REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
LEBANESE RELIEF COUNCIL (LebRelief-LRC)

PROJECT No.762

CONTRACT No. ___

DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

VOLUME 6

DRAWINGS

JUNE 2024

BUREAU TECHNIQUE
POUR LE
DEVELOPPEMENT

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GENERAL LIST OF DRAWINGS	LIST OF DRAWINGS	762W-LOD00	1/1	00
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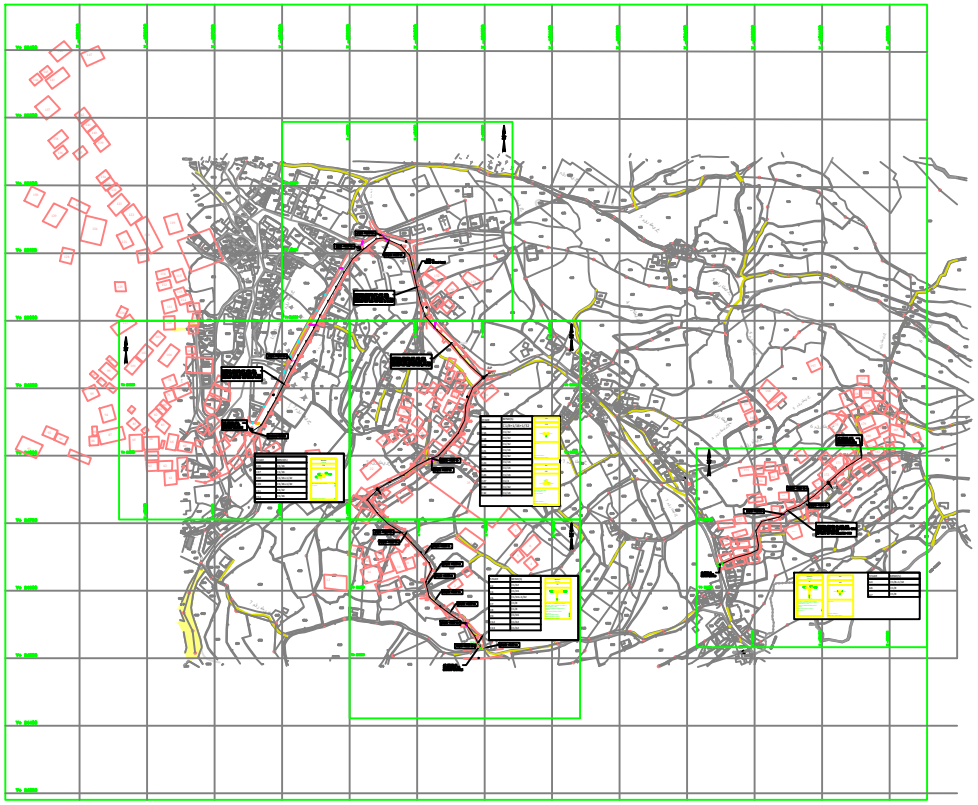
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

GENERAL LIST OF DRAWINGS

LIST OF DRAWINGS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W– LOD	C.ELIAS	R.CHAMAA	W.WANNA

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	1/1	762W–LOD00



HYDRAULIC LEGEND

PIPELINE		BEND 1/8	C1/8
FLOW DIRECTION		ARV (SINGLE AIR VALVE - SAV)	
GATE VALVE		W.O (WASHOUT)	
TEE		EXISTING PIPE	
REDUCER		FLOW METER F.M.	
FLANGED ADAPTER		S.M.D. ##	SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS
END CAPS			

NOTES

- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION DATUM OF LEBANON.
- HEAD LOSSES HAVE BEEN CALCULATED ACCORDING TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 762W-STDP10.
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- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 762W-STDP08, DWG Nb762W-STDP09 AND DWG Nb 762W-STDP10.
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- PIPE MATERIAL: DUCTILE IRON UNLESS OTHER WISE SPECIFIED .
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED.
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS.

TOPOGRAPHICAL LEGEND

	BUILDING		GULLY
	PAVED ROAD		MANHOLE SEWER
	CONCRETE ROAD		MANHOLE WATER
	TRACK		MANHOLE TELEPHONIE
	REFERENCE LINE	MH	MANHOLE NOT IDENTIFIED
channel	CHANNEL		LIGHTING POLE
	TERRACE	TP	TELEPHONE POLE
	FENCE		TRIANGULATION STATION
	STREAM/RIVER	EL.S.S	ELECTRIC SUB STATION
			ELECTRIC POLE/TELEGRAPH POLE
		Num	STAKE NUMBER STAKE POINT
		1160.12	SPOT HEIGHT
Spr	SPRING	1262	PLOT No
	WELL		BOUNDARY
	DECIDUOUS/PINE TREE		MAIN ROAD
	ROCKS		CIRCONSCRIPTION BOUNDARY
	Downhill		
	High-hill		RESERVOIR

KEY PLAN

N

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DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

SYR DISTRIBUTION NETWORK

GENERAL PLAN

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-DS-PL	C.ELIAS	R.CHAMAA	W.WANNA

