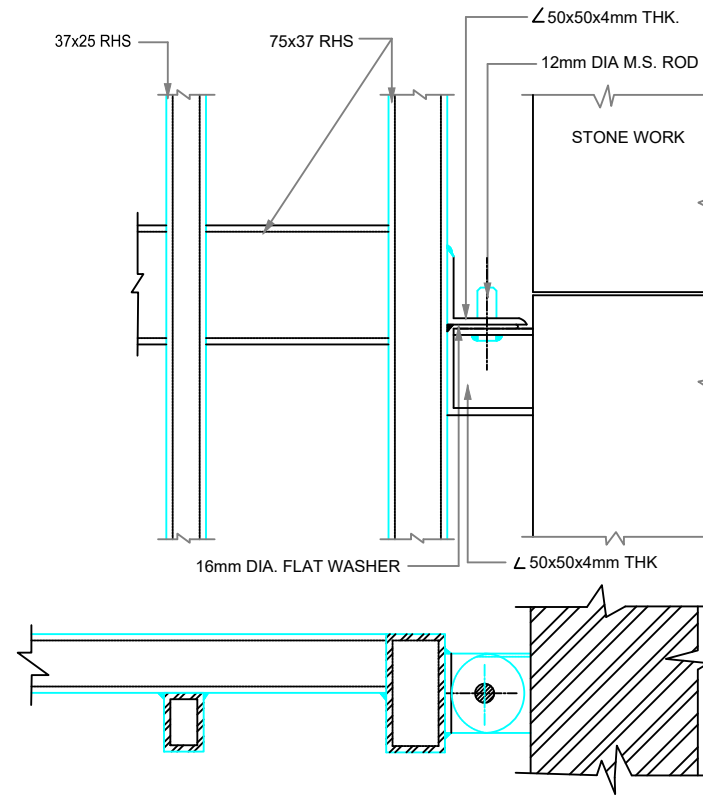


<p>Government of Uganda Ministry of Water and Environment</p>	<p>WORLD BANK</p>	<p>saman Barren Corp</p> <p>CHEIL</p> <p>AWE Engineers</p>	PROJECT REFERENCE NUMBER : ...	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN: Andrew Turyakira
			INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)	STANDARD DRAWINGS FENCING		SHEET NUMBER	2 OF 3	
CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI			CONSTRUCTION SUPERVISION	FENCING	SHEET 2 OF 3	DRAWING SCALE	H=1:1000 V=1:100 A3	CHECKED: Ronald Musenze
						CATEGORY	DETAIL	APPROVED: OH Dongwoom
						DRAWING NUMBER		
						IWMDP/MBA/1-D-008		



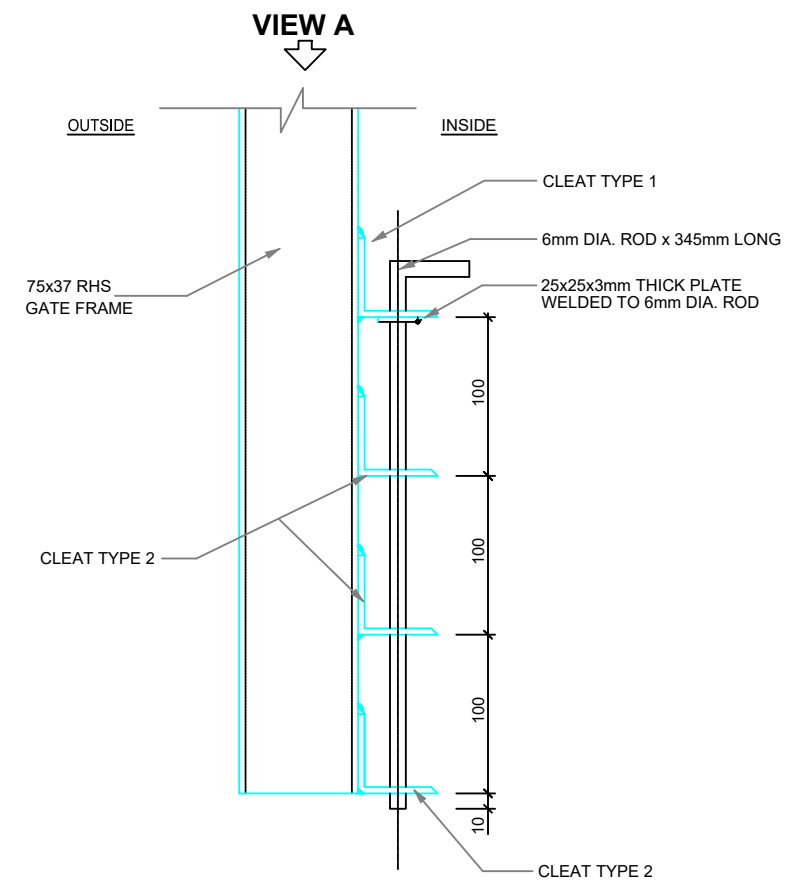
**DETAIL OF HINGE FOR LARGE GATE**

SCALE: 1:50



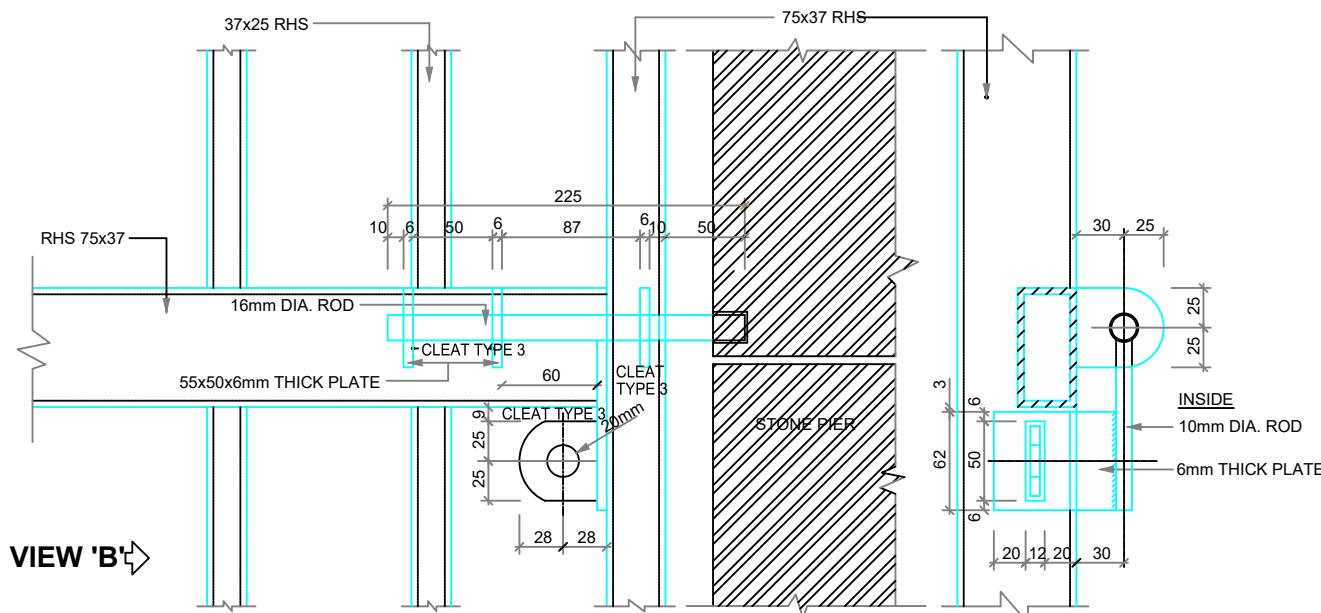
**DETAIL OF HINGE FOR SMALL GATE**

SCALE: 1:50



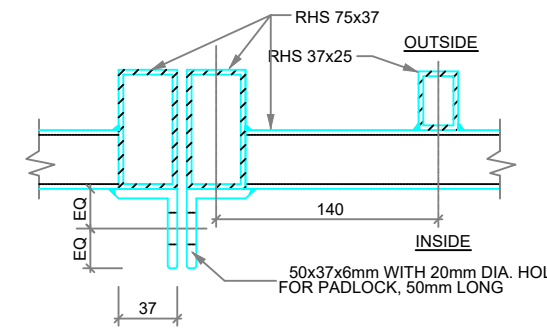
**DETAIL OF DROP BOLT FOR LARGE GATE**

SCALE: 1:50



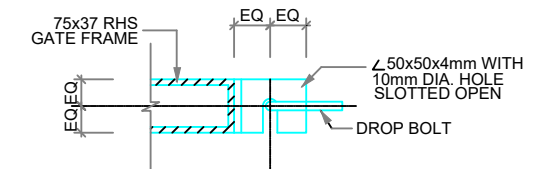
**DETAIL OF LOCKING BOLT FOR SMALL GATE**

SCALE: 1:50

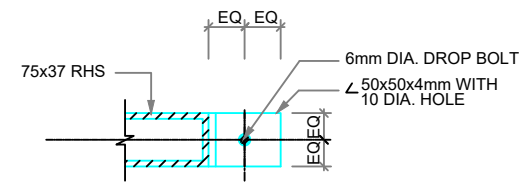


**DETAIL OF LOCKING CLEATS FOR LARGE GATE**

SCALE: 1:50



**CLEAT TYPE 1**



**CLEAT TYPE 2**

**DETAIL OF LOCKING BOLT FOR LARGE GATE**

**VIEW A**

SCALE: 1:50

CLIENT



Government of Uganda  
Ministry of Water and  
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PROJECT REFERENCE NUMBER : ...

**INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)**

CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI

DRAWING DESCRIPTION

**STANDARD DRAWINGS  
FENCING**

CONSTRUCTION  
SUPERVISION

FENCING  
SHEET 3 OF 3

DATE 19/08/2021

SHEET NUMBER 3 OF 3

DRAWING SCALE H=1:1000 V=1:100 A3

CATEGORY DETAIL

DRAWING NUMBER

**IWMDP/MBA/1-D-008**

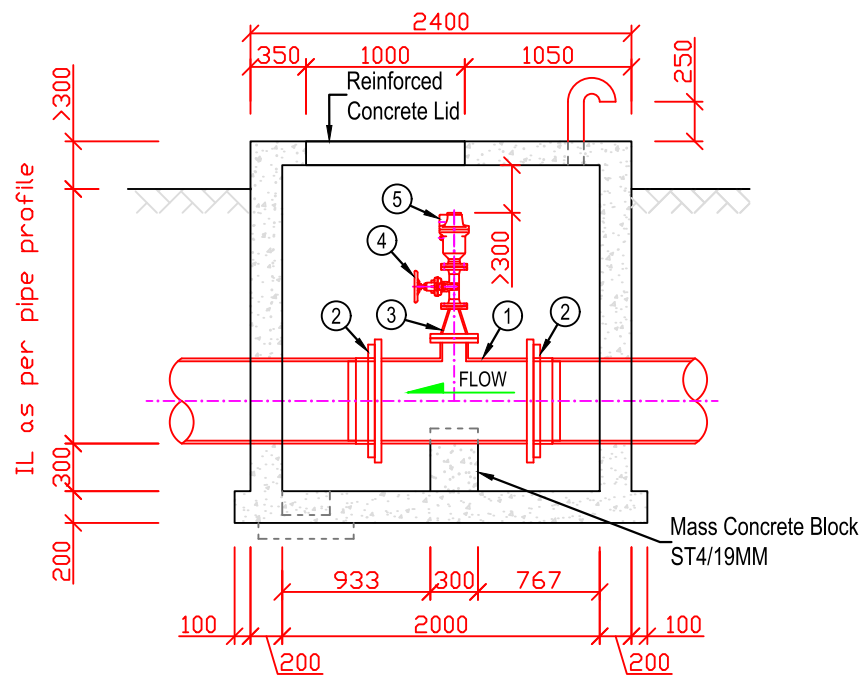
DRAWN: Andrew Turyakira

DESIGNED: Ceasar Kisa Wakiibi

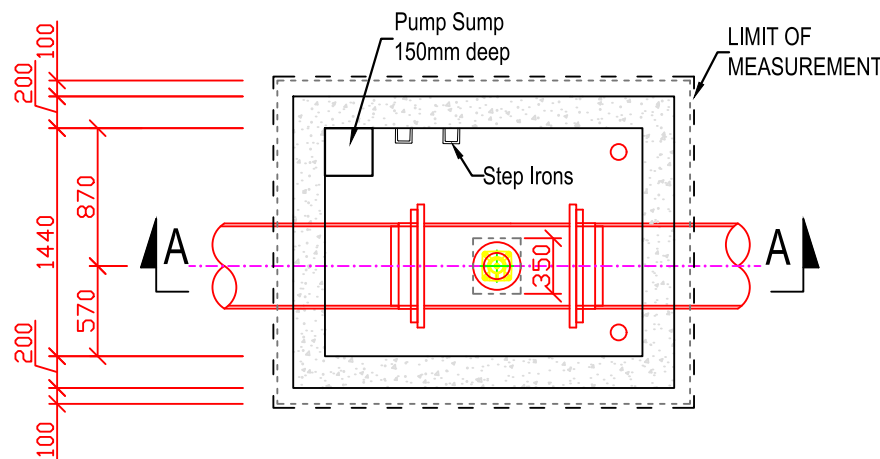
CHECKED: Ronald Musenze

APPROVED: OH Dongwoom





**Section A-A**  
Scale 1:50



**Plan**  
Scale 1:50

PIPE & FITTING SCHEDULE DN 300 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	300 mm / 150 mm	n/a		DN 300 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	300 mm	n/a		DN 300 Ductile Iron, Ranger Type Flange Adaptor, Connection to 300 DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE DN 400 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	400 mm / 150 mm	n/a		DN 400 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	400 mm	n/a		DN 400 Ductile Iron, Ranger Type Flange Adaptor, Connection to 400 DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE DN 500 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	500 mm / 150 mm	n/a		DN 500 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	500 mm	n/a		DN 500 Ductile Iron, Ranger Type Flange Adaptor, Connection to 500 DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE DN 600 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	600 mm / 150 mm	n/a		DN 600 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	600 mm	n/a		DN 600 Ductile Iron, Ranger Type Flange Adaptor, Connection to 600 DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE IDENTICAL FOR ALL DIAMETERS (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
③	1	150 mm / 50 mm	n/a		DN 150 to DN 50 mild steel taper, hot dip galvanized to BS ISO 1461, flanged on both sides
④	1	50 mm	3J861		50 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑤	1	50 mm	3J861		DN 50 Automatic Air Valve, Single Chamber Type, Resilient Seated, discharge up to sonic speed, Triple Function (vent and drain under pressure, drain during filling), Body and Bonnet in Ductile Iron, Inner Parts in Stainless Steel, EPDM Sealing, epoxy coating to BS 6920
⑥	1	100 mm	n/a		Set of two DN 100 Air Vents, mild steel, hot dip galvanized to BS ISO 1641, one to terminate at bottom level of roof slab, other 500 mm on top of base slab

**Notes**

**Pipework, Valves and Equipment**

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCALD 70 (OR EQUAL APPROVED)

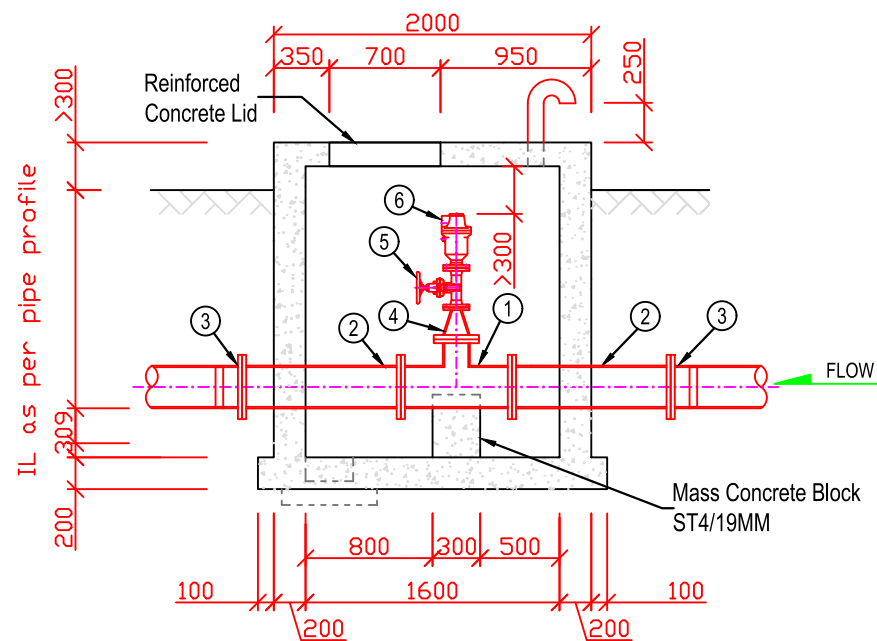
**Concrete**

- ALL STRUCTURAL CONCRETE TO BE C25/20 AND ALL MASS CONCRETE TO BE ST4/20
- ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- NO CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER

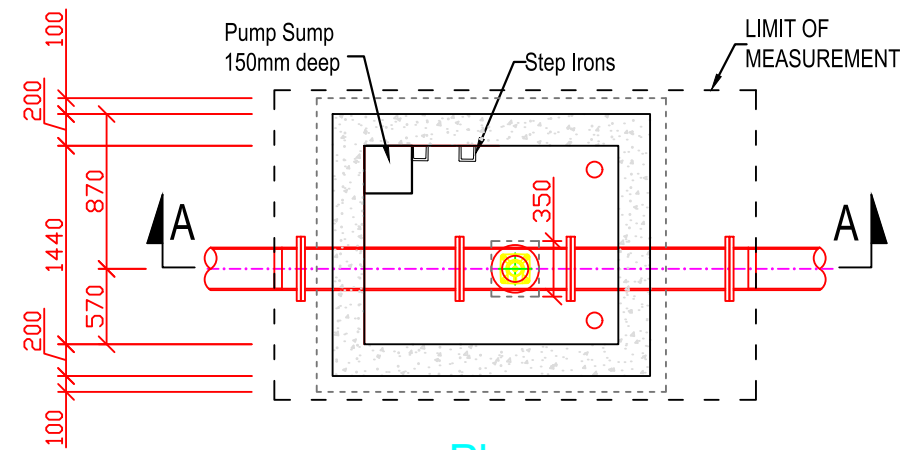
**General**

- ALL AIR VALVE CHAMBERS SHALL INCLUDE A DN 50 DRAIN PIPE WITH A SMALL HARD-CORE SOAK PIT ATTACHED (ONE M3)
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

 Government of Uganda Ministry of Water and Environment	 FUNDED BY WORLD BANK	 saman Saman Corp.	 CHEIL CONSULTANT	PROJECT REFERENCE NUMBER : ..... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI	DRAWING DESCRIPTION <b>CHAMBERS</b> <b>AIR VALVES DN 300 - DN 600</b>		DATE 19/08/2021	DRAWN: Andrew Turyakira
					SHEET NUMBER 1 OF 1	DRAWING SCALE H=1:1000 V=1:100 A3	DESIGNED: Ceaser Kisa Wakiibi	
					CONSTRUCTION SUPERVISION	AIR VALVES DN 300 - DN 600 SHEET 1 OF 1	CATEGORY DETAIL	CHECKED: Ronald Musenze
							DRAWING NUMBER <b>IWMDP/MBA/1-D-010</b>	APPROVED: OH Dongwoom



**Section A-A**  
Scale 1:50



**Plan**  
Scale 1:50

PIPE & FITTING SCHEDULE OD 250 mm or OD 280 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	250 mm / 150 mm	n/a		DN 250 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	250 mm	n/a		DN 250 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining
③	2	250 mm	n/a		DN 250 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 250 mm or OD 280 mm uPVC pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE OD 225 mm or DN 200 (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	200 mm / 150 mm	n/a		DN 200 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	200 mm	n/a		DN 200 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining
③	2	200 mm	n/a		DN 200 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 225 mm uPVC pipe or DN 200 Ductile Iron pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE OD 160 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	150 mm / 150 mm	n/a		DN 150 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	150 mm	n/a		DN 150 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining
③	2	150 mm	n/a		DN 150 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 160 mm uPVC pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE IDENTICAL FOR ALL DIAMETERS (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
④	1	150 mm / 50 mm	n/a		DN 150 to DN 50 mild steel taper, PN 16, hot dip galvanized to BS ISO 1461, flanged on both sides
⑤	1	50 mm	3J861		50 mm Gate Valve to EN 558-1, basic series 14, PN 16, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑥	1	50 mm	3J861		DN 50 Automatic Air Valve, Single Chamber Type, Resilient Seated, PN 16, discharge up to sonic speed, Triple Function (vent and drain under pressure, drain during filling), Body and Bonnet in Ductile Iron, Inner Parts in Stainless Steel, EPDM Sealing, epoxy coating to BS 6920
⑦	1	100 mm	n/a		Set of two DN 100 Air Vents, mild steel, hot dip galvanized to BS ISO 1641, one to terminate at bottom level of roof slab, other 500 mm on top of base slab

Notes

Pipework, Valves and Equipment

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCALD 70 (OR EQUAL APPROVED)

Concrete

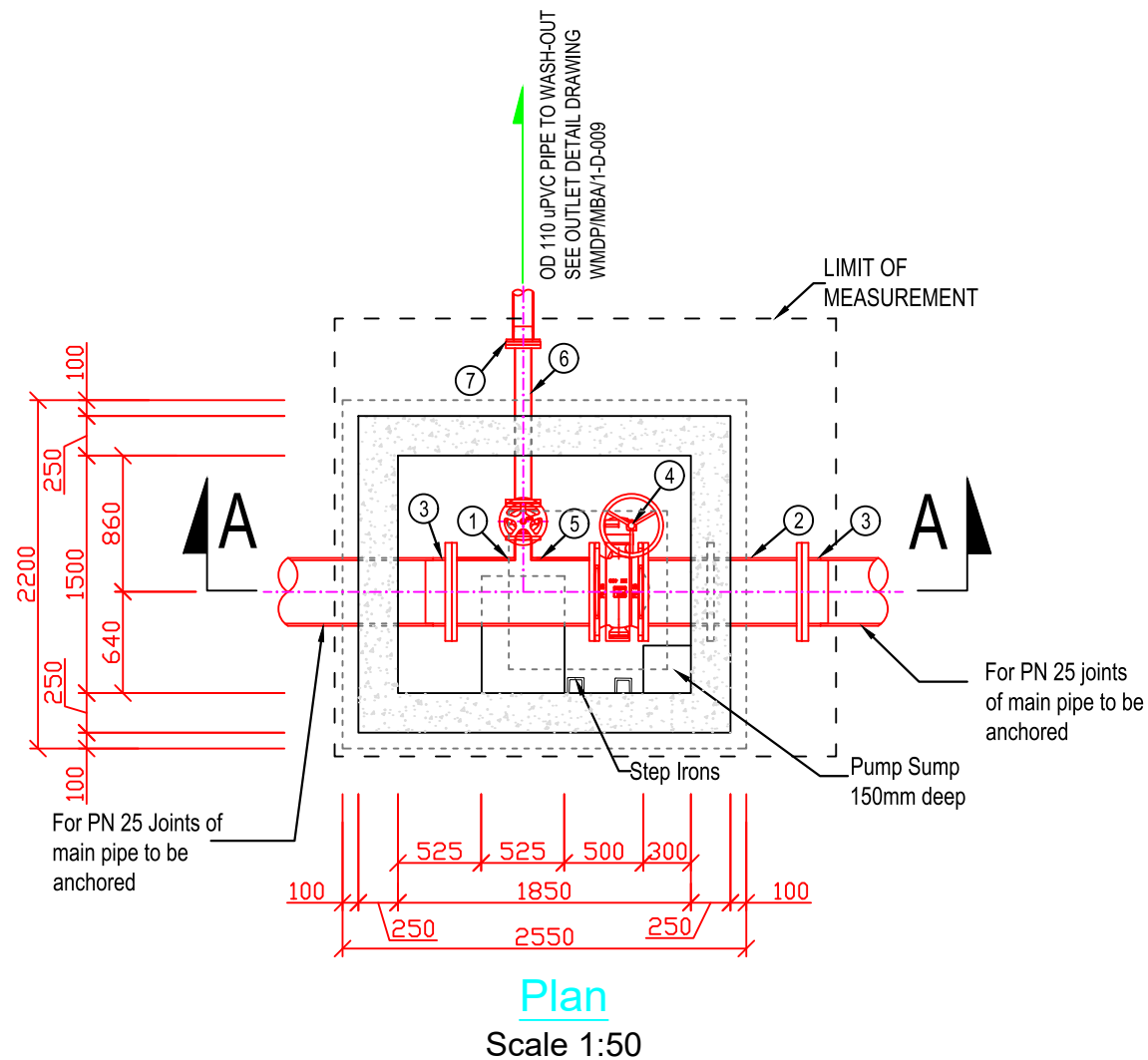
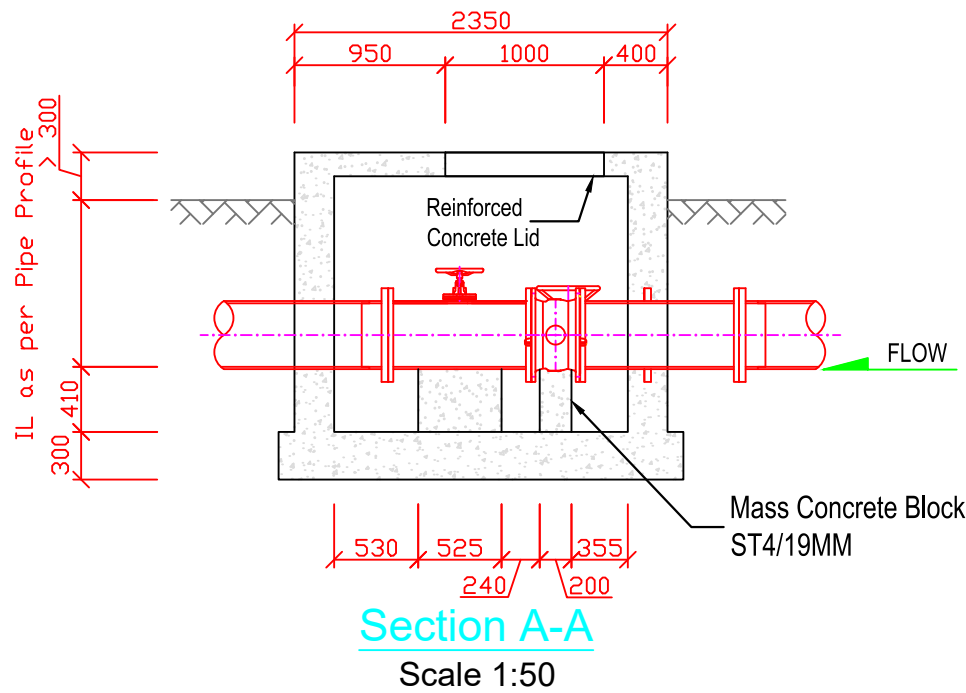
- ALL STRUCTURAL CONCRETE TO BE C25/20 AND ALL MASS CONCRETE TO BE ST4/20
- ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- ALL CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER

General

- ALL AIR VALVE CHAMBERS SHALL INCLUDE A DN 50 DISCHARGE PIPE AND A SMALL HARD-CORE SOAK PIT (0.5 M3)
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

 CLIENT Government of Uganda Ministry of Water and Environment	 FUNDED BY WORLD BANK	 CONSULTANT saman CHEIL  AWE Engineers	PROJECT REFERENCE NUMBER : ... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN:	Andrew Turyakira
				<b>CHAMBERS</b> <b>AIR VALVES OD 160 - 280</b>		SHEET NUMBER	1 OF 1		DESIGNED:
CONSTRUCTION SUPERVISION		AIR VALVES OD 160 - 280		DRAWING SCALE	H=1:1000 V=1:100 A3	CATEGORY	DETAIL	CHECKED:	Ronald Musenze
						DRAWING NUMBER		APPROVED:	OH Dongwoom
						IWMDP/MBA/1-D-011			

# DN 300 & 400



## PIPE & FITTING SCHEDULE DN 300 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	300 mm / 100 mm	n/a		DN 300 to DN 100 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	1	300 mm	n/a		DN 300 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	300 mm	n/a		DN 300 Ductile Iron, Restrained Flange Adaptor, Connection to DN 300 mm DI pipe. Epoxy coated with anchor bolts.
④	1	300 mm	varies		DN 300 mm Butterfly Valve to DIN EN 593, with double offset-flange, resilient seated, epoxy coated wear-, corrosion- and undermining-resitant disk, double offset bearing mounted in maintenance free bushing, incl handwheel

## PIPE & FITTING SCHEDULE DN 400 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	400 mm / 100 mm	n/a		DN 400 to DN 100 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	1	400 mm	n/a		DN 400 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	400 mm	n/a		DN 400 Ductile Iron, Restrained Flange Adaptor, Connection to DN 400 mm DI pipe. Epoxy coated with anchor bolts.
④	1	400 mm	varies		DN 400 mm Butterfly Valve to DIN EN 593, with double offset flange, epoxy coated wear-, corrosion- and undermining-resitant disk, double offset bearing mounted in maintenance free bushing, incl handwheel

## PIPE & FITTING SCHEDULE IDENTICAL FOR ALL DIAMETERS (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
⑤	1	100 mm	varies		DN 100 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl hand wheel
⑥	1	100 mm	n/a		DN 100 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining
⑦	1	100 mm	n/a		DN 100 Ductile Iron, Flange Adaptor ( VAG Vari Plus RFA Ranger, or similar approved), Connection to OD 110 mm PVC pipe. Epoxy coated with anchor bolts.

## Notes

### Pipework, Valves and Equipment

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'ICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCALD 70 (OR EQUAL APPROVED)

### Concrete

- ALL STRUCTURAL CONCRETE TO BE C25/19 AND ALL MASS CONCRETE TO BE ST4/19
- ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- ALL CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER

### General

- WASH-OUT LOCATION TO BE DIRECTED BY THE ENGINEER
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

CLIENT



Government of Uganda  
Ministry of Water and  
Environment

FUNDED BY



CONSULTANT



PROJECT REFERENCE NUMBER : ...

INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)

CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI

DRAWING DESCRIPTION

CHAMBERS  
WASHOUT WITH IV DN 300 - DN 600

CONSTRUCTION  
SUPERVISION

WASHOUT WITH IV DN 300 - DN 600

SHEET 1 OF 2

DATE 19/08/2021

SHEET NUMBER 1 OF 2

DRAWING SCALE H=1:1000 V=1:100 A3

CATEGORY DETAIL

DRAWING NUMBER

IWMDP/MBA/1-D-012

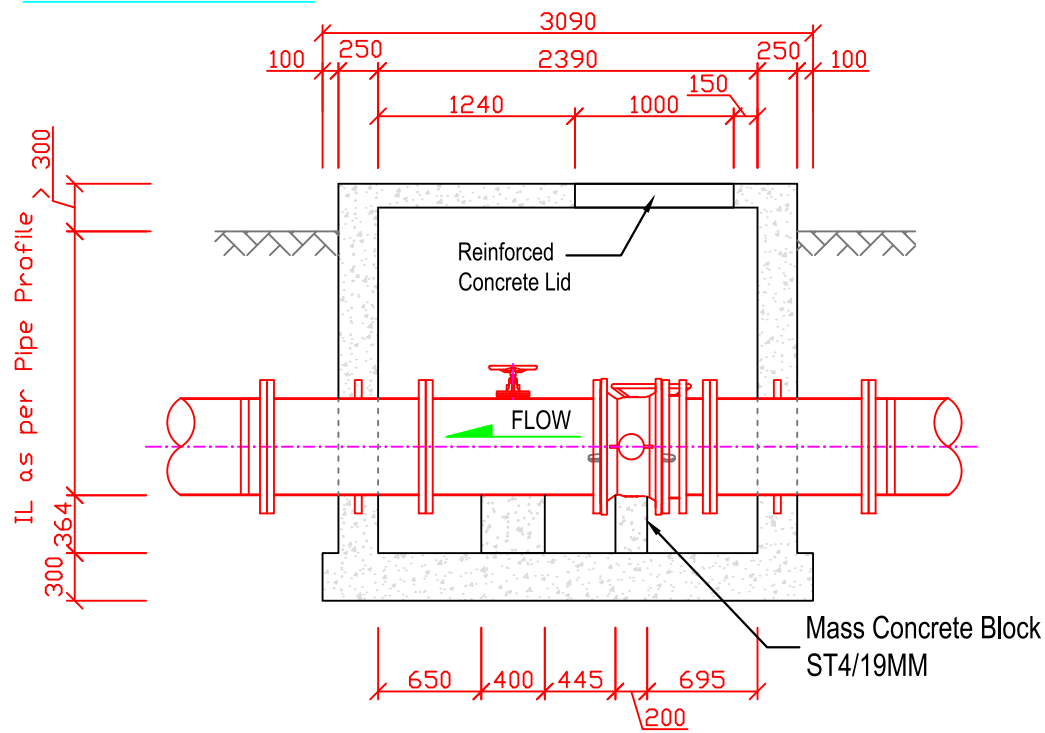
DRAWN: Andrew Turyakira

DESIGNED: Ceaser Kisa Wakiibi

CHECKED: Ronald Musenze

APPROVED: OH Dongwoom

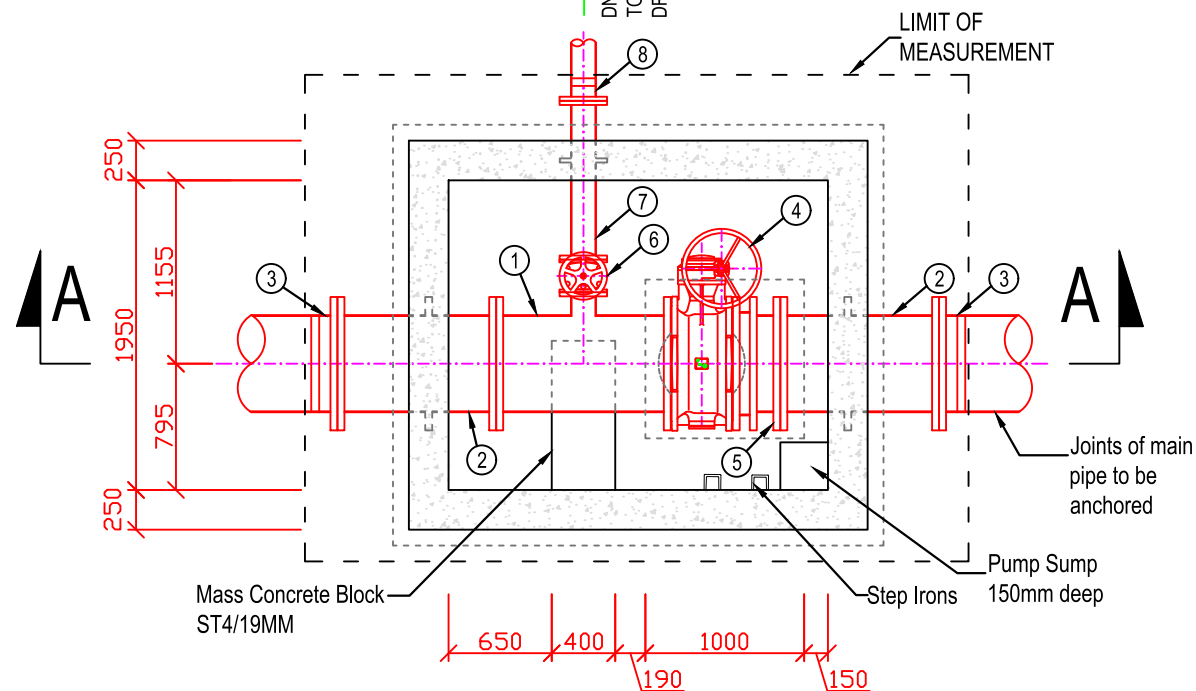
# DN 500 & 600



## Section A-A

Scale 1:50

DN 200 PIPE (uPVC for PN 16, DI for PN 25)  
TO WASH-OUT SEE OUTLET DETAIL  
DRAWING WMDP/MB/1-D-009



## Plan

Scale 1:50

### PIPE & FITTING SCHEDULE DN 500 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	500 mm / 150 mm	n/a		DN 500 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	500 mm	n/a		DN 500 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	500 mm	n/a		DN 500 Ductile Iron, Restrained Flange Adaptor, Connection to DN 500 mm DI pipe. Epoxy coated with anchor bolts.
④	1	500 mm	varies		DN 500 mm Butterfly Valve to DIN 593, with double offset flange, epoxy coated wear-, corrosion- and undermining-resitant disk, double offset bearing mounted in maintainance free bushing, incl handwheel
⑤	1	500 mm	varies		DN 500 Ductile Iron, Dismantling Piece, Epoxy coated with anchor bolts, threaded anchor bolts on both sides

### PIPE & FITTING SCHEDULE DN 600 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	600 mm / 150 mm	n/a		DN 600 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	600 mm	n/a		DN 600 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	600 mm	n/a		DN 600 Ductile Iron, Restrained Flange Adaptor, Connection to DN 600 mm DI pipe. Epoxy coated with anchor bolts.
④	1	600 mm	varies		DN 600 mm Butterfly Valve to DIN 593, with double offset flange, epoxy coated wear-, corrosion- and undermining-resitant disk, double offset bearing mounted in maintainance free bushing, incl handwheel
⑤	1	600 mm	varies		DN 600 Ductile Iron, Dismantling Piece, Epoxy coated with anchor bolts, threaded anchor bolts on both sides

### PIPE & FITTING SCHEDULE IDENTICAL FOR ALL DIAMETERS (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
⑥	1	150 mm	varies		DN 150 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl hand wheel
⑦	1	150 mm	n/a		DN 150 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, with puddle flange, cement mortar lining
⑧	1	150 mm	n/a		DN 150 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 160 mm PVC pipe or DN 150 Ductile Iron pipe depending on pressure class of main pipe. Epoxy coated with anchor bolts.