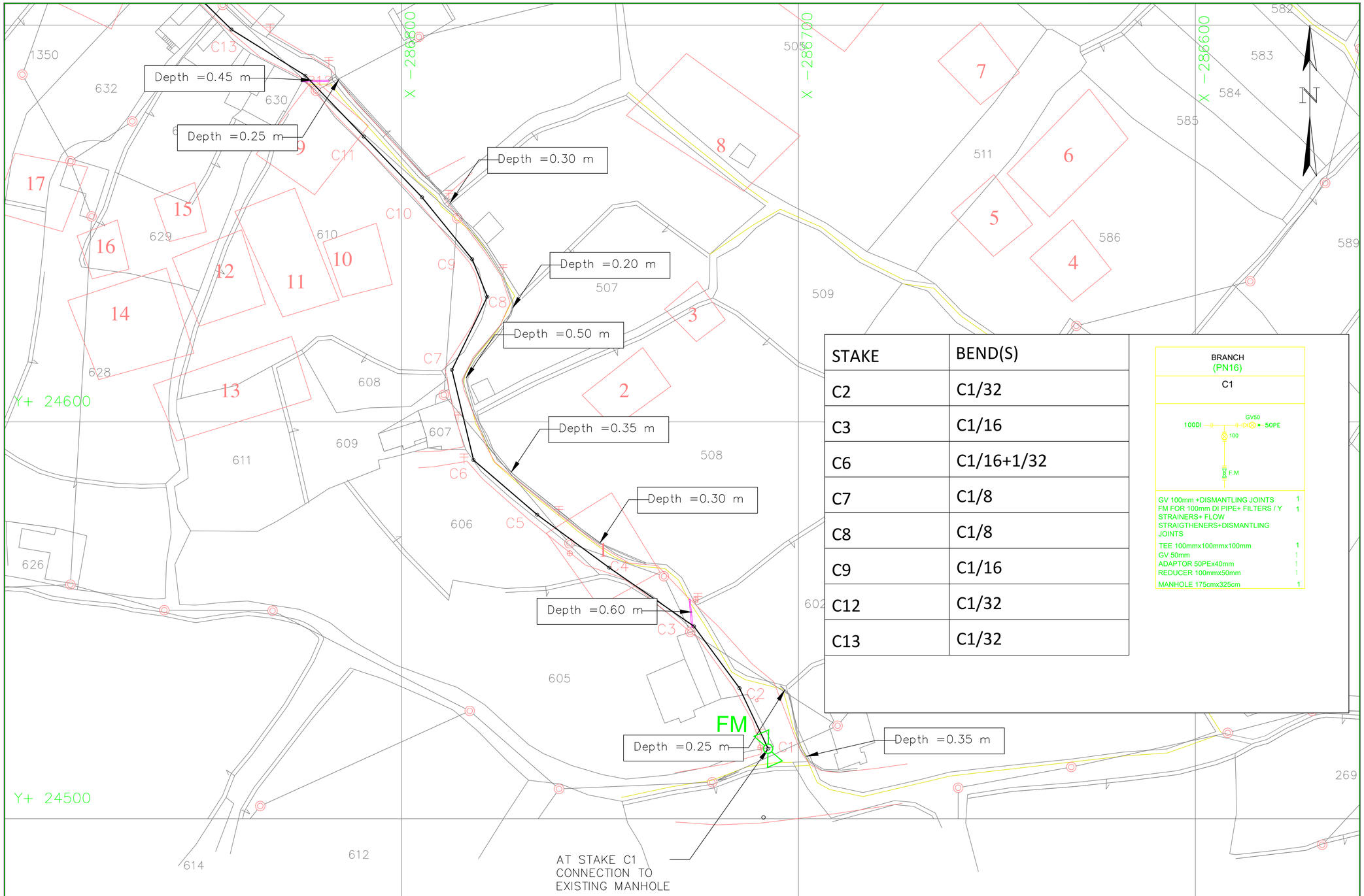
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1/2000	1/6	762W- DS-PL01

STAKE	BEND(S)
C15	C1/8+1/16+1/32
C16	C1/32
C18	C1/32
C19	C1/32
C21	C1/16
C23	C1/32
C24	C1/16
C25	C1/16
C26	C1/16
C27	C1/4
C30	C1/32
C32	C1/16

STAKE	BEND(S)
C36	C1/16
C37	C1/16
C38	C1/16+1/32
C39	C1/16+1/32
C41	C1/32
C53	C1/16

STAKE	BEND(S)
C2	C1/32
C3	C1/16
C6	C1/16+1/32
C7	C1/8
C8	C1/8
C9	C1/16
C12	C1/32
C13	C1/32

STAKE	BEND(S)
A4	C1/8+1/32
A6	C1/8
A7	C1/8



STAKE	BEND(S)
C2	C1/32
C3	C1/16
C6	C1/16+1/32
C7	C1/8
C8	C1/8
C9	C1/16
C12	C1/32
C13	C1/32

BRANCH
(PN16)

C1

GV 100mm +DISMANTLING JOINTS	1
FM FOR 100mm DI PIPE+ FILTERS / Y STRAINERS+ FLOW STRAIGTHENERS+DISMANTLING JOINTS	1
TEE 100mmx100mmx100mm	1
GV 50mm	1
ADAPTOR 50PEx40mm	1
REDUCER 100mmx50mm	1
MANHOLE 175cmx325cm	1

HYDRAULIC LEGEND

PIPELINE
FLOW DIRECTION
GATE VALVE
TEE
REDUCER
FLANGED ADAPTER
END CAPS
BEND 1/8 C1/8
ARV (SINGLE AIR VALVE - SAV)
W.O (WASHOUT)
EXISTING PIPE
FLOW METER F.M.
S.M.D. ## SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS

NOTES

- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION DATUM OF LEBANON.
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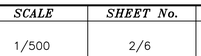
TOPOGRAPHICAL LEGEND

BUILDING
PAVED ROAD
CONCRETE ROAD
TRACK
REFERENCE LINE
CHANNEL
TERRACE
FENCE
STREAM/RIVER
CULVERT/BRIDGE
SPRING
WELL
DECIDUOUS/PINE TREE
ROCKS
Down Hill
High Hill
GULLY
MANHOLE SEWER
MANHOLE WATER
MANHOLE TELEPHONE
MANHOLE NOT IDENTIFIED
LIGHTING POLE
TELEPHONE POLE
TRIANGULATION STATION
ELECTRIC SUB STATION
ELECTRIC POLE/TELEGRAPH POLE
STAKE NUMBER STAKE POINT
SPOT HEIGHT
PLOT No
BOUNDARY
MAIN ROAD
CIRCONSCRIPTION BOUNDARY
RESERVOIR

KEY PLAN



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DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

SYR DISTRIBUTION NETWORK	PLAN

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-DS-PL	C.ELIAS	R.CHAMAA	W.WANNA

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1/500	2/6	762W- DS-PL02

BETWEEN STAKES C27 AND C54
THE PROPOSED 100 mm DI PIPE
SHALL BE LAID IN PARALLEL TO THE
EXISTING 150 AND 100 mm DI PIPES

ARV

WO

Depth =0.50 m

Depth =1.00 m

X = 286800

X = 286700

X = 286600

Y= 24900

Y= 24800

N

STAKE	BEND(S)
C15	C1/8+1/16+1/32
C16	C1/32
C18	C1/32
C19	C1/32
C21	C1/16
C23	C1/32
C24	C1/16
C25	C1/16
C26	C1/16
C27	C1/4
C30	C1/32
C32	C1/16

WO

C16

100DI — 100 DI
WO 60
75PE

WO 60mm	1
COVER GRADE A	1
MANHOLE 150cmx150cm	1

ARV

C27

ARV 60 — 100 — 100 DI — 100DI

ARV FOR 100DI PIPE	1
GV DN 60mm	1
GV DN 100mm	1
COVER GRADE A	1
MANHOLE 175cmx125cm	1

HYDRAULIC LEGEND

PIPELINE		BEND 1/8	C1/8
FLOW DIRECTION		ARV (SINGLE AIR VALVE - SAV)	
GATE VALVE		W.O (WASHOUT)	
TEE		EXISTING PIPE	
REDUCER		FLOW METER F.M.	
FLANGED ADAPTER		S.M.D. ##	SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS
END CAPS			

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- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS.

TOPOGRAPHICAL LEGEND

BUILDING, PAVED ROAD, CONCRETE ROAD, TRACK, REFERENCE LINE, CHANNEL, TERRACE, FENCE, STREAM/RIVER, CULVERT/BRIDGE, SPRING, WELL, DECIDUOUS/PINE TREE, ROCKS, Down Hill, High Hill, GULLY, MANHOLE SEWER, MANHOLE WATER, MANHOLE TELEPHONE, MH MANHOLE NOT IDENTIFIED, LIGHTING POLE, TP TELEPHONE POLE, TRIANGULATION STATION, EL.S.S ELECTRIC SUB STATION, ELECTRIC POLE/TELEGRAPH POLE, Num STAKE NUMBER STAKE POINT, 1160.12 SPOT HEIGHT, 1262 PLOT No, BOUNDARY, MAIN ROAD, CIRCONSCRIPTION BOUNDARY, RESERVOIR

KEY PLAN

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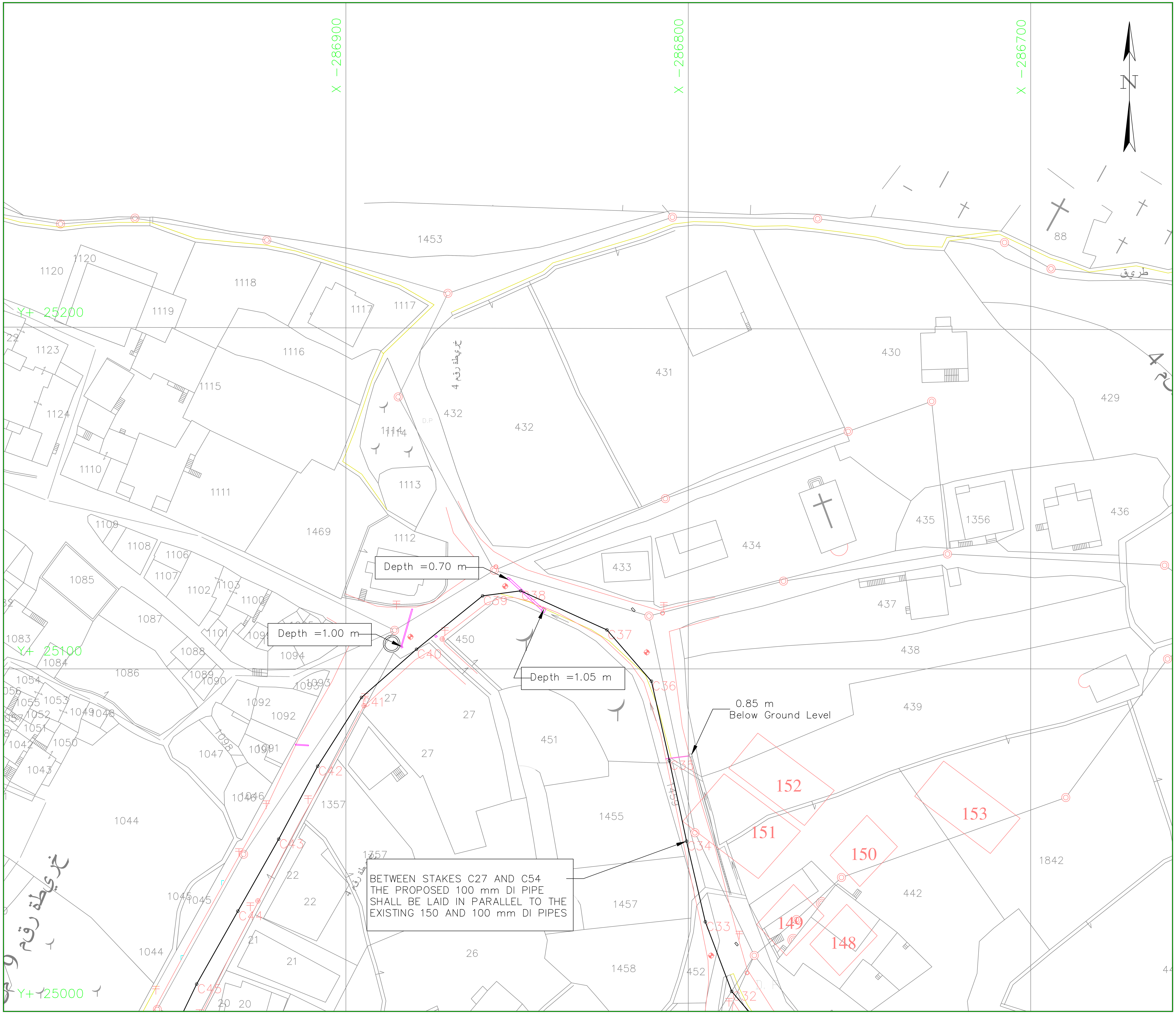
SYR DISTRIBUTION NETWORK	PLAN