### Notes

#### Pipework, Valves and Equipment

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCCLAD 70 (OR EQUAL APPROVED)

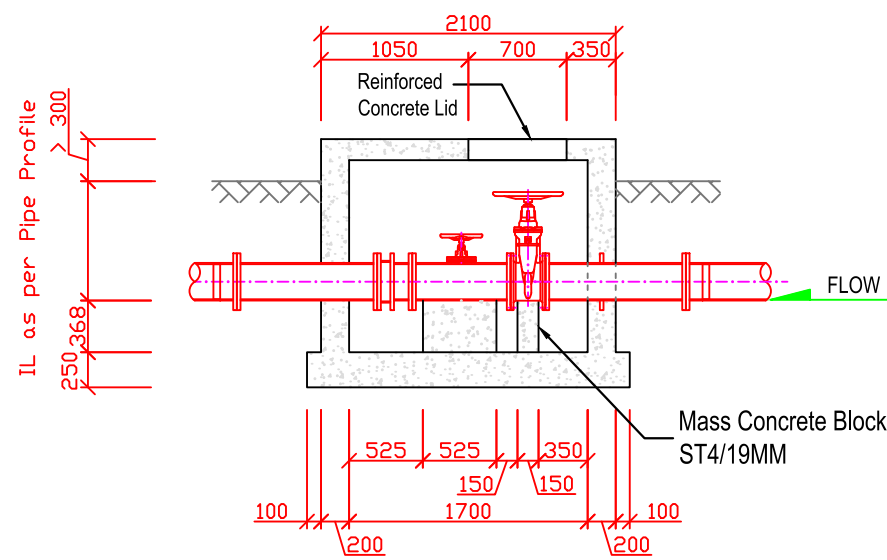
#### Concrete

- ALL STRUCTURAL CONCRETE TO BE C25/19 AND ALL MASS CONCRETE TO BE ST4/19
- ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- ALL CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER

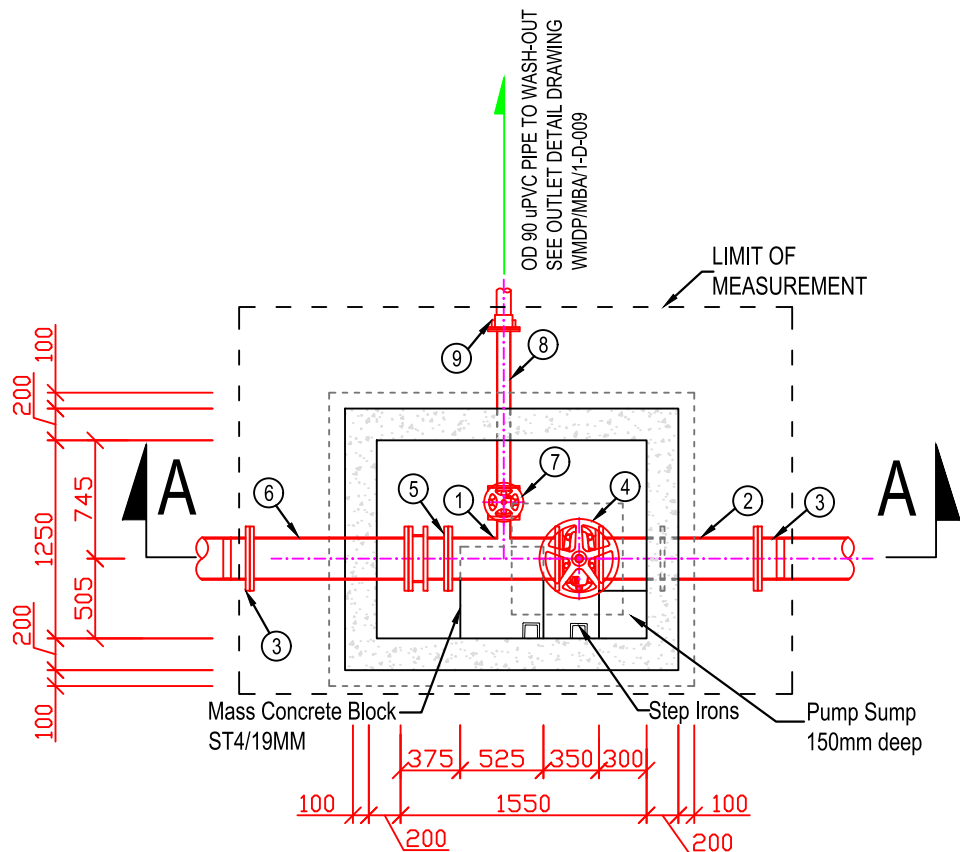
#### General

- WASH-OUT LOCATION TO BE DIRECTED BY THE ENGINEER
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

 CLIENT Government of Uganda Ministry of Water and Environment	 FUNDED BY WORLD BANK	 CONSULTANT saman CHEIL AWE Engineers	PROJECT REFERENCE NUMBER : ... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN:	Andrew Turyakira
				<b>CHAMBERS WASHOUT WITH IV DN 300 - DN 600</b>		SHEET NUMBER	2 OF 2		DESIGNED:
CONSTRUCTION SUPERVISION		WASHOUT WITH IV DN 300 - DN 600		DRAWING SCALE	H=1:1000 V=1:100 A3	CATEGORY	DETAIL	CHECKED:	Ronald Musenze
				DRAWING NUMBER		IWMDB/MB/1-D-012		APPROVED:	OH Dongwoom
				SHEET 2 OF 2					



**Section A-A**  
Scale 1:50



**Plan**  
Scale 1:50

PIPE & FITTING SCHEDULE IDENTICAL FOR ALL DIAMETERS (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
⑦	1	80 mm	varies		DN 80 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑧	1	80 mm	n/a		DN 80 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining
⑨	1	80 mm	n/a		DN 80 Ductile Iron, Flange Adaptor, Connection to OD90 PVC pipe. Epoxy coated with anchor bolts.

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	250 mm / 80 mm	n/a		DN 250 to DN 80 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	1	250 mm	n/a		DN 250 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	250 mm	n/a		DN 250 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 250 mm or OD 280 mm uPVC pipe. Epoxy coated with anchor bolts.
④	1	250 mm	varies		DN 250 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑤	1	250 mm	n/a		DN 250 Ductile Iron, Dismantling Piece, Epoxy coated with anchor bolts, threaded anchor bolts on both sides
⑥	1	250 mm	n/a		DN 250 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining

PIPE & FITTING SCHEDULE OD 225 mm or DN 200 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	200 mm / 80 mm	n/a		DN 200 to DN 80 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	1	200 mm	n/a		DN 200 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	200 mm	n/a		DN 200 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 225 mm uPVC pipe or DN 200 Ductile Iron pipe. Epoxy coated with anchor bolts.
④	1	200 mm	varies		DN 200 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑤	1	200 mm	n/a		DN 200 Ductile Iron, Dismantling Piece, Epoxy coated with anchor bolts, threaded anchor bolts on both sides
⑥	1	200 mm	n/a		DN 200 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining

PIPE & FITTING SCHEDULE OD 160 mm (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	150 mm / 80 mm	n/a		DN 150 to DN80 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	1	150 mm	n/a		DN 150 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	150 mm	n/a		DN 150 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 160 mm uPVC pipe. Epoxy coated with anchor bolts.
④	1	150 mm	varies		DN 150 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑤	1	150 mm	n/a		DN 150 Ductile Iron, Dismantling Piece, Epoxy coated with anchor bolts, threaded anchor bolts on both sides
⑥	1	150 mm	n/a		DN 150 Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining

**Notes**

**Pipework, Valves and Equipment**

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCALD 70 (OR EQUAL APPROVED)

**Concrete**

- ALL STRUCTURE CONCRETE TO BE C25/19 AND ALL MASS CONCRETE TO BE ST4/19
- ALL EXPOSED CONCRETE STRUCTURES TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- ALL CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE TO BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER

**General**

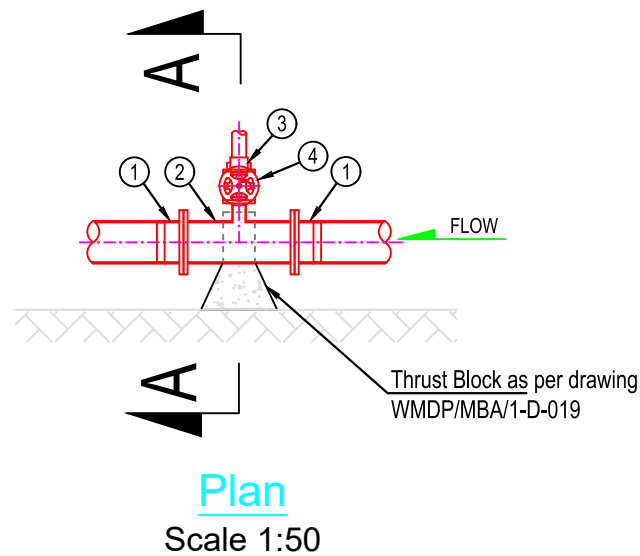
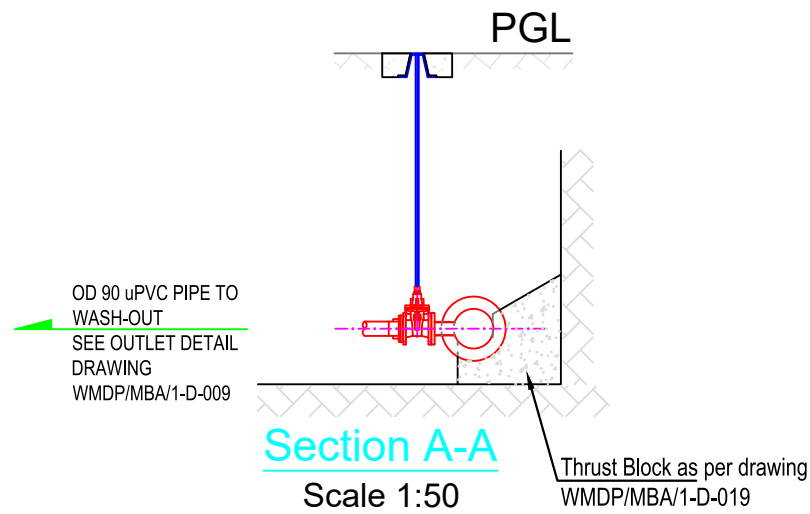
- WASH-OUT LOCATION TO BE DIRECTED BY THE ENGINEER
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL



PROJECT REFERENCE NUMBER : ...  
**INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)**  
CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI

DRAWING DESCRIPTION  
**CHAMBERS**  
**WASHOUT WITH IV OD 160 - 280**  
CONSTRUCTION SUPERVISION  
WASHOUT WITH IV OD 160 - 280  
SHEET 1 OF 1

DATE	19/08/2021	DRAWN:	Andrew Turyakira
SHEET NUMBER	1 OF 1	DESIGNED:	Ceaser Kisa Wakiibi
DRAWING SCALE	H=1:1000 V=1:100 A3	CHECKED:	Ronald Musenze
CATEGORY	DETAIL	APPROVED:	OH Dongwoom
DRAWING NUMBER <b>IWMDP/MBA/1-D-013</b>			



PIPE & FITTING SCHEDULE OD 250 mm or OD 280 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	250 mm / 80 mm	n/a		DN 250 to DN 80 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	250 mm	n/a		DN 250 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 250 or OD 280 mm uPVC pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE OD 225 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	200 mm / 80 mm	n/a		DN 200 to DN 80 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	200 mm	n/a		DN 200 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 225 mm uPVC pipe or DN 200 Ductile Iron pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE OD 160 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	150 mm / 80 mm	n/a		DN 150 to DN 80 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	150 mm	n/a		DN 150 Ductile Iron, Ranger Type Flange Adaptor, Connection to OD 160 mm uPVC pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE IDENTICAL FOR ALL DIAMETERS (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
③	1	80 mm	n/a		DN 80 Ductile Iron, Flange Adaptor, Connection to OD 90 PVC pipe. Epoxy coated with anchor bolts.
④	1	80 mm	n/a		DN 80 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, suitable for underground installation, incl extension spindle (< 2.5m) and valve box

## Notes

### Pipework, Valves and Equipment

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCALD 70 (OR EQUAL APPROVED)

### General

- WASH-OUT LOCATION TO BE DIRECTED BY THE ENGINEER
- THRUST BLOCK MEASURED ELSEWHERE
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

CLIENT



Government of Uganda  
Ministry of Water and  
Environment

FUNDED BY



CONSULTANT



PROJECT REFERENCE NUMBER : ....

INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)

CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI

DRAWING DESCRIPTION

CHAMBERS  
WASHOUT OD 160 - 280

CONSTRUCTION  
SUPERVISION

WASHOUT OD 160 - 280

SHEET 1 OF 1

DATE 19/08/2021

SHEET NUMBER 1 OF 1

DRAWING SCALE H=1:1000 V=1:100 A3

CATEGORY DETAIL

DRAWING NUMBER

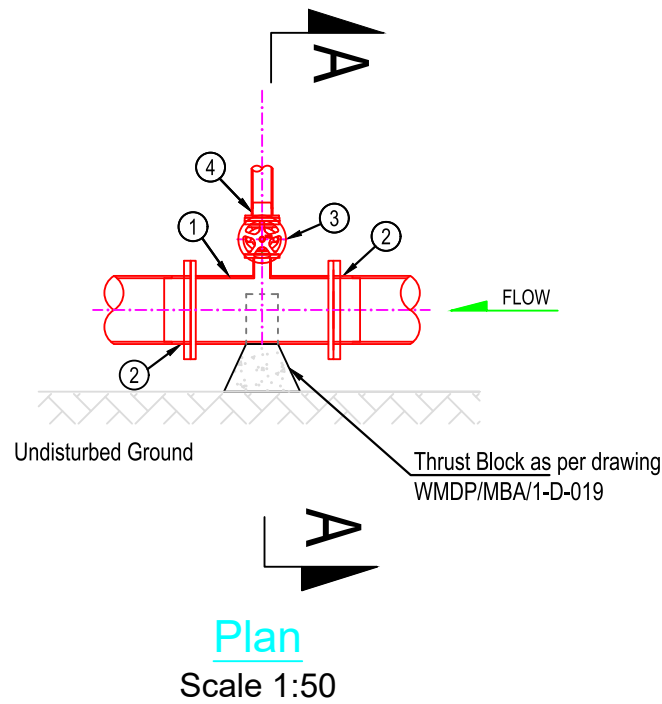
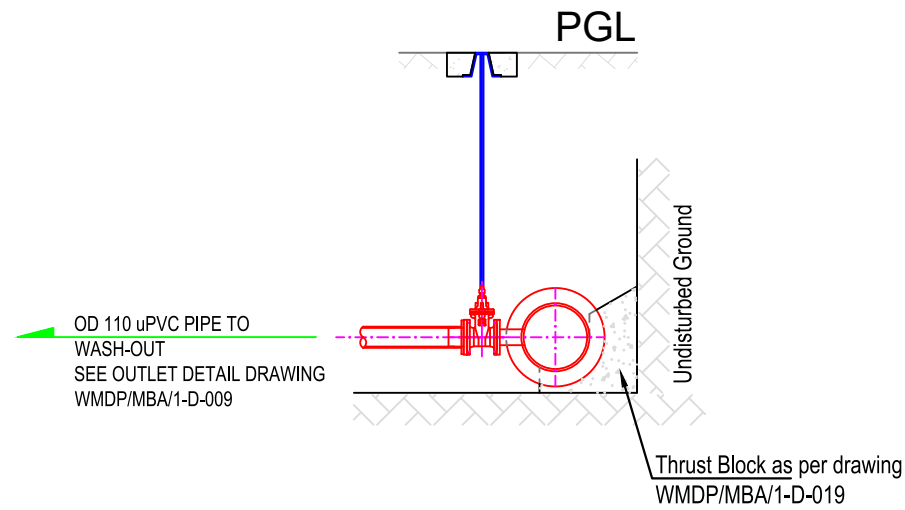
IWMDP/MBA/1-D-014

DRAWN: Andrew Turyakira

DESIGNED: Ceaser Kisa Wakiibi

CHECKED: Ronald Musenze

APPROVED: OH Dongwoom



PIPE & FITTING SCHEDULE DN 400 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	400 mm / 100 mm	n/a		DN 400 to DN 100 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	400 mm	n/a		DN 400 Ductile Iron, Ranger Type Flange Adaptor, Connection to DN 400 mm DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE DN 300 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	300 mm / 100 mm	n/a		DN 300 to DN 100 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	300 mm	n/a		DN 300 Ductile Iron, Ranger Type Flange Adaptor, Connection to DN 300 mm DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE IDENTICAL FOR DN 300 & 400 MAIN PIPE (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
③	1	100 mm	n/a		DN 100 Ductile Iron, Flange Adaptor, Connection to OD90 PVC pipe. Epoxy coated with anchor bolts.
④	1	100 mm	n/a		DN 100 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, suitable for underground installation, incl extension spindle (< 2.5m) and valve box

PIPE & FITTING SCHEDULE DN 500 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	500 mm / 150 mm	n/a		DN 500 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	500 mm	n/a		DN 500 Ductile Iron, Ranger Type Flange Adaptor, Connection to DN 500 mm DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE DN 600 mm (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	600 mm / 150 mm	n/a		DN 600 to DN 150 mm Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	600 mm	n/a		DN 600 Ductile Iron, Ranger Type Flange Adaptor, Connection to DN 600 mm DI pipe. Epoxy coated with anchor bolts.