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–DS–PL	C.ELIAS	R.CHAMAA	W.WANNA

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1/500	3/6	762W– DS–PL03



HYDRAULIC LEGEND

PIPELINE	BEND 1/8 (C1/8)
FLOW DIRECTION	ARV (SINGLE AIR VALVE - SAV)
GATE VALVE	W.O (WASHOUT)
TEE	EXISTING PIPE
REDUCER	FLOW METER F.M.
FLANGED ADAPTER	S.M.D. ## — SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS
END CAPS	

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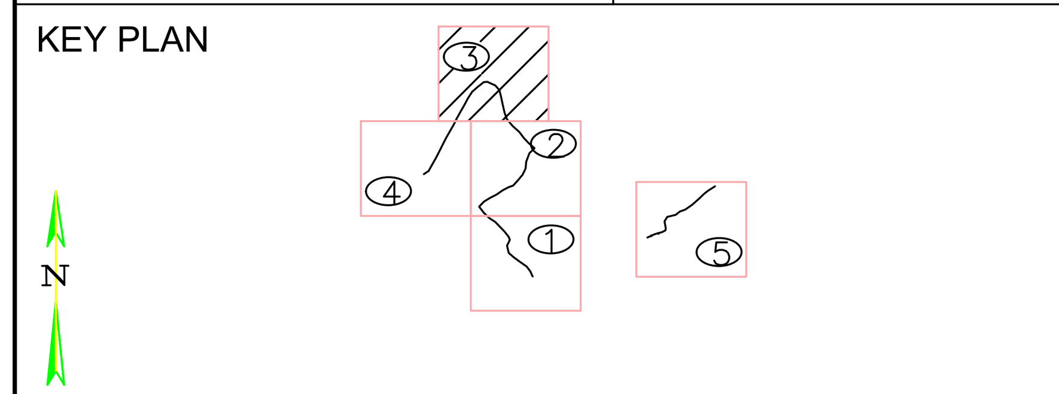
TOPOGRAPHICAL LEGEND

BUILDING	GULLY
PAVED ROAD	MANHOLE SEWER
CONCRETE ROAD	MANHOLE WATER
TRACK	MANHOLE TELEPHONE
REFERENCE LINE	MH — MANHOLE NOT IDENTIFIED
channel — CHANNEL	LIGHTING POLE
TERRACE	TP — TELEPHONE POLE
FENCE	TRIANGULATION STATION
STREAM/RIVER	EL.S.S — ELECTRIC SUB STATION
CULVERT/BRIDGE	ELECTRIC POLE/TELEGRAPH POLE
Spr — SPRING	Num — STAKE NUMBER STAKE POINT
WELL	1160.12 — SPOT HEIGHT
DECIDUOUS/PINE TREE	1262 — PLOT No
ROCKS	BOUNDARY
DownHill	MAIN ROAD
High-Hill	CIRCONSCRIPTION BOUNDARY
	RESERVOIR

KEY PLAN



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DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1/500	4/6	762W- DS-PL04

BETWEEN STAKES C27 AND C54
THE PROPOSED 100 mm DI PIPE
SHALL BE LAID IN PARALLEL TO THE
EXISTING 150 AND 100 mm DI PIPES

Depth =0.45 m

AT STAKE C54
CONNECTION TO
EXISTING MANHOLE

Inv.Level 898.86

1:500

N

Y+ 24900

Y+ 24800

X -287200

X -287100

X -287000

X -286900

STAKE	BEND(S)
C36	C1/16
C37	C1/16
C38	C1/16+1/32
C39	C1/16+1/32
C41	C1/32
C53	C1/16

BRANCH
(PN16)
C54

100DI 100 100DI
100DI 100

TEE 100mmx100mmx100mm 1
GV 100mm 2

MANHOLE 150cmx150cm 1

HYDRAULIC LEGEND

PIPELINE
FLOW DIRECTION
GATE VALVE
TEE
REDUCER
FLANGED ADAPTER
END CAPS
BEND 1/8 C1/8
ARV (SINGLE AIR VALVE - SAV)
W.O (WASHOUT)
EXISTING PIPE
FLOW METER F.M.
S.M.D. ## SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS

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TOPOGRAPHICAL LEGEND

BUILDING
PAVED ROAD
CONCRETE ROAD
TRACK
REFERENCE LINE
CHANNEL
TERRACE
FENCE
STREAM/RIVER
CULVERT/BRIDGE
SPRING
WELL
DECIDUOUS/PINE TREE
ROCKS
Down Hill
High Hill
GULLY
MANHOLE SEWER
MANHOLE WATER
MANHOLE TELEPHONIE
MH MANHOLE NOT IDENTIFIED
LIGHTING POLE
TP TELEPHONE POLE
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ELECTRIC POLE/TELEGRAPH POLE
Num STAKE NUMBER STAKE POINT
1160.12 SPOT HEIGHT
1262 PLOT No
BOUNDARY
MAIN ROAD
CIRCONSCRIPTION BOUNDARY
RESERVOIR

KEY PLAN

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1/500	5/6	762W- DS-PL05

Depth =0.90 m

Depth =0.70 m

Depth =0.30m

WO

BETWEEN STAKES A1 AND A15
REPLACEMENT OF THE EXISTING 3INCH
STEEL PIPELINE WITH
AN HDPE 90 mm DIAMETER PIPE

FM

At STAKE A1
CONNECTION TO
EXISTING MANHOLE

Y+ 24700

Y+ 24600

X - 286300

X - 286200

X - 286100

BRANCH (PN16) A1		WO A12	
GV 80mm +DISMANTLING JOINTS	1	WO 60mm	1
FM FOR 90mm PE PIPE+ FILTERS / Y STRAINERS+ FLOW STRAIGTHENERS+DISMANTLING JOINTS	1		
TEE 150mmx60mmx150mm	1		
GV 150mm	1		
MANHOLE 175cmx300cm	1	COVER GRADE A	1
		MANHOLE 150cmx150cm	1

STAKE	BEND(S)
A4	C1/8+1/32
A6	C1/8
A7	C1/8

HYDRAULIC LEGEND

PIPELINE
FLOW DIRECTION
GATE VALVE
TEE
REDUCER
FLANGED ADAPTER
END CAPS
BEND 1/8 C1/8
ARV (SINGLE AIR VALVE - SAV)
W.O (WASHOUT)
EXISTING PIPE
FLOW METER F.M.
S.M.D. ## SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS

NOTES

- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION DATUM OF LEBANON.
- HEAD LOSSES HAVE BEEN CALCULATED ACCORDING TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 762W-STDP10.
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 762W-STDP04.
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 762W-STDP08, DWG Nb762W-STDP09 AND DWG Nb 762W-STDP10.
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG 762W-STDP08.
- PIPE MATERIAL: DUCTILE IRON UNLESS OTHER WISE SPECIFIED .
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED.
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS.

TOPOGRAPHICAL LEGEND

BUILDING
PAVED ROAD
CONCRETE ROAD
TRACK
REFERENCE LINE
CHANNEL
TERRACE
FENCE
STREAM/RIVER
CULVERT/BRIDGE
SPRING
WELL
DECIDUOUS/PINE TREE
ROCKS
Down Hill
High Hill
GULLY
MANHOLE SEWER
MANHOLE WATER
MANHOLE TELEPHONE
MANHOLE NOT IDENTIFIED
LIGHTING POLE
TELEPHONE POLE
TRIANGULATION STATION
ELECTRIC SUB STATION
ELECTRIC POLE/TELEGRAPH POLE
STAKE NUMBER STAKE POINT
SPOT HEIGHT
PLOT No
BOUNDARY
MAIN ROAD
CIRCONSCRIPTION BOUNDARY
RESERVOIR

KEY PLAN

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB – HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 – ANTELIAS FAX:(04) 712159

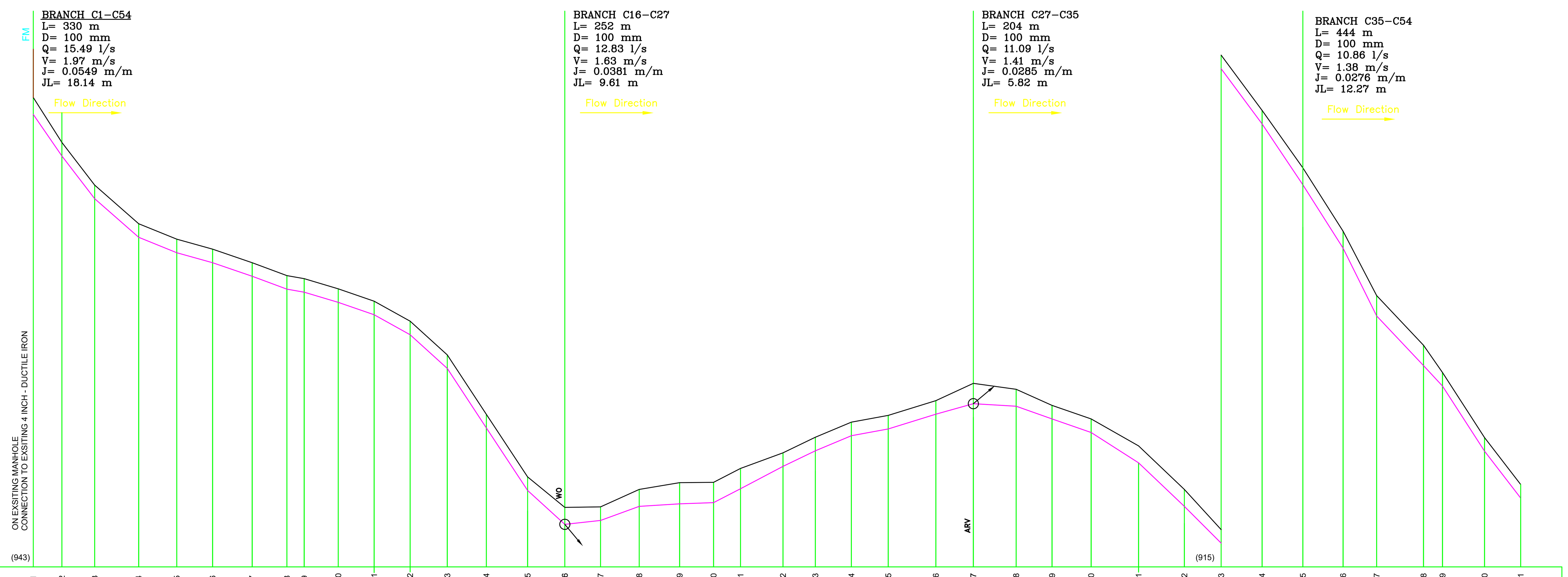
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