PIPE & FITTING SCHEDULE IDENTICAL FOR DN 500 & 600 MAIN PIPE (Quantity per Wash-Out)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
③	1	150 mm	n/a		DN 150 Ductile Iron, Flange Adaptor, Connection to OD160 PVC pipe or DN 150 Ductile Iron, depending on pressure class of main pipe. Epoxy coated with anchor bolts.
④	1	150 mm	n/a		DN 150 mm Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl hand wheel

**Notes**

**Pipework, Valves and Equipment**

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCALD 70 (OR EQUAL APPROVED)

**Concrete**

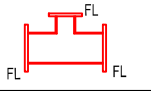
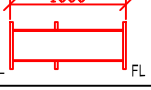

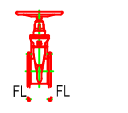

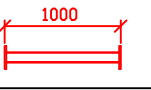
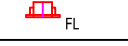
- ALL STRUCTURAL CONCRETE TO BE C25/20 AND ALL MASS CONCRETE TO BE ST4/20
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER

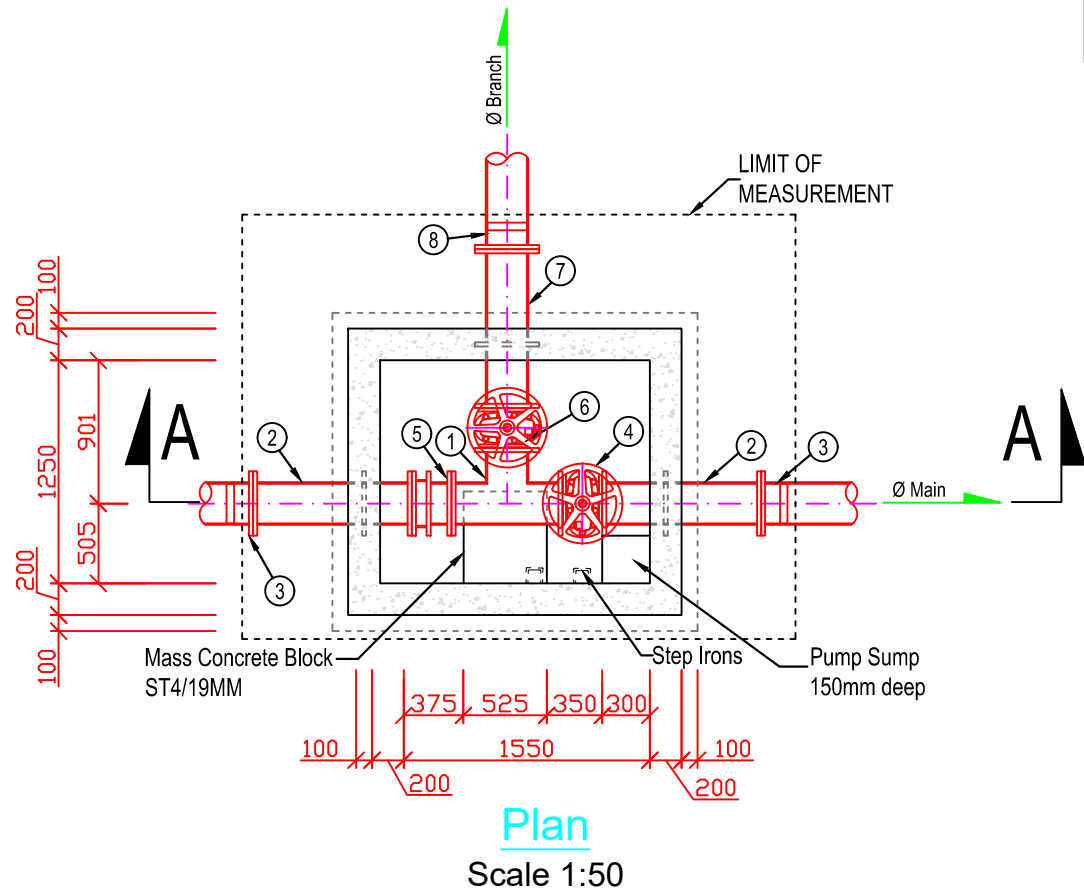
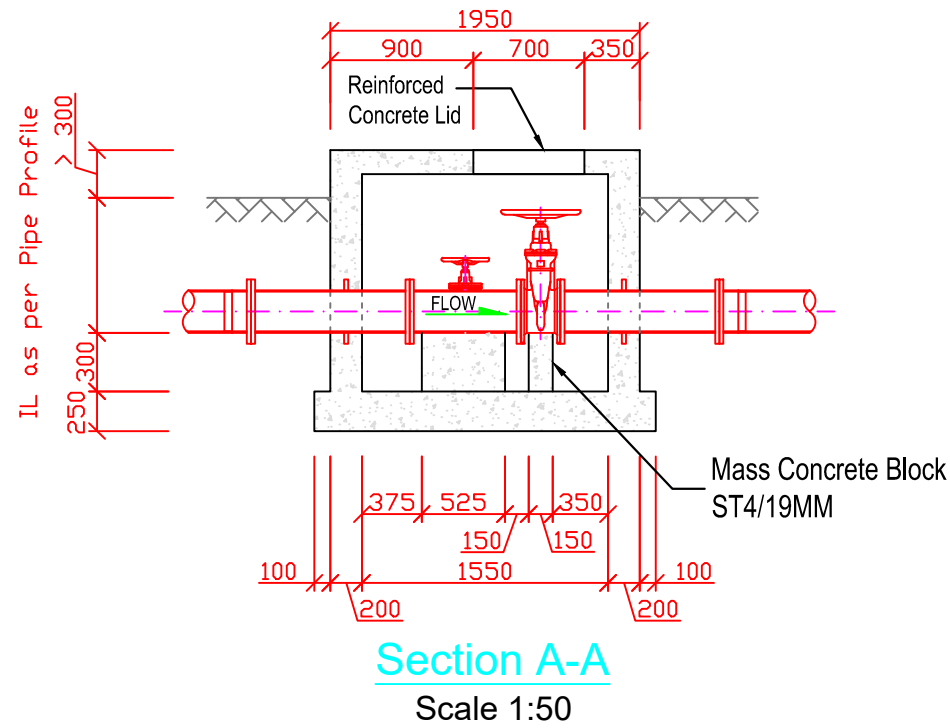
**General**

- WASH-OUT LOCATION TO BE DIRECTED BY THE ENGINEER
- THRUST BLOCK MEASURED SEPERATELY
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

 Government of Uganda Ministry of Water and Environment	 FUNDED BY	   CONSULTANT	PROJECT REFERENCE NUMBER : .... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN:	Andrew Turyakira
				<b>CHAMBERS WASHOUT DN 300 - DN 600</b>		SHEET NUMBER	1 OF 1		DESIGNED:
CONSTRUCTION SUPERVISION		WASHOUT DN 300 - DN 600		DRAWING SCALE	H=1:1000 V=1:100	A3	CHECKED:	Ronald Musenze	
SHEET 1 OF 1		IWMDP/MBA/1-D-015		CATEGORY	DETAIL		APPROVED:	OH Dongwoom	

PIPE & FITTING SCHEDULE BRANCHES DN 125 TO DN 250 (Quantity per Chamber)

ITEM	Qty.	Dia.	BoQ Item	DETAILS	DESCRIPTION
①	1	DN Main / DN Branch	n/a		DN Main Pipe to DN Branch Ductile Iron Tee Piece, to DIN EN 545, flanged on all sides, cement mortar lining
②	2	DN Main	n/a		DN Main Pipe Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, incl Puddle Flange, cement mortar lining
③	2	DN Main	n/a		DN Main Pipe Ductile Iron, Ranger Type Flange Adaptor, Connection to main pipeline. Epoxy coated with anchor bolts.
④	1	DN Main	Varies		DN Main Pipe Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl. handwheel
⑤	1	DN Main	n/a		DN Main Pipe Ductile Iron, Dismantling Piece, Epoxy coated with anchor bolts, threaded anchor bolts on both sides
⑥	1	DN Branch	varies		DN Branch Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to BS 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl handwheel
⑦	1	DN Branch	n/a		DN Branch Flanged Ductile Iron Piece, 1m, to DIN EN 545, flanged on all sides, cement mortar lining
⑧	1	DN Branch	n/a		DN Branch Ductile Iron, Flange Adaptor, Connection to branch pipeline. Epoxy coated with anchor bolts.



Notes

Pipework, Valves and Equipment

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL RSV GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- PRESSURE CLASS AS PER LONGITUDINAL SECTION
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELLING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED, DENSOCLAD 70 (OR EQUAL APPROVED)
- 300 mm CLEARANCE TO BE MAINTAINED BETWEEN FLANGE AND WALL

Concrete

- ALL STRUCTURAL CONCRETE TO BE C25/19 AND ALL MASS CONCRETE TO BE ST4/19
- ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- ALL CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER
- WALLS AND BASE TO BE REINFORCED WITH Y12 AT 250 mm SPACING BOTH WAYS, SLAB WITH Y10 AT 250 mm SPACING

General

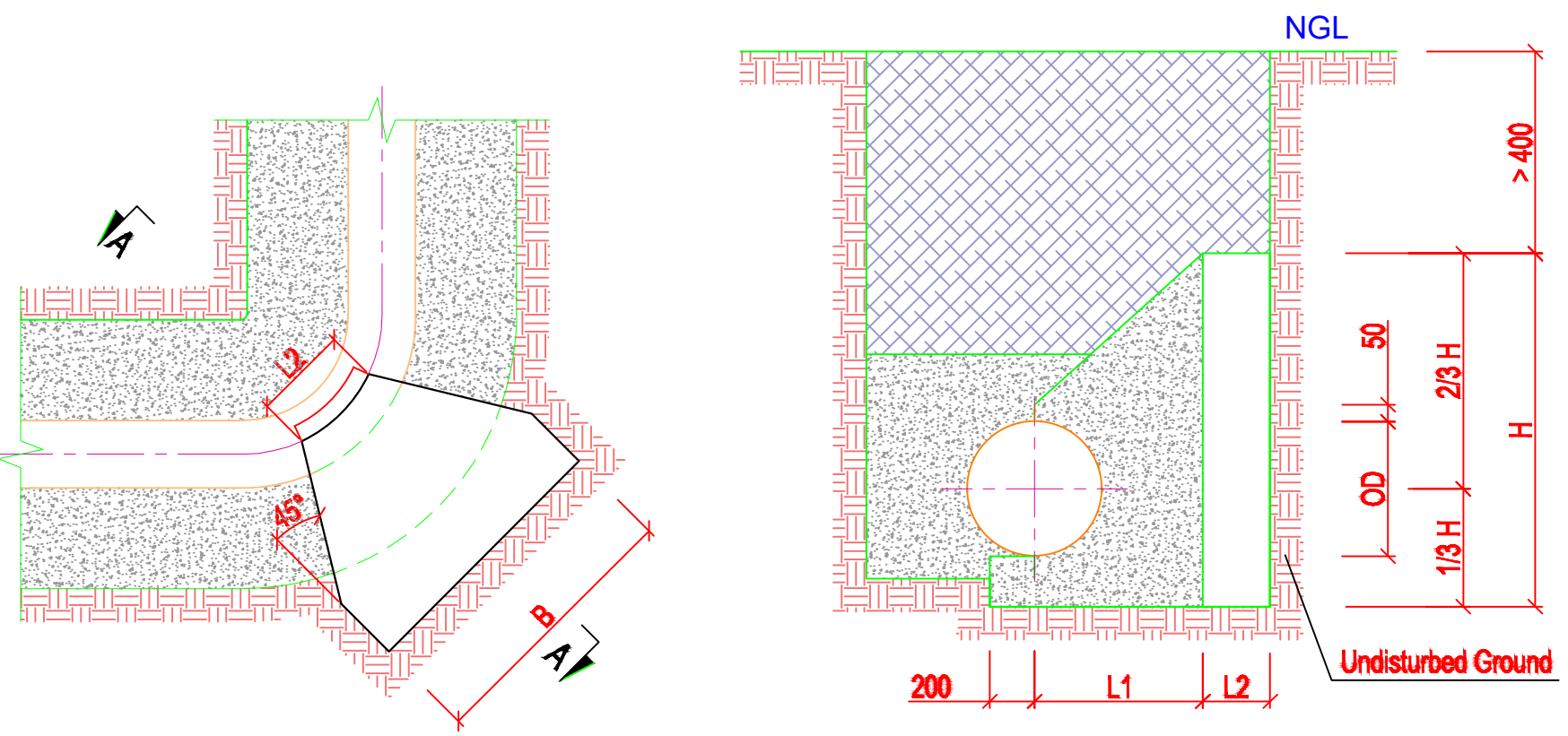
- IN CASE OF MORE THAN ONE BRANCH, SIZE OF CHAMBER TO BE INCREASED TO A VALUE THAT IS ACCOMMODATING WORKING SPACE (300 mm NEXT TO PIPE)
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL



PROJECT REFERENCE NUMBER : ....  
**INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)**  
CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI

DRAWING DESCRIPTION		DATE		DRAWN:	
CONSTRUCTION SUPERVISION	BRANCH DN 125 TO DN 250 SHEET 1 OF 1	19/08/2021		Andrew Turyakira	
		1 OF 1		DESIGNED: Ceaser Kisa Wakiibi	
		DRAWING SCALE H=1:1000 V=1:100 A3		CHECKED: Ronald Musenze	
		CATEGORY: DETAIL		APPROVED: OH Dongwoom	
		DRAWING NUMBER: IWMDP/MBA/1-D-017			





PLAN

SECTION A-A

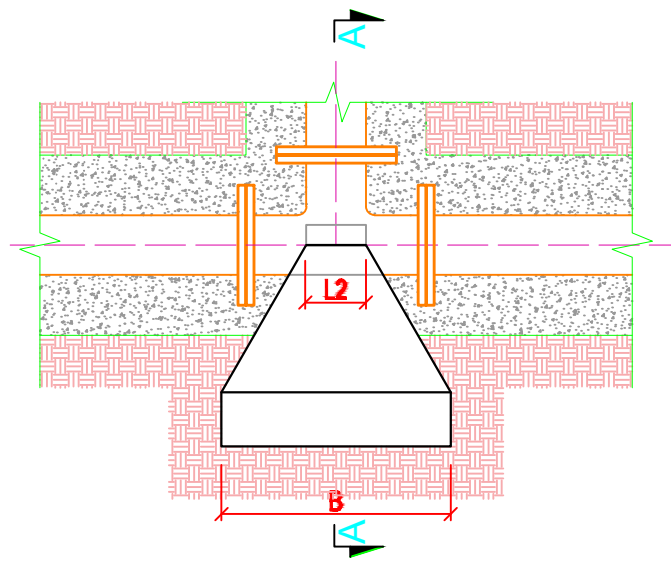
HORIZONTAL DEFLECTION

**GENERAL:**

1. THRUST BLOCKS SHALL ONLY BE CAST AGAINST UNDISTURBED NATURAL GROUND. THE BEARING CAPACITY OF THE IN-SITU GROUND HAS BEEN ASSUMED WITH 100 kPA. WHERE STABILITY OF THE GROUND IS IN DOUBT OR MOISTURE CONTENTS ARE EXCESSIVE THE ENGINEER SHALL DIRECT AN ALTERNATIVE SOLUTION.
2. THE DIMENSIONS ARE LIMITED TO THE DIAMETERS AND PRESSURES STATED IN THE DRAWING
3. WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED. A "ROCKER PIPE" SHALL BE INSTALLED BEFORE AND AFTER EACH THRUST BLOCK.
4. THE UNIT RATES SHALL BE INCLUDING THE PROVISION OF ALL MATERIALS THAT ARE SHOWN ON THE DRAWING.
5. OVEREXCAVATED MATERIAL SHALL BE REPLACED WITH LEAN CONCRETE (ST3/20) AT THE CONTRACTORS EXPENSE.
6. THRUST BLOCK TO BE CAST IN C20/20.
7. NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

Nominal diameter	Test pressure	90° Deflection					45° Deflection					22.5° Deflection					11.25° Deflection				
		H	B	L1	L2	Vol	H	B	L1	L2	Vol	H	B	L1	L2	Vol	H	B	L1	L2	Vol
[mm]	[bar]	[m]	[m]	[m]	[m]	m³	[m]	[m]	[m]	[m]	m³	[m]	[m]	[m]	[m]	m³	[m]	[m]	[m]	[m]	m³
65	15	0.25	0.48	0.15	0.17	0.02	0.15	0.43	0.2	0.12	0.01	0.2	0.17	0.1	0.03	0	0.1	0.17	0.1	0.04	0
	24	0.3	0.64	0.15	0.25	0.04	0.2	0.52	0.2	0.16	0.02	0.2	0.27	0.1	0.06	0.01	0.1	0.27	0.1	0.09	0
	37.5	0.35	0.86	0.15	0.35	0.07	0.25	0.65	0.2	0.22	0.04	0.2	0.42	0.1	0.16	0.01	0.1	0.42	0.1	0.16	0.01
80	15	0.3	0.61	0.2	0.2	0.04	0.2	0.5	0.2	0.15	0.02	0.2	0.25	0.1	0.06	0.01	0.1	0.25	0.1	0.13	0
	24	0.35	0.83	0.2	0.32	0.08	0.25	0.63	0.2	0.21	0.04	0.2	0.4	0.1	0.15	0.01	0.15	0.27	0.1	0.08	0
	37.5	0.4	1.14	0.2	0.47	0.14	0.3	0.82	0.25	0.29	0.07	0.2	0.63	0.1	0.26	0.02	0.15	0.42	0.1	0.16	0.01
100	15	0.4	0.7	0.2	0.25	0.07	0.25	0.62	0.25	0.18	0.04	0.2	0.39	0.1	0.15	0.01	0.15	0.27	0.1	0.08	0
	24	0.5	0.9	0.2	0.35	0.12	0.3	0.82	0.25	0.29	0.07	0.3	0.42	0.1	0.16	0.02	0.2	0.32	0.1	0.11	0.01
	37.5	0.6	1.18	0.2	0.49	0.22	0.4	0.96	0.25	0.36	0.12	0.3	0.65	0.1	0.28	0.03	0.25	0.4	0.1	0.15	0.01
150	15	0.6	1.07	0.3	0.38	0.23	0.4	0.87	0.3	0.28	0.12	0.3	0.59	0.1	0.24	0.03	0.25	0.36	0.1	0.13	0.01
	24	0.7	1.46	0.3	0.58	0.43	0.5	1.11	0.3	0.4	0.21	0.4	0.71	0.1	0.3	0.05	0.3	0.47	0.1	0.19	0.02
	37.5	0.8	1.99	0.3	0.84	0.82	0.6	1.44	0.3	0.57	0.37	0.4	1.1	0.1	0.5	0.11	0.3	0.74	0.1	0.32	0.04
200	15	0.9	1.29	0.3	0.49	0.45	0.55	1.12	0.3	0.41	0.23	0.4	0.79	0.25	0.27	0.09	0.3	0.53	0.15	0.19	0.03
	24	1	1.82	0.3	0.76	0.88	0.65	1.51	0.3	0.61	0.43	0.4	1.25	0.25	0.5	0.19	0.3	0.84	0.15	0.35	0.06
	37.5	1.05	2.7	0.3	1.2	1.82	0.8	1.92	0.3	0.81	0.77	0.5	1.57	0.25	0.66	0.33	0.4	0.99	0.15	0.42	0.1
250	15	1.05	1.69	0.3	0.7	0.81	0.65	1.48	0.3	0.59	0.41	0.45	1.09	0.25	0.42	0.17	0.3	0.82	0.2	0.31	0.07
	24	1.1	2.58	0.3	1.14	1.75	0.8	1.92	0.3	0.81	0.78	0.6	1.31	0.25	0.53	0.29	0.4	0.99	0.2	0.39	0.11
	37.5	1.2	3.69	0.3	1.7	3.63	1	2.4	0.3	1.05	1.41	0.75	1.63	0.25	0.69	0.52	0.5	1.23	0.2	0.52	0.2
300	15	1.1	2.33	0.4	0.96	1.61	0.85	1.63	0.3	0.66	0.62	0.6	1.18	0.3	0.44	0.27	0.4	0.89	0.2	0.35	0.1
	24	1.15	3.55	0.4	1.57	3.48	1	2.21	0.3	0.96	1.22	0.7	1.61	0.3	0.66	0.51	0.5	1.14	0.2	0.47	0.18
	37.5	1.25	5.1	0.4	2.35	7.23	1.1	3.14	0.3	1.42	2.48	0.8	2.2	0.3	0.95	0.98	0.6	1.48	0.2	0.64	0.33
350	15	1.2	2.9	0.4	1.25	2.55	1	1.89	0.3	0.79	0.93	0.7	1.37	0.3	0.54	0.39	0.5	0.97	0.25	0.36	0.15
	24	1.3	4.28	0.4	1.94	5.46	1.1	2.74	0.3	1.22	1.95	0.8	1.92	0.3	0.81	0.78	0.6	1.29	0.25	0.52	0.28
	37.5	1.4	6.21	0.4	2.9	11.54	1.2	3.92	0.3	1.81	4.04	0.95	2.52	0.3	1.11	1.47	0.7	1.73	0.25	0.74	0.54
400	15	1.3	3.5	0.5	1.5	4.09	1.05	2.34	0.35	1	1.49	0.75	1.67	0.35	0.66	0.62	0.6	1.11	0.3	0.4	0.24
	24	1.45	5.01	0.5	2.26	8.52	1.2	3.28	0.35	1.46	3.04	0.9	2.23	0.35	0.94	1.18	0.7	1.45	0.3	0.57	0.43
	37.5	1.6	7.09	0.5	3.3	17.53	1.35	4.55	0.35	2.1	6.14	1.05	2.98	0.35	1.32	2.26	0.8	1.98	0.3	0.84	0.81
500	15	1.6	4.44	0.5	1.97	7.54	1.25	3.08	0.4	1.34	2.93	0.95	2.06	0.4	0.83	1.15	0.7	1.41	0.35	0.53	0.44
	24	1.8	6.31	0.5	2.9	15.85	1.35	4.55	0.4	2.08	6.33	1.05	2.98	0.4	1.29	2.36	0.8	1.98	0.35	0.81	0.86
	37.5	2	8.87	0.5	4.18	32.84	1.6	6	0.4	2.8	12.33	1.15	4.33	0.4	1.97	4.96	0.95	2.6	0.35	1.12	1.62
600	15	1.8	5.68	0.75	2.47	14.69	1.25	4.43	0.5	1.96	5.94	1.05	2.7	0.5	1.1	2.16	0.8	1.78	0.4	0.69	0.77
	24	2	8.18	0.75	3.71	30.8	1.5	5.9	0.5	2.7	11.78	1.15	3.92	0.5	1.71	4.44	0.9	2.53	0.4	1.06	1.54
	37.5	2.2	11.59	0.75	5.42	63.63	1.75	7.89	0.5	3.7	23.27	1.25	5.63	0.5	2.57	9.11	1.1	3.23	0.4	1.42	2.83

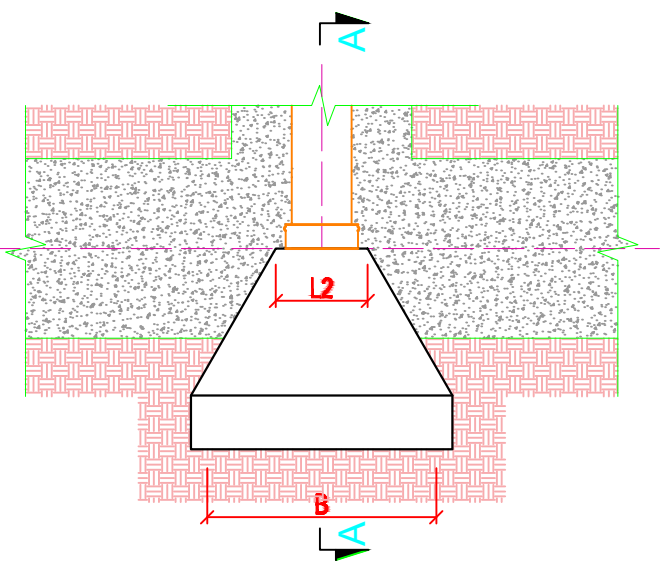
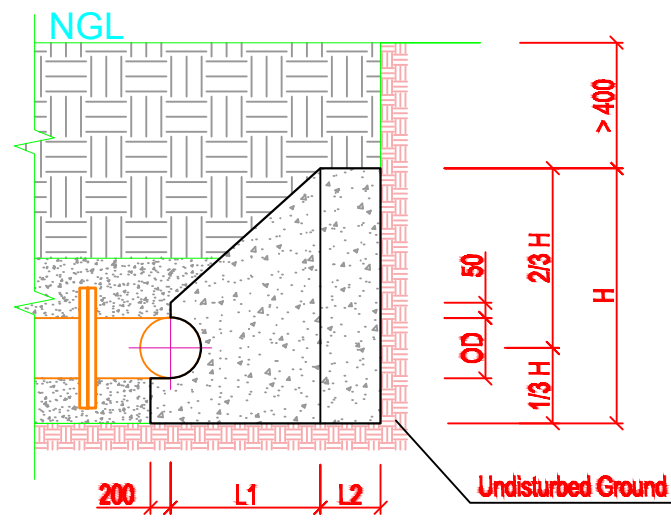
	PROJECT REFERENCE NUMBER : ...		DRAWING DESCRIPTION		DATE	25/11/2021	DRAWN: Andrew Turyakira
	INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)		THRUST BLOCKS HORIZONTAL DEFLECTION		SHEET NUMBER	1 OF 1	
	CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,		CONSTRUCTION SUPERVISION		DRAWING SCALE	H=1:1000 V=1:100 A3	CHECKED: Ronald Musenze
			HORIZONTAL DEFLECTION		CATEGORY	DETAIL	
		SHEET 1 OF 6		DRAWING NUMBER		IWMDP/MBA/1-D-019	



PLAN

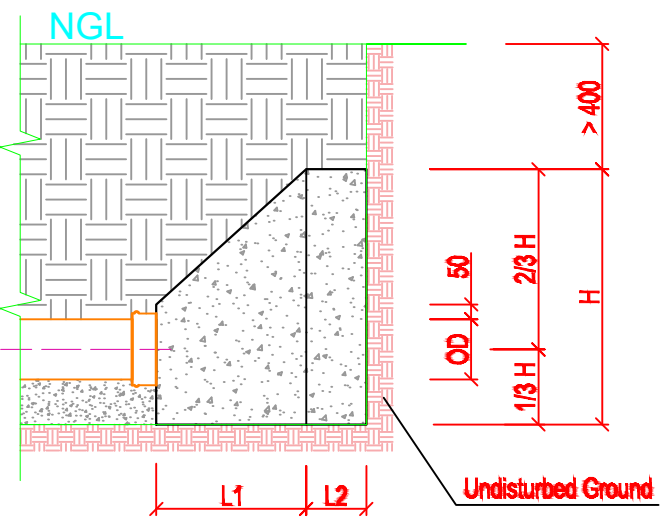
TEE-JUNCTION

SECTION A-A



PLAN

END CAP



SECTION A-A

Nominal diameter	Test pressure	90° Deflection				
		H	B	L1	L2	Vol
[mm]	[bar]	[m]	[m]	[m]	[m]	m <sup>3</sup>
65	15	0.25	0.34	0.15	0.1	0.01
	24	0.3	0.45	0.15	0.15	0.02
	37.5	0.35	0.61	0.15	0.23	0.04
80	15	0.3	0.43	0.2	0.11	0.03
	24	0.35	0.59	0.2	0.19	0.04
	37.5	0.4	0.8	0.2	0.3	0.08
100	15	0.4	0.5	0.2	0.15	0.04
	24	0.5	0.64	0.2	0.22	0.07
	37.5	0.6	0.84	0.2	0.32	0.13
150	15	0.6	0.75	0.3	0.23	0.14
	24	0.7	1.03	0.3	0.37	0.25
	37.5	0.8	1.41	0.3	0.55	0.46
200	15	0.9	0.89	0.3	0.3	0.25
	24	1	1.28	0.3	0.49	0.49
	37.5	1.05	1.91	0.3	0.8	0.99
250	15	1.05	1.19	0.3	0.45	0.46
	24	1.1	1.82	0.3	0.76	0.96
	37.5	1.2	2.61	0.3	1.15	1.95
300	15	1.1	1.64	0.4	0.62	0.91
	24	1.15	2.51	0.4	1.05	1.91
	37.5	1.4	3.22	0.4	1.41	3.54
350	15	1.2	2.05	0.4	0.82	1.41
	24	1.4	2.8	0.4	1.2	2.79
	37.5	1.65	3.72	0.4	1.66	5.35
400	15	1.5	2.14	0.5	0.82	2.05
	24	1.8	2.85	0.5	1.17	3.92
	37.5	2	4.01	0.5	1.75	7.8
500	15	1.8	2.78	0.5	1.14	3.77
	24	2	4.01	0.5	1.75	7.8
	37.5	2.25	5.56	0.5	2.53	15.69
600	15	2	3.61	0.75	1.43	7.53
	24	2.25	5.13	0.75	2.19	15.19
	37.5	2.5	7.21	0.75	3.23	30.49

**GENERAL:**

- THRUST BLOCKS SHALL ONLY BE CAST AGAINST UNDISTURBED NATURAL GROUND. THE BEARING CAPACITY OF THE IN-SITU GROUND HAS BEEN ASSUMED WITH 100 kPa. WHERE STABILITY OF THE GROUND IS IN DOUBT OR MOISTURE CONTENTS ARE EXCESSIVE THE ENGINEER SHALL DIRECT AN ALTERNATIVE SOLUTION.
- THE DIMENSIONS ARE LIMITED TO THE DIAMETERS AND PRESSURES STATED IN THE DRAWING
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED. A "ROCKER PIPE" SHALL BE INSTALLED BEFORE AND AFTER EACH THRUST BLOCK.
- THE UNIT RATES SHALL BE INCLUDING THE PROVISION OF ALL MATERIALS THAT ARE SHOWN ON THE DRAWING.
- OVEREXCAVATED MATERIAL SHALL BE REPLACED WITH LEAN CONCRETE (ST3/20) AT THE CONTRACTORS EXPENSE.
- THRUST BLOCK TO BE CAST IN C20/20 CONCRETE.
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

CLIENT



MINISTRY OF WATER AND ENVIRONMENT

FUNDED BY



WORLD BANK

CONSULTANT



PROJECT REFERENCE NUMBER : ....

**INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)**

CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,

DRAWING DESCRIPTION

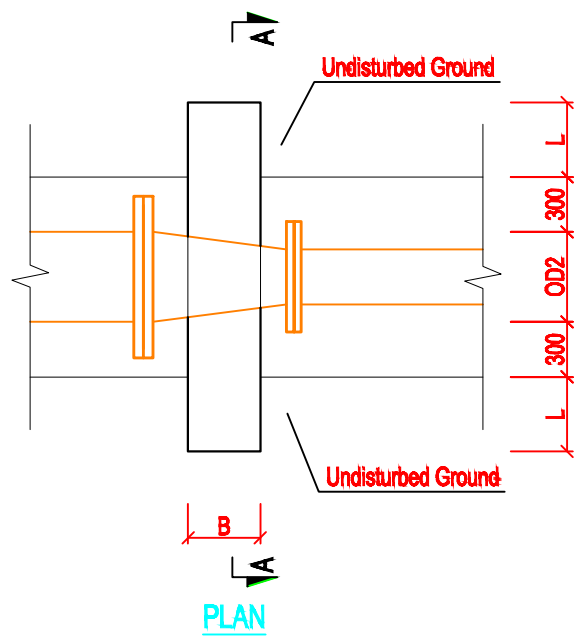
**THRUST BLOCKS TEE- JUNCTIONS AND END CAPS**

CONSTRUCTION SUPERVISION

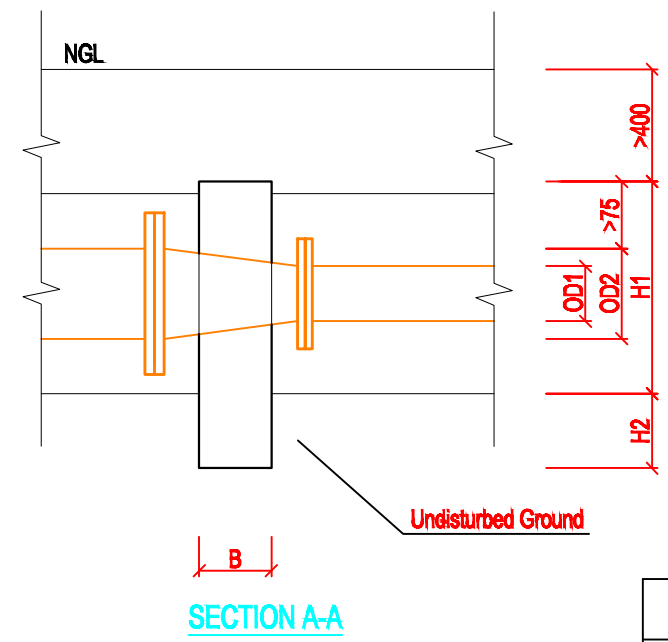
TEE- JUNCTIONS AND END CAPS SHEET 2 OF 6

DATE	25/11/2021
SHEET NUMBER	1 OF 1
DRAWING SCALE	H=1:1000 V=1:100 A3
CATEGORY	DETAIL
DRAWING NUMBER	
<b>IWMDP/MBA/1-D-019</b>	

DRAWN:	Andrew Turyakira
DESIGNED:	Ceaser Kisa Wakiibi
CHECKED:	Ronald Musenze
APPROVED:	OH Dongwoom



**REDUCER / TAPER**



Nominal Diameter [m]	Test Pressure [bar]	Reducers				
		H1 [m]	H2 [m]	L [m]	B [m]	Vol [m <sup>3</sup> ]
100/80	15	0.25	0.1	0.1	0.3	0.06
	24	0.25	0.1	0.1	0.3	0.06
	37.5	0.25	0.1	0.1	0.3	0.06
150/100	15	0.3	0.1	0.29	0.3	0.1
	24	0.4	0.1	0.41	0.3	0.17
	37.5	0.5	0.1	0.55	0.3	0.26
150/80	15	0.3	0.1	0.41	0.3	0.12
	24	0.4	0.1	0.55	0.3	0.2
	37.5	0.5	0.2	0.66	0.3	0.29
200/150	15	0.45	0.2	0.21	0.3	0.13
	24	0.45	0.2	0.44	0.3	0.2
	37.5	0.45	0.3	0.71	0.3	0.27
200/100	15	0.45	0.25	0.44	0.3	0.2
	24	0.55	0.3	0.65	0.3	0.32
	37.5	0.65	0.3	0.97	0.3	0.2
250/200	15	0.7	0.25	0.17	0.4	0.32
	24	0.7	0.3	0.33	0.4	0.5
	37.5	0.8	0.4	0.49	0.4	0.28
250/150	15	0.6	0.3	0.45	0.4	0.37
	24	0.7	0.4	0.67	0.4	0.54
	37.5	0.9	0.4	0.92	0.4	0.37
250/100	15	0.6	0.4	0.58	0.4	0.56
	24	0.6	0.4	1.1	0.4	0.92
	37.5	1	0.4	1.14	0.4	0.43
300/250	15	0.75	0.25	0.22	0.4	0.68
	24	0.75	0.25	0.44	0.4	1.2
	37.5	0.8	0.35	0.66	0.4	0.33
300/200	15	0.75	0.4	0.42	0.45	0.46
	24	0.75	0.4	0.82	0.45	0.64
	37.5	0.9	0.45	1.16	0.45	0.52
300/150	15	1	0.45	0.49	0.5	0.79
	24	1.1	0.4	0.79	0.5	1.24
	37.5	1.2	0.45	1.21	0.5	0.87
350/300	15	1	0.5	0.13	0.4	1.3
	24	1.1	0.4	0.26	0.4	1.93
	37.5	1.2	0.5	0.48	0.4	0.82
350/250	15	1	0.5	0.36	0.45	0.65
	24	1.1	0.5	0.65	0.45	1.02
	37.5	1.2	0.6	1.01	0.45	1.51