SYR DISTRIBUTION NETWORK

PLAN

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–DS–PL	C.ELIAS	R.CHAMAA	W.WANNA

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1/500	6/6	762W– DS–PL06



DATUM LEVEL (943) at C1; (915) at C33

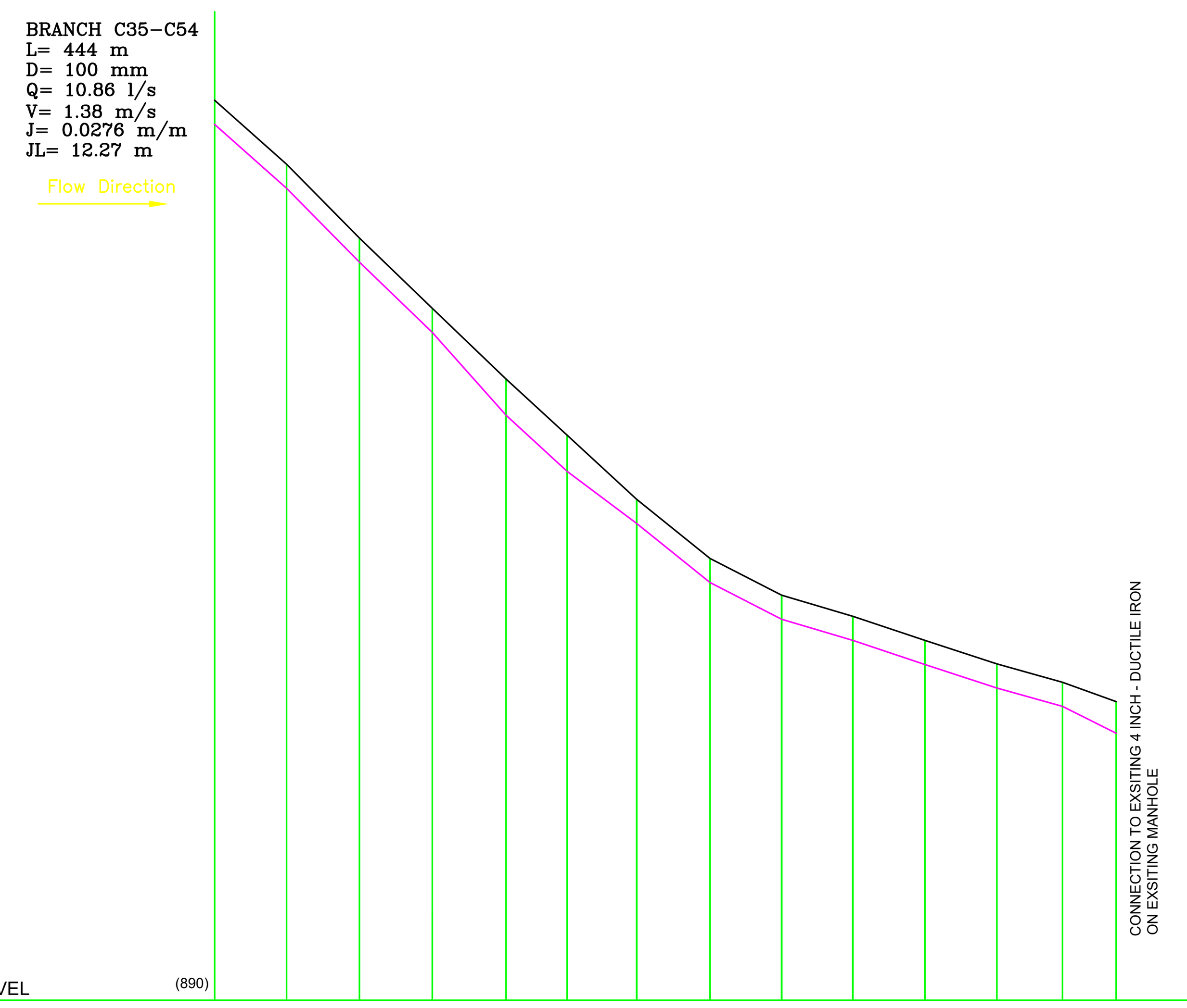
STAKE NUMBER	GROUND LEVEL	CROWN PIPE ELEVATION	PIEZOMETRIC LEVEL	PRESSURE ON GROUND	PARTIAL DISTANCE (to next stake)	ADD DISTANCE
C1	970.70	969.70	1014.22	43.52	16.86	0.00
C2	968.05	967.25	1013.23	45.18	19.36	16.86
C3	965.53	964.73	1012.11	46.58	25.98	36.21
C4	963.25	962.45	1010.60	47.35	22.50	62.19
C5	962.34	961.54	1009.30	46.96	21.15	84.69
C6	961.75	960.95	1008.07	46.32	23.37	105.84
C7	960.95	960.15	1006.72	45.77	20.48	129.21
C8	960.19	959.39	1005.54	45.35	10.20	149.69
C9	960.01	959.21	1004.95	44.94	20.10	159.89
C10	959.41	958.61	1003.78	44.37	21.19	179.99
C11	958.68	957.88	1002.56	43.88	21.24	201.18
C12	957.50	956.70	1001.33	43.83	21.95	222.42
C13	955.51	954.71	1000.05	44.54	23.07	244.37
C14	952.00	951.20	998.70	46.70	24.34	267.44
C15	948.31	947.51	997.28	48.97	21.96	291.78
C16	946.51	945.51	996.01	49.50	21.10	313.74
C17	946.54	945.74	995.17	48.63	22.82	334.84
C18	947.57	946.57	994.26	46.69	23.85	357.66
C19	947.97	946.72	993.31	45.34	20.04	381.51
C20	947.99	946.79	992.51	44.52	15.91	401.55
C21	948.81	947.61	991.87	43.06	25.07	417.46
C22	949.73	948.93	990.87	41.14	19.10	442.52
C23	950.65	949.85	990.11	39.46	21.27	461.63
C24	951.54	950.74	989.26	37.72	21.77	482.90
C25	951.94	951.14	988.39	36.45	28.09	504.68
C26	952.81	952.01	987.27	34.46	22.13	532.77
C27	953.83	952.63	986.39	32.56	25.28	554.90
C28	953.48	952.48	985.63	32.15	21.19	580.18
C29	952.53	951.73	985.00	32.47	23.07	601.37
C30	951.73	950.93	984.31	32.58	28.02	624.44
C31	950.14	949.14	983.47	33.33	27.00	652.46
C32	947.57	946.57	982.66	35.09	21.73	679.45
C33	945.20	944.40	982.00	36.80	24.17	701.18
C34	941.94	941.14	981.27	39.33	24.05	725.36
C35	938.55	937.55	980.55	42.00	23.76	749.40
C36	934.81	933.81	979.86	45.05	19.82	773.16
C37	931.01	929.81	979.28	48.27	27.66	792.98
C38	928.08	926.88	978.48	50.40	11.22	820.65
C39	926.47	925.67	978.15	51.68	24.81	831.87
C40	922.63	921.83	977.43	54.80	21.33	856.68
C41	919.86	919.06	976.81	56.95		878.01

PIPE DIAMETER: 100 mm-DI (C1–C16); 100 mm-DI (C16–C27); 100 mm-DI (C27–C35)

PIPE DETAILS: at C1: 100DI – 100 – GV50 – 50PE, W.M; at C16: 100 DI – 100 DI, 60, 75PE; at C27: ARV 60, 100 DI – 100 DI, 100

HECTOMETER: 0 1 2 3 4 5 6 7 8 9

KILOMETER: 0



DATUM LEVEL (890)

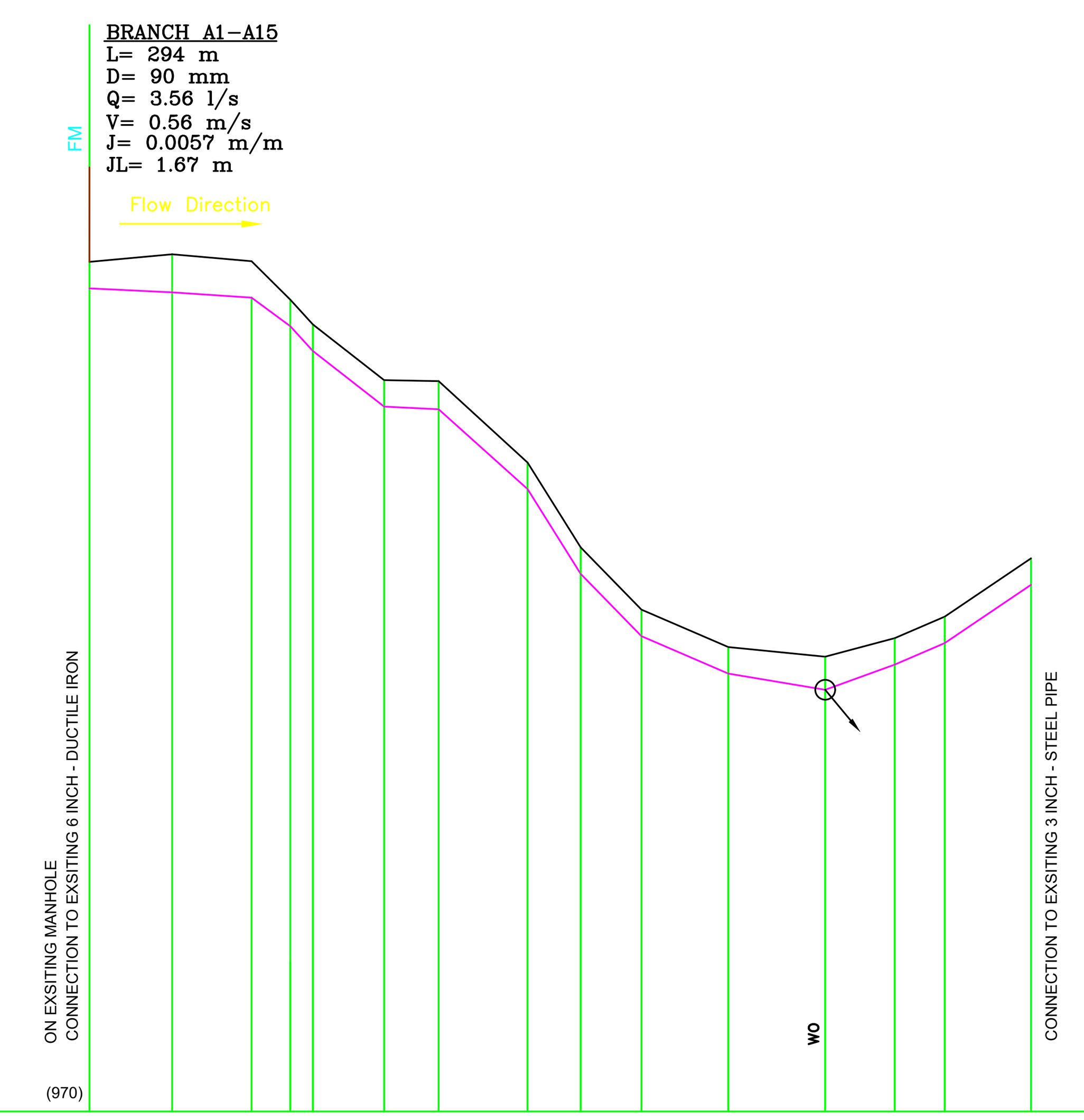
STAKE NUMBER	GROUND LEVEL	CROWN PIPE ELEVATION	PIEZOMETRIC LEVEL	PRESSURE ON GROUND	PARTIAL DISTANCE (to next stake)	ADD DISTANCE
C41	919.86	919.06	976.81	56.95	23.83	878.01
C42	917.74	916.94	976.13	58.39	24.15	901.84
C43	915.29	914.49	975.43	60.14	24.14	925.99
C44	912.96	912.16	974.73	61.77	24.47	950.13
C45	910.61	909.41	974.03	63.42	20.23	974.61
C46	908.75	907.55	973.44	64.69	23.08	994.83
C47	906.62	905.82	972.78	66.16	24.30	1017.92
C48	904.66	903.86	972.08	67.42	23.75	1042.22
C49	903.44	902.64	971.40	67.96	23.60	1065.97
C50	902.74	901.94	970.72	67.98	23.89	1089.57
C51	901.94	901.14	970.03	68.09	23.84	1113.47
C52	901.16	900.36	969.35	68.19	21.76	1137.30
C53	900.55	899.75	968.72	68.17	17.78	1159.07
C54	899.91	898.86	968.21	68.30		1176.85

PIPE DIAMETER: 100 mm-DI

PIPE DETAILS: at C53–C54: 100DI – 100 – 100DI; 100DI – 100

HECTOMETER: 9 0 1

KILOMETER: 1



DATUM LEVEL (970)

STAKE NUMBER	GROUND LEVEL	CROWN PIPE ELEVATION	PIEZOMETRIC LEVEL	PRESSURE ON GROUND	PARTIAL DISTANCE (to next stake)	ADD DISTANCE
A1	995.65	994.85	1029.03	33.38	24.96	0.00
A2	995.88	994.73	1028.89	33.01	23.98	24.96
A3	995.67	994.57	1028.75	33.08	11.69	48.94
A4	994.51	993.71	1028.69	34.18	6.83	60.63
A5	993.76	992.96	1028.65	34.89	21.52	67.46
A6	992.08	991.28	1028.53	36.45	16.47	88.98