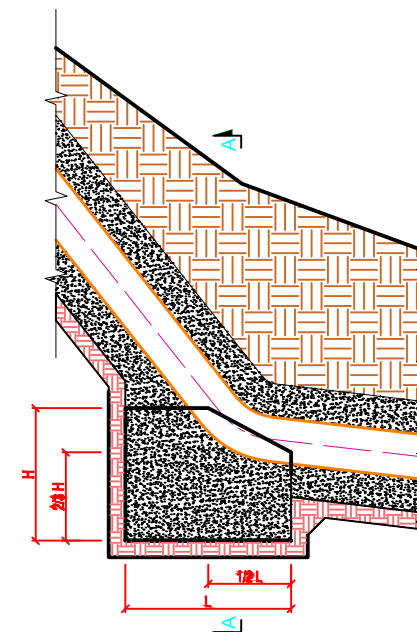
**GENERAL**

- THRUST BLOCKS SHALL ONLY BE CAST AGAINST UNDISTURBED NATURAL GROUND. THE BEARING CAPACITY OF THE IN-SITU GROUND HAS BEEN ASSUMED WITH 100 kPA. WHERE STABILITY OF THE GROUND IS IN DOUBT OR MOISTURE CONTENTS ARE EXCESSIVE THE ENGINEER SHALL DIRECT AN ALTERNATIVE SOLUTION.
- THE DIMENSIONS ARE LIMITED TO THE DIAMETERS AND PRESSURES STATED IN THE DRAWING
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED. A "ROCKER PIPE" SHALL BE INSTALLED BEFORE AND AFTER EACH THRUST BLOCK.
- THE UNIT RATES SHALL BE INCLUDING THE PROVISION OF ALL MATERIALS THAT ARE SHOWN ON THE DRAWING.
- OVEREXCAVATED MATERIAL SHALL BE REPLACED WITH LEAN CONCRETE (ST3/20) AT THE CONTRACTORS EXPENSE.
- THRUST BLOCK TO BE CAST IN C20/20 CONCRETE.
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
- THRUST BLOCK TO BE REINFORCED WITH Y12 BARS BOTH WAYS AT 250mm SPACING

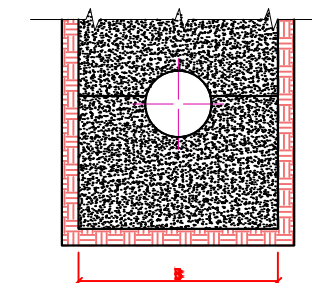
<p>MINISTRY OF WATER AND ENVIRONMENT</p>	<p>WORLD BANK</p>	<p>AWE Engineers</p>	<p>PROJECT REFERENCE NUMBER : ....</p> <p><b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b></p> <p>CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,</p>	<p>DRAWING DESCRIPTION</p> <p><b>THRUST BLOCKS TAPERS</b></p>		<p>DATE: 25/11/2021</p>	<p>DRAWN: Andrew Turyakira</p>
				<p>CONSTRUCTION SUPERVISION</p>	<p>THRUST BLOCKS TAPERS</p> <p>SHEET 3 OF 6</p>	<p>SHEET NUMBER: 1 OF 1</p> <p>DRAWING SCALE: H=1:1000 V=1:100 A3</p> <p>CATEGORY: DETAIL</p> <p>DRAWING NUMBER: IWMDP/MBA/1-D-019</p>	

**GENERAL**

1. VERTICAL BENDS ONLY TO BE USED WHERE NOT POSSIBLE OTHERWISE. THE USE OF PIPE DEFLECTIONS SHALL ALWAYS BE PREFERRED
2. THRUST BLOCKS SHALL ONLY BE CAST AGAINST UNDISTURBED NATURAL GROUND. THE BEARING CAPACITY OF THE IN-SITU GROUND HAS BEEN ASSUMED WITH 100 kPA. WHERE STABILITY OF THE GROUND IS IN DOUBT OR MOISTURE CONTENTS ARE EXCESSIVE THE ENGINEER SHALL DIRECT AN ALTERNATIVE SOLUTION.
3. THE DIMENSIONS ARE LIMITED TO THE DIAMETERS AND PRESSURES STATED IN THE DRAWING
4. WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED. A "ROCKER PIPE" SHALL BE INSTALLED BEFORE AND AFTER EACH THRUST BLOCK.
5. THE UNIT RATES SHALL BE INCLUDING THE PROVISION OF ALL MATERIALS THAT ARE SHOWN ON THE DRAWING.
6. OVEREXCAVATED MATERIAL SHALL BE REPLACED WITH LEAN CONCRETE (ST3/20) AT THE CONTRACTORS EXPENSE.
7. THRUST BLOCK TO BE CAST IN C20/20 CONCRETE.
8. NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.



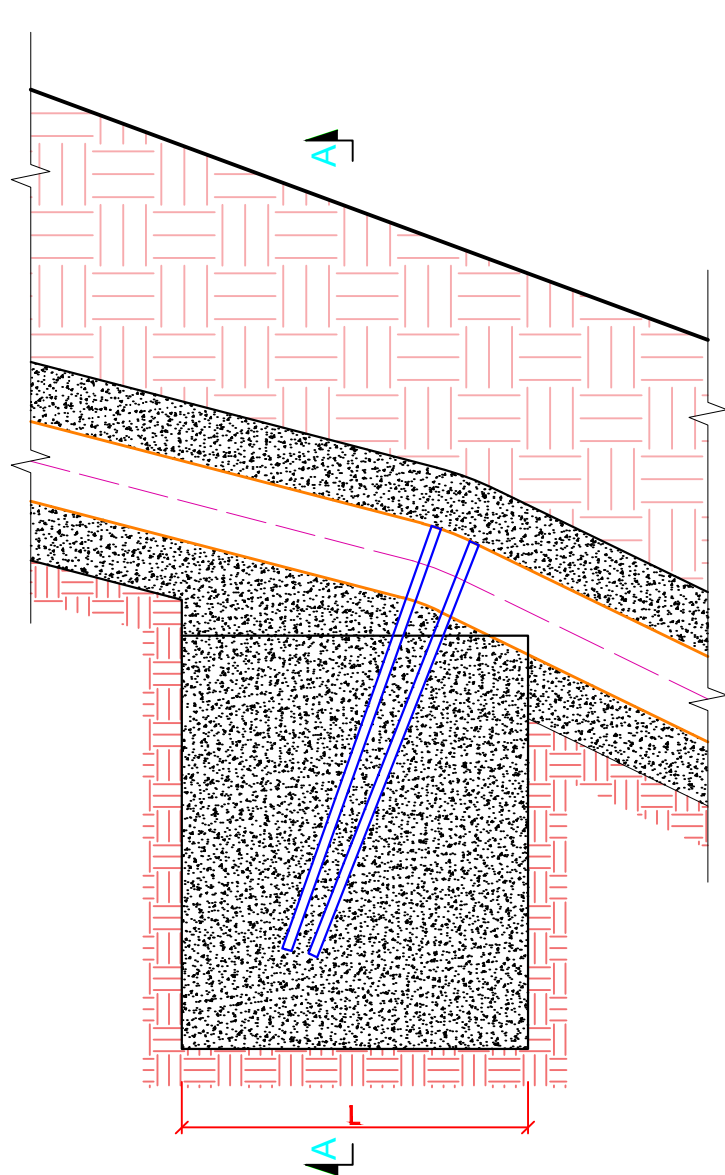
TYPICAL SECTION ALONG AXIS OF PIPELINE



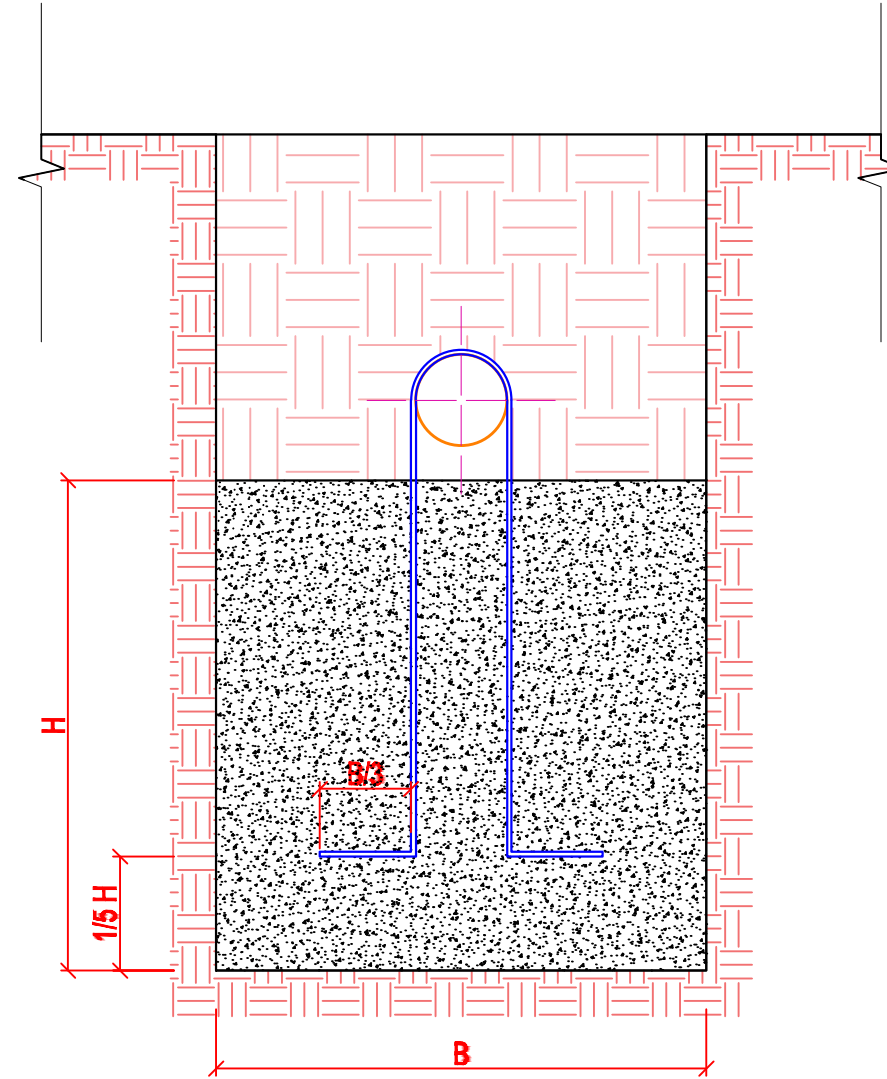
SECTION A-A

Nominal Diameter	Test Pressure	45 Degree Deflection				22.5 Degree Deflection				11.25 Degree Deflection			
		B	L	H	Vol	B	L	H	Vol	B	L	H	Vol
[m]	[bar]	[m]	[m]	[m]	[m3]	[m]	[m]	[m]	[m3]	[m]	[m]	[m]	[m3]
65	15	0.67	0.09	0.05	0	0.67	0.05	0.02	0	0.67	0.02	0.01	0
	24	0.67	0.15	0.07	0.01	0.67	0.08	0.04	0	0.67	0.04	0.02	0
	37.5	0.67	0.23	0.11	0.02	0.67	0.12	0.06	0	0.67	0.06	0.03	0
80	15	0.68	0.14	0.07	0.01	0.68	0.07	0.03	0	0.68	0.03	0.02	0
	24	0.68	0.22	0.11	0.01	0.68	0.11	0.06	0	0.68	0.03	0.03	0
	37.5	0.68	0.34	0.17	0.04	0.68	0.17	0.09	0.01	0.68	0.09	0.04	0
100	15	0.7	0.21	0.1	0.01	0.7	0.11	0.05	0	0.7	0.05	0.03	0
	24	0.7	0.33	0.17	0.04	0.7	0.17	0.08	0.01	0.7	0.08	0.04	0
	37.5	0.7	0.52	0.26	0.09	0.7	0.26	0.13	0.02	0.7	0.13	0.07	0.01
150	15	0.75	0.44	0.22	0.07	0.75	0.22	0.11	0.02	0.75	0.11	0.06	0
	24	0.75	0.7	0.35	0.17	0.75	0.35	0.18	0.04	0.75	0.18	0.09	0.01
	37.5	0.75	1.09	0.54	0.4	0.75	0.55	0.28	0.11	0.75	0.28	0.14	0.03
200	15	0.8	0.72	0.36	0.19	0.8	0.37	0.19	0.05	0.8	0.19	0.09	0.01
	24	0.8	1.16	0.58	0.49	0.8	0.59	0.3	0.13	0.8	0.3	0.15	0.03
	37.5	0.8	1.81	0.9	1.2	0.8	0.92	0.46	0.31	0.8	0.47	0.23	0.08
250	15	0.85	1.07	0.53	0.44	0.85	0.54	0.27	0.12	0.85	0.27	0.14	0.03
	24	0.85	1.7	0.85	1.13	0.85	0.87	0.43	0.29	0.85	0.44	0.22	0.07
	37.5	0.85	2.66	1.33	2.76	0.85	1.36	0.68	0.72	0.85	0.68	0.34	0.18
300	15	0.9	1.45	0.73	0.87	0.9	0.74	0.37	0.23	0.9	0.37	0.19	0.06
	24	0.9	2.32	1.16	2.22	0.9	1.18	0.59	0.58	0.9	0.6	0.3	0.15
	37.5	0.9	3.61	1.81	5.39	0.9	1.85	0.92	1.4	0.9	0.93	0.47	0.36
350	15	0.95	1.87	0.94	1.52	0.95	0.95	0.48	0.4	0.95	0.48	0.24	0.1
	24	0.95	2.99	1.49	3.89	1.1	1.32	0.66	0.87	0.95	0.77	0.38	0.26
	37.5	0.95	4.67	1.33	9.49	1.3	1.74	0.87	1.8	0.95	1.2	0.6	0.63
400	15	1.2	1.93	0.97	2.06	1	1.18	0.59	0.64	1	0.63	0.31	0.18
	24	1.5	2.47	1.24	4.2	1.2	1.58	0.79	1.37	1	0.95	0.48	0.42
	37.4	1.8	3.22	1.61	8.54	1.4	2.11	1.05	2.85	1	1.49	0.74	1.02
500	15	1.5	2.42	1.21	4.01	1.1	1.68	0.84	1.42	1.1	0.85	0.42	0.36
	24	1.7	3.41	1.7	9.05	1.3	2.27	1.14	3.08	1.1	1.36	0.68	0.93
	37.5	2	2.52	0.36	8.75	1.5	3.13	1.57	6.74	1.1	2.12	1.06	2.26
600	15	1.9	2.75	1.37	6.57	1.4	1.91	0.95	2.33	1.2	1.12	0.56	0.69
	24	2.3	2.29	1.5	3.5	1	2.66	1.33	5.18	1.2	1.79	0.89	1.76
	37.5	2.5	5.21	2.61	31.12	1.8	3.69	1.84	11.23	1.2	2.79	1.4	4.29

<p>MINISTRY OF WATER AND ENVIRONMENT</p>	<p>WORLD BANK</p>	<p>saman Samen Corp. CHEIL CHEIL ENGINEERING CO. LTD.</p>	<p>AWE Engineers</p>	<p>PROJECT REFERENCE NUMBER : .....</p> <p><b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b></p> <p>CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,</p>	DRAWING DESCRIPTION		DATE	25/11/2021	DRAWN:	Andrew Turyakira
					THRUST BLOCKS VERTICAL DEPRESSION		SHEET NUMBER	1 OF 1		DESIGNED:
CONSTRUCTION SUPERVISION	PIPE TRENCH SHEET 4 OF 6	DRAWING SCALE	H=1:1000 V=1:100	A3	CHECKED:	Ronald Musenze				
		CATEGORY	DETAIL			APPROVED:	OH Dongwoom			
		DRAWING NUMBER								
		IWMDP/MBA/1-D-019								



TYPICAL SECTION ALONG AXIS OF PIPELINE



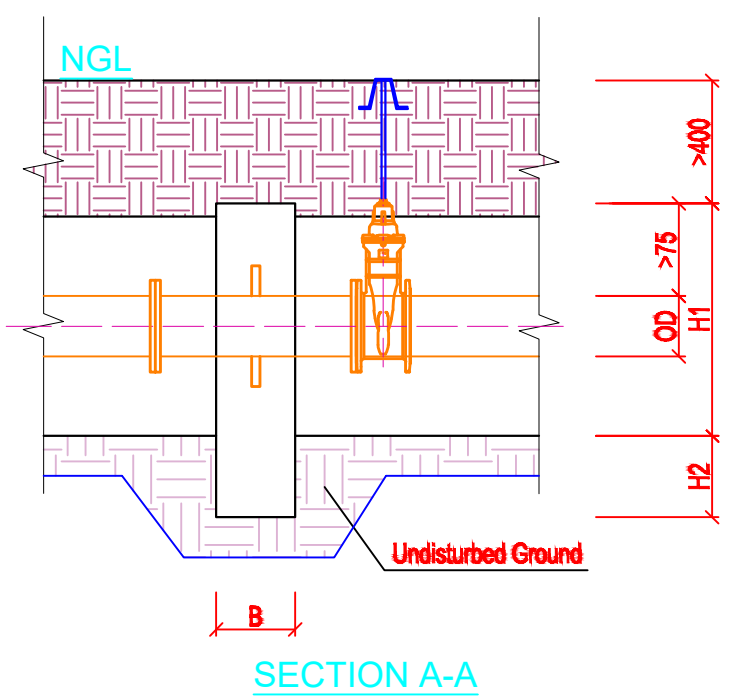
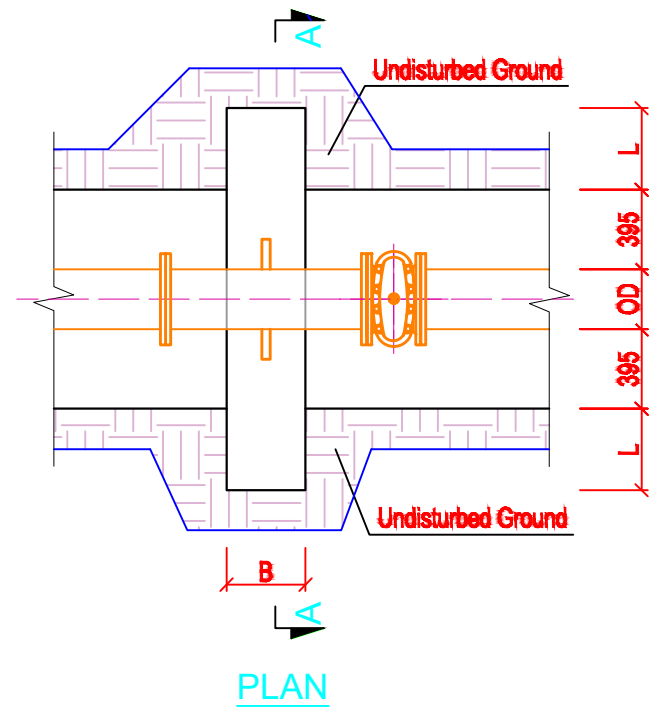
SECTION A-A

**GENERAL**

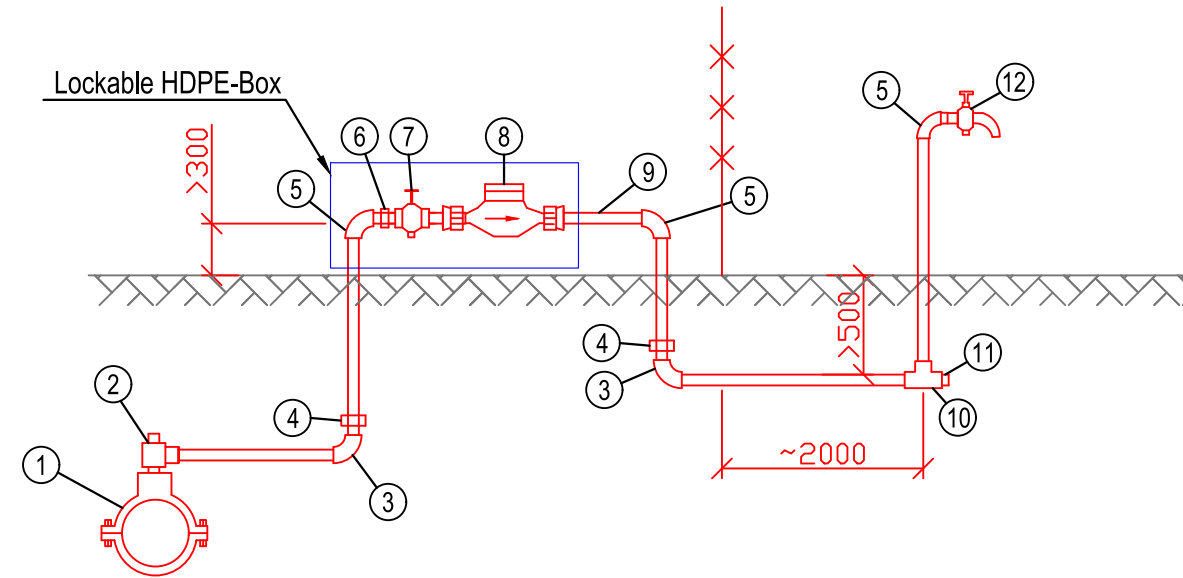
1. VERTICAL BENDS ONLY TO BE USED WHERE NOT POSSIBLE OTHERWISE. THE USE OF PIPE DEFLECTIONS SHALL ALWAYS BE PREFERRED
2. THRUST BLOCKS SHALL ONLY BE CAST AGAINST UNDISTURBED NATURAL GROUND. THE BEARING CAPACITY OF THE IN-SITU GROUND HAS BEEN ASSUMED WITH 100 kPA. WHERE STABILITY OF THE GROUND IS IN DOUBT OR MOISTURE CONTENTS ARE EXCESSIVE THE ENGINEER SHALL DIRECT AN ALTERNATIVE SOLUTION.
3. THE DIMENSIONS ARE LIMITED TO THE DIAMETERS AND PRESSURES STATED IN THE DRAWING
4. A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED BETWEEN THE STRAP AND THE PIPE.
5. THE STRAP SHALL BE MADE OF HOT-DIP GALVANIZED STEEL. GALVANIZING IN ACCORDANCE WITH BS ISO 1461. MINIMUM THICKNESS 150 MICRONS
6. A "ROCKER PIPE" SHALL BE INSTALLED BEFORE AND AFTER EACH THRUST BLOCK.
7. THE UNIT RATES SHALL BE INCLUDING THE PROVISION OF ALL MATERIALS THAT ARE SHOWN ON THE DRAWING.
8. OVEREXCAVATED MATERIAL SHALL BE REPLACED WITH LEAN CONCRETE (ST3/20) AT THE CONTRACTORS EXPENSE.
9. THRUST BLOCK TO BE CAST IN C20/20 CONCRETE.
10. NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
11. THRUST BLOCK TO BE REINFORCED WITH Y10 BARS BOTH WAYS AT 250mm SPACING

 CLIENT MINISTRY OF WATER AND ENVIRONMENT	 FUNDED BY WORLD BANK	 CONSULTANT saman Samen Corp. CHEIL ENGINEERING CO., LTD. AWE Engineers	PROJECT REFERENCE NUMBER : ..... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,	DRAWING DESCRIPTION		DATE	25/11/2021	DRAWN: Andrew Turyakira
				THRUST BLOCKS VERTICAL CREST		SHEET NUMBER	1 OF 1	
CONSTRUCTION SUPERVISION	THRUST BLOCKS-VERTICAL CREST SHEET 5 OF 6	DRAWING NUMBER	IWMDP/MBA/1-D-019	DRAWING SCALE	H=1:1000 V=1:100	A3	CHECKED: Ronald Musenze	
				CATEGORY	DETAIL			APPROVED: OH Dongwoom

Nominal diameter	Test pressure	Isolation value				
		H1	H2	L	B	Vol
[mm]	[bar]	[m]	[m]	[m]	[m]	m <sup>3</sup>
100	15	0.2	0.4	0	0.3	0.03
	24	0.2	0.4	0.1	0.3	0.05
	37.5	0.2	0.4	0.55	0.3	0.1
150	15	0.2	0.45	0.28	0.3	0.06
	24	0.4	0.45	0.48	0.3	0.19
	37.5	0.6	0.45	0.66	0.3	0.35
200	15	0.6	0.4	0.4	0.3	0.26
	24	0.7	0.4	0.69	0.3	0.43
	37.5	0.8	0.4	1.05	0.3	0.67
250	15	0.7	0.4	0.65	0.4	0.55
	24	0.85	0.4	0.98	0.4	0.91
	37.5	1.1	0.4	1.27	0.4	1.44
300	15	0.9	0.4	0.8	0.4	0.83
	24	1.1	0.4	1.15	0.4	1.34
	37.5	1.4	0.4	1.48	0.4	2.09
350	15	1.1	0.4	0.94	0.5	1.46
	24	1.3	0.4	1.36	0.5	2.29
	37.5	1.5	0.4	1.92	0.5	3.49
400	15	1.1	0.4	1.28	0.5	1.83
	24	1.5	0.4	1.58	0.5	2.99
	37.5	1.8	0.4	2.11	0.5	4.58
500	15	1.25	0.4	1.83	0.6	3.37
	24	1.5	0.4	2.52	0.6	5.34
	37.5	2	0.4	3.02	0.6	8.37
600	15	1.4	1.75	1.83	0.6	3.79
	24	1.9	2	2.41	0.6	6.57
	37.5	2.5	2.25	3.07	0.6	10.71



- GENERAL**
- THRUST BLOCKS SHALL ONLY BE CAST AGAINST UNDISTURBED NATURAL GROUND. THE BEARING CAPACITY OF THE IN-SITU GROUND HAS BEEN ASSUMED WITH 100 kPA. WHERE STABILITY OF THE GROUND IS IN DOUBT OR MOISTURE CONTENTS ARE EXCESSIVE THE ENGINEER SHALL DIRECT AN ALTERNATIVE SOLUTION.
  - THE DIMENSIONS ARE LIMITED TO THE DIAMETERS AND PRESSURES STATED IN THE DRAWING
  - WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED. A "ROCKER PIPE" SHALL BE INSTALLED BEFORE AND AFTER EACH THRUST BLOCK.
  - THE UNIT RATES SHALL BE INCLUDING THE PROVISION OF ALL MATERIALS THAT ARE SHOWN ON THE DRAWING.
  - OVEREXCAVATED MATERIAL SHALL BE REPLACED WITH LEAN CONCRETE (ST3/20) AT THE CONTRACTORS EXPENSE.
  - THRUST BLOCK TO BE CAST IN C20/20 CONCRETE.
  - NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
  - THRUST BLOCK TO BE REINFORCED WITH Y12 BARS BOTH WAYS AT 250mm SPACING



Typical Section with Yard-Tap

FITTING SCHEDULE (with Yard - Tap)

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN HC Ductile Iron Reducing Pipe Saddle
②	1	varies	DN HC HDPE Swivel Ferule
③	2	varies	DN HC HDPE Elbow, Compression Fitting
④	2	varies	DN HC HDPE / GI Adaptor
⑤	3	varies	DN HC GI Elbow
⑥	1	varies	DN HC GI EX Nipple
⑦	1	varies	DN HC Brass Gate Valve, Female Thread, Non-Rising Stem
⑧	1	varies	DN HC Brass Single-Jet Water Meter to ISO 4061 (2014), incl adjustable bushes for ease of installation
⑨	1	varies	DN HC GI Barrel Nipple
⑩	1	varies	DN HC HDPE Tee-Junction, Compression Fitting
⑪	1	varies	DN HC HDPE Plug
⑫	1	varies	DN HC Brass Tap

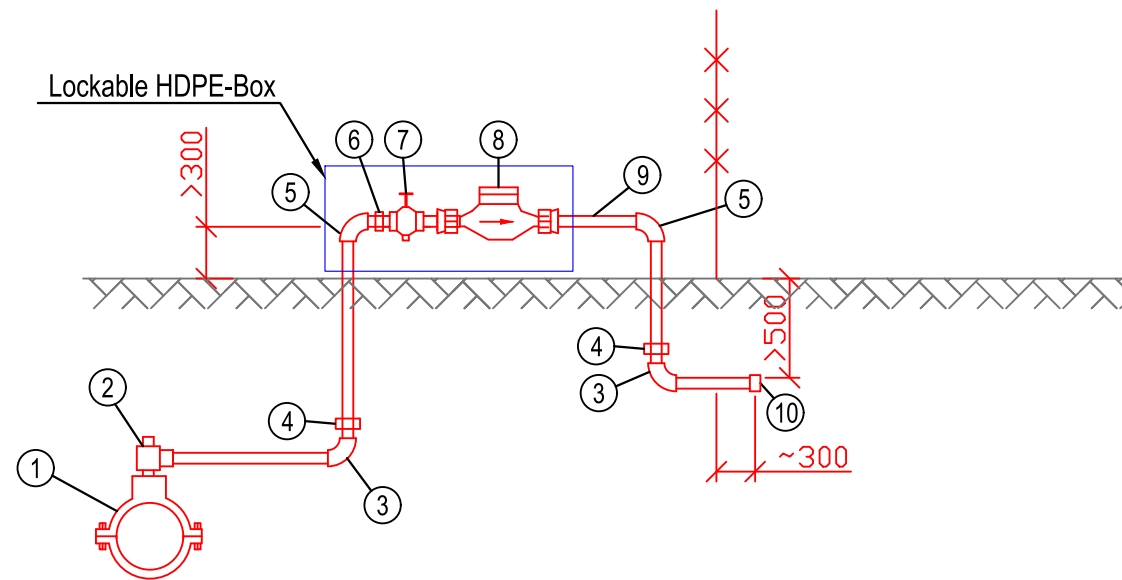
Notes

Pipework, Valves and Equipment

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL GATE VALVES MUST BE CLOCKWISE CLOSING
- ALL FITTINGS AT LEAST PN16
- ALL PIPEWORK BELOW GROUND TO BE HDPE AND ABOVE GROUND TO BE GI
- ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED

General

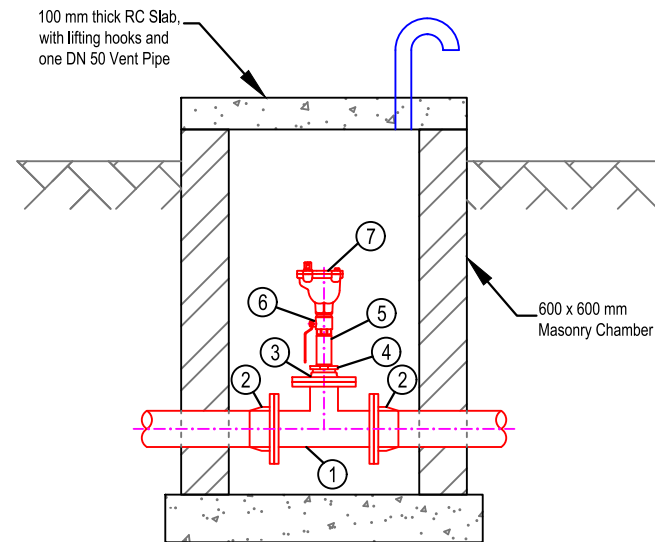
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
- ALL FITTINGS, PIPEWORK AND LOCKBOX AS INDICATED IN THE DRAWING TO BE INCLUDED IN THE UNIT RATE OF THE HOUSE CONNECTION



Typical Section without Yard-Tap

FITTING SCHEDULE (without yard-tap)

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN HC Ductile Iron Reducing Pipe Saddle
②	1	varies	DN HC HDPE Swivel Ferule
③	2	varies	DN HC HDPE Elbow, Compression Fitting
④	2	varies	DN HC HDPE / GI Adaptor
⑤	3	varies	DN HC GI Elbow
⑥	1	varies	DN HC GI EX Nipple
⑦	1	varies	DN HC Brass Gate Valve, Female Thread, Non-Rising Stem
⑧	1	varies	DN HC Brass Single-Jet Water Meter to ISO 4061 (2014), incl adjustable bushes for ease of installation
⑨	1	varies	DN HC GI Barrel Nipple
⑩	1	varies	DN HC HDPE Endcap, Compression Fitting



**Typical Section uPVC Pipe**

Scale 1:25

**FITTING SCHEDULE (uPVC Main Pipe DN 110 to DN 150)**

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN 80 GI Tee Piece, Flanged
②	2	varies	DN Main Pipe Flange Adapter
③	1	75 / 50	DN 75 to DN 50 GI Orifice Plate
④	1	50 / 25	DN 50 to DN 25 GI Reducing Bush
⑤	1	25	DN 25 GI Barrel Nippel Length 100 mm
⑥	1	25	DN 25 Brass Ball Valve, Female Thread
⑦	1	25	DN 25 Air Valve, with male thread (or female with male/female socket), minimum operation pressure 0.5 bar, single chamber in compact design, Materials: Body and Bonnet in Ductile Cast Iron, Float in Plastic and Sealing in NBR

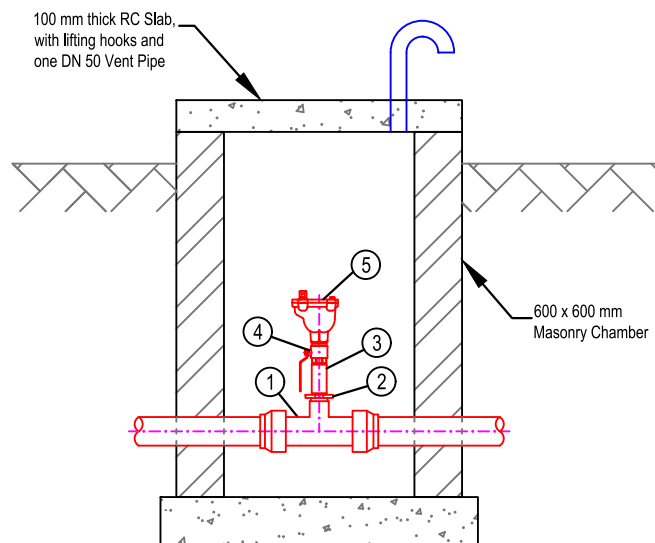
**Notes**

**Pipework, Valves and Equipment**

1. ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
2. ALL VALVES MUST BE CLOCKWISE CLOSING
3. ALL FITTINGS AT LEAST PN10
4. ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS
5. ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER FOR TO BE BITUMEN TAPE WRAPPED

**General**

6. MASONRY CHAMBER TO BE PLASTERED, 150 MM WALL THICKNESS, SLAB AND BASE OF ST4/20 CONCRETE, REINFORCED WITH Y10 @ 200 MM SPACING
7. SLAB TO BE INSTALLED WITH PUMP SUMP
8. TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
9. ALL FITTINGS, PIPEWORK AND LOCKBOX AS INDICATED IN THE DRAWING TO BE INCLUDED IN THE UNIT RATE OF THE HOUSE CONNECTION



**Typical Section HDPE Pipe**

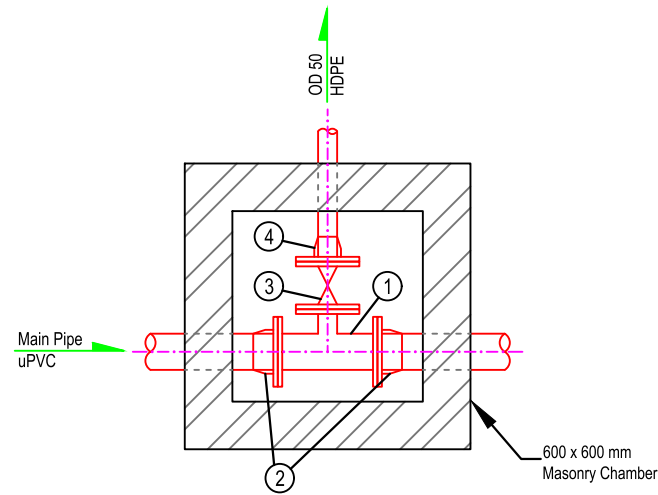
Scale 1:25

**FITTING SCHEDULE (HDPE Main Pipe OD 50 to OD 90)**

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN 50 HDPE Female Tee, Compression Fitting
②	1	50 / 25	DN 50 to DN 25 GI Reducing Bush
③	1	25	DN 25 GI Barrel Nippel Length 100 mm
④	1	25	DN 25 Brass Ball Valve, Female Thread
⑤	1	25	DN 25 Air Valve, with male thread (or female with male/female socket), minimum operation pressure 0.5 bar, single chamber in compact design, Materials: Body and Bonnet in Ductile Cast Iron, Float in Plastic and Sealing in NBR

<p>CLIENT</p> <p>Government of Uganda Ministry of Water and Environment</p>	<p>FUNDED BY</p> <p>WORLD BANK</p>	<p>CONSULTANT</p> <p>saman Saman Corp. CHEIL AWE Engineers</p>	<p>PROJECT REFERENCE NUMBER : ...</p> <p><b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b></p> <p>CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,</p>	DRAWING DESCRIPTION		DATE	19/08/2021	DRAWN:	Andrew Turyakira
				<p><b>STANDARD DETAILS</b></p> <p><b>AIR VALVE CHAMBER (Ø &lt; DN 150)</b></p>		SHEET NUMBER	1 OF 1		DESIGNED:
CONSTRUCTION SUPERVISION	AIR VALVE CHAMBER (Ø < DN 150)	SHEET 1 OF 1	DRAWING NUMBER	DRAWING SCALE	H=1:1000 V=1:100 A3	CHECKED:	Ronald Musenze		
				CATEGORY	DETAIL		APPROVED:	OH Dongwoom	
						IWMDB/1-D-022			





**Typical Plan uPVC Pipe**  
Scale 1:25

FITTING SCHEDULE (uPVC Main Pipe OD 110 to OD 140)

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN 40 GI Tee Piece, Flanged
②	2	varies	DN Main Pipe Flange Adapter
③	1	40	DN 40 Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to bs 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl handwheel
④	1	40	DN 40 Flange Adapter

Note: OD 140 to be installed with one reducer DN 50 to DN 40

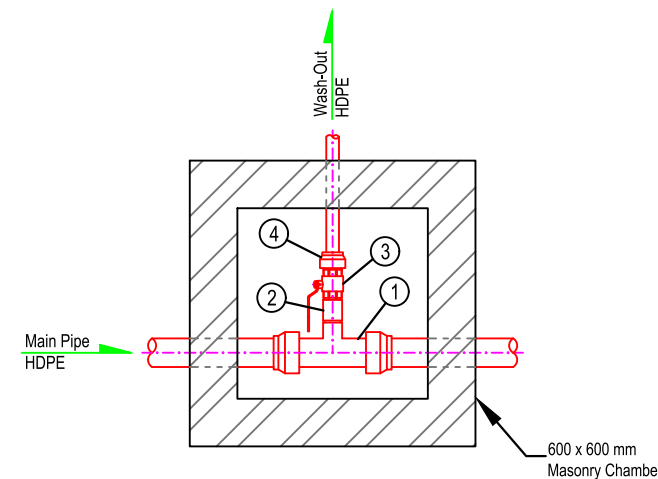
**Notes**

**Pipework, Valves and Equipment**

1. ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
2. ALL VALVES MUST BE CLOCKWISE CLOSING
3. ALL FITTINGS AT LEAST PN10
4. ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS
5. ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED

**General**

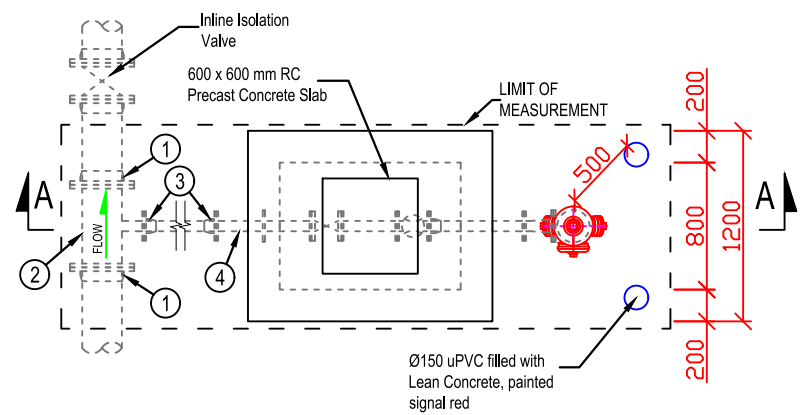
6. MASONRY CHAMBER TO BE PLASTERED, 150 MM WALL THICKNESS, SLAB AND BASE OF ST4/20 CONCRETE, REINFORCED WITH Y10 @ 200 MM SPACING
7. SLAB TO BE INSTALLED WITH PUMP SUMP
8. TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
9. ALL FITTINGS, PIPEWORK AND LOCKBOX AS INDICATED IN THE DRAWING TO BE INCLUDED IN THE UNIT RATE OF THE HOUSE CONNECTION



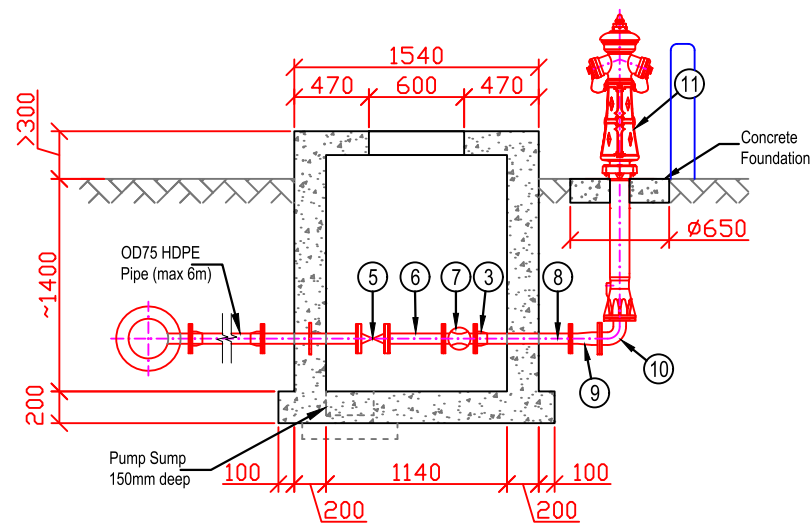
**Typical Plan HDPE Pipe**  
Scale 1:25

FITTING SCHEDULE (HDPE Main Pipe OD 40 to OD 90)

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN Wash-Out HDPE Female Tee, Compression Fitting
②	1	varies	DN Wash-Out Barrel Nipple, 50 mm
③	1	varies	DN Wash-Out Brass Gate Valve, Female Thread, Non-Rising Stem
④	1	varies	DN 40 Male Adapter



**Top View**  
Scale 1:50



**Section A-A**  
Scale 1:50

**PIPE & FITTING SCHEDULE**

ITEM	Qty.	Dia.	DETAILS	DESCRIPTION
①	1	DN Main / 65 mm		DN Main Pipe to DN 65 mm Ductile Iron Tee Piece, to EN 545, flanged, cement-mortar lined
②	2	DN Main		DN Main Pipe Ductile Iron Ranger Type Flange Adaptor, Connection to main pipe. Epoxy coated with anchor bolts.
③	3	65 mm		DN 65 Pipe Ductile Iron Ranger Type Flange Adaptor, Connection to OD 75 HDPE Pipe. Epoxy coated with anchor bolts.
④	1	65 mm		DN 65 Mild Steel Spool Piece, length 600 mm, hot-dip galvanized, Flanged on both sides with puddle flange
⑤	1	65 mm		DN 65 Gate Valve to EN 558-1, basic series 14, resilient seated, flanged on both sides, epoxy coated to bs 6920, Body Bonnet and Wedge Ductile Iron, Wedge EPDM vulcanized, Stem in Stainless Steel, incl handwheel
⑥	1	65 mm		DN 65 Mild Steel Spool Piece, length 350 mm, hot-dip galvanized, Flanged on both sides
⑦	1	65 mm		DN 65 Woltmann type flow meter, cast iron, epoxy coated, min flow 0.4 m <sup>3</sup> /h, max flow 120 m <sup>3</sup> /h, max temp 50°, flow capacity at 0.1 bar pressure loss > 45.5 m <sup>3</sup> /h
⑧	1	65 mm		DN 65 Mild Steel Spool Piece, length approximately 600 mm, hot-dip galvanized, Flanged on one side
⑨	1	65 mm / 80 mm		DN 80 to DN 65 Mild Steel Taper, hot-dip galvanized, Flanged on both sides
⑩	1	80 mm		DN 80 Mild Steel Bend, 90 degrees, hot-dip galvanized, Flanged on both sides
⑩	1	80 mm		DN 80 Fire Hydrant, Post Type, flanged at the bottom and with double shut-off and pre-determined breaking point, safety interlock of the main valve assembly, maintenance-free stem seal with O-rings in bearing cap, free alignment of the hydrant due to loose flange connection on the pre-determined breaking point, patented integrated multifunction seal on the connecting flange, Materials: Valve Cone, Pillar, Hydrant Head in Ductile Iron, Bearing in Brass, Bonnet and Coupling in Corrosion-Resistant Aluminum Alloy, Stem Nut in Brass, Internally and externally epoxy coated with additional UV-resistant acrylic varnish on the outside in signal red

**Notes**

**Pipework, Valves and Equipment**

- ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
- ALL GATE VALVES MUST BE CLOCKWISE CLOSING
- GASKETS FOR FLANGED JOINTS SHALL BE OF COMPRESSED NON-ASBESTOS SYNTHETIC FIBER TO BS 7531 GRADE Y AND FULL FACED WITH A MINIMUM THICKNESS OF 2 mm
- FOR ALL BOLTS, ONE WASHER ON THE BOLT AND WASHER ON THE NUT SIDE TO BE FITTED. A MINIMUM OF 2-4 THREADS IS TO BE PROTRUDING THE NUT SIDE AFTER TIGHTENING
- ALL FITTINGS AT LEAST PN10
- ALL BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH BS EN ISO 1461, MINIMUM 70 MICRONS THICK MAKING GOOD OF GALVANIZED JOINTS ONLY WHERE APPROVED BY THE ENGINEER
- ALL BURIED BOLTS AND FLANGES SHALL BE WRAPPED IN PETROLEUM MASTIC AND TAPE, IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION
- ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED

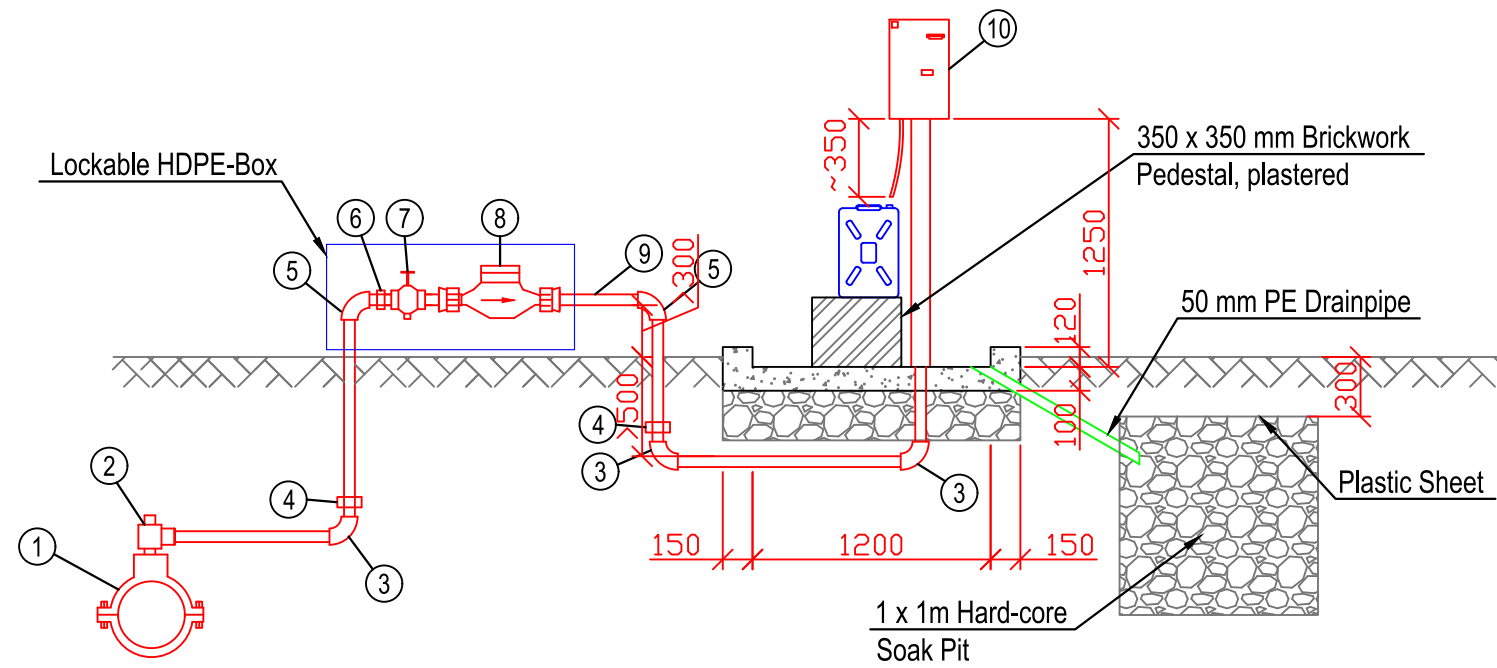
**Concrete**

- ALL STRUCTURAL CONCRETE TO BE C25/19 AND ALL MASS CONCRETE TO BE ST4/19
- ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
- WHERE THE PIPE ENTERS RIGID STRUCTURES A 10mm RUBBER WRAP (50 DUROMETER) SHALL BE INSTALLED
- 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
- ALL CONCRETE STRUCTURES TO BE WATER RETAINING
- NO CONCRETE SHALL BE POURED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER
- CHAMBER TO BE REINFORCED WITH Y10 @ 200 mm SPACING

**General**

- LOCATION OF CHAMBER AND HYDRANT TO BE DETERMINED BY ENGINEER
- INLINE VALVE TO BE PLACED DOWNSTREAM OF THE HYDRANT IF NO SECTION VALVE WITHIN 200m
- THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
- TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

 CLIENT Government of Uganda Ministry of Water and Environment	 FUNDED BY WORLD BANK	 CONSULTANT saman Saman Corp. CHEIL CONSULTANTS  AWE Engineers	PROJECT REFERENCE NUMBER : .... <b>INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)</b> CONSTRUCTION WORKS FOR WATER SUPPLY AND SANITATION SYSTEM IN SMALL TOWNS OF BUDAKA, KADAMA, KIBUKU, AND TIRINYI,	DRAWING DESCRIPTION		DATE 19/08/2021 SHEET NUMBER 1 OF 1 DRAWING SCALE H=1:1000 V=1:100 A3 CATEGORY DETAIL DRAWING NUMBER <b>IWMDP/MBA/1-D-024</b>	DRAWN: Andrew Turyakira DESIGNED: Ceaser Kisa Wakiibi CHECKED: Ronald Musenze APPROVED: OH Dongwoom
				<b>STANDARD DETAILS</b> <b>FIRE HYDRANT</b>	CONSTRUCTION SUPERVISION FIRE HYDRANT SHEET 1 OF 1		



**Typical Section**

**Notes**

**Pipework, Valves and Equipment**

1. ANY INCOMPATIBILITIES WITH REGARDS TO THE SPECIFICATION MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING THE MATERIALS
2. ALL GATE VALVES MUST BE CLOCKWISE CLOSING
3. ALL FITTINGS AT LEAST PN16
4. ALL PIPEWORK BELOW GROUND TO BE HDPE AND ABOVE GROUND TO BE GI
5. ALL THREADED JOINTS TO BE TREATED WITH 'HICHEM' SOLVENTLESS TRAVELING FILLER OR 'EPIDERMIX 372' ACCORDING TO SUPPLIERS
6. ALL BURIED STEEL PIPEWORK OUTSIDE THE CHAMBER TO BE BITUMEN TAPE WRAPPED

**Concrete**

7. ALL CONCRETE TO BE ST4/19
8. 50 mm BLINDING TO BE POURED BENEATH STRUCTURE
9. PLATFORM TO BE REINFORCED WITH MESH A98
10. ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED
11. 50 mm BLINDING TO BE POURED BENEATH EVERY STRUCTURE
12. ALL CONCRETE STRUCTURES TO BE WATER RETAINING
13. FOUNDATION OF WATER DISPENSER AS PER REQUIREMENTS OF MANUFACTURER

**General**

14. SOAK-PIT LOCATION TO BE DIRECTED BY THE ENGINEER
15. PLATFORM TO HAVE 2 % GRADIENT TOWARDS OUTLET
16. THE CONTRACTOR SHALL PRODUCE AND SUBMIT SHOP DRAWINGS FOR ALL PIPEWORK AND EQUIPMENT FOR APPROVAL BY ENGINEER
17. TECHNICAL DATASHEETS SHEETS OF ALL FITTINGS AND SPECIALS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
18. ALL FITTINGS, PIPEWORK, LOCKBOX, CONCRETE, MASONRY WORKS AND SOAK-PIT AS INDICATED IN THE DRAWING TO BE INCLUDED IN THE UNIT RATE OF THE PUBLIC STAND POST

**FITTING SCHEDULE**

ITEM	Qty.	Dia.	DESCRIPTION
①	1	varies	DN Main Pipe to DN 20 mm Ductile Iron Reducing Pipe Saddle
②	1	20 mm	DN 20 mm HDPE Swivel Ferule
③	3	20 mm	DN 20 mm HDPE Elbow, Compression Fitting
④	2	20 mm	DN 20 mm HDPE / GI Adaptor
⑤	2	20 mm	DN 20 mm GI Elbow
⑥	1	20 mm	DN 20 mm GI EX Nipple
⑦	1	20 mm	DN 20 mm Brass Gate Valve, Female Thread, Non-Rising Stem
⑧	1	20 mm	DN 20 mm Brass Single-Jet Water Meter to ISO 4061 (2014), incl adjustable bushes for ease of installation
⑨	1	20 mm	DN 20 mm GI Barrel Nipple
⑩	1	20 mm	Communal Pre-Paid Water Dispenser, for DN 20 HDPE pipe, IP 67, 3 year battery life, low battery indication, LCD display indicating remaining credit, temper detection, stainless steel fittings, incl. Y-Strainer, plastic-bodied volumetric watermeter complete with Pulse Output and Non-Return Valve