A7	992.05	991.20	1028.43	36.38	26.84	105.45
A8	989.59	988.79	1028.28	38.69	16.03	132.29
A9	987.03	986.23	1028.19	41.16	18.36	148.32
A10	985.15	984.35	1028.08	42.93	26.22	166.68
A11	984.02	983.22	1027.94	43.92	29.25	192.90
A12	983.73	982.73	1027.77	44.04	20.99	222.14
A13	984.29	983.49	1027.65	43.36	15.10	243.13
A14	984.94	984.14	1027.57	42.63	26.05	258.24
A15	986.70	985.90	1027.42	40.72		284.29

PIPE DIAMETER: 90 mm-HDPE

PIPE DETAILS: at A1: 150DI – 150DI, 80, 150, W.M, 90 PE; at A12: 90 PE – 90 PE, 60, 75PE

HECTOMETER: 0 1 2

KILOMETER: 0

HYDRAULIC LEGEND

PIPELINE	BEND 1/8 (C1/8)
FLOW DIRECTION	ARV (SINGLE AIR VALVE - SAV)
GATE VALVE	W.O (WASHOUT)
TEE	EXISTING PIPE
REDUCER	FLOW METER F.M.
FLANGED ADAPTER	S.M.D. ## — SEE MANHOLE DETAILS OF STAKE ## ON NETWORK PLANS
END CAPS	

NOTES

- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION DATUM OF LEBANON.
- HEAD LOSSES HAVE BEEN CALCULATED ACCORDING TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 762W-STDP10.
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 762W-STDP04.
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 762W-STDP08, DWG Nb762W-STDP09 AND DWG Nb 762W-STDP10.
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG 762W-STDP08.
- PIPE MATERIAL: DUCTILE IRON UNLESS OTHER WISE SPECIFIED .
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED.
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS.

TOPOGRAPHICAL LEGEND

BUILDING	GULLY
PAVED ROAD	MANHOLE SEWER
CONCRETE ROAD	MANHOLE WATER
TRACK	MANHOLE TELEPHONE
REFERENCE LINE	MANHOLE NOT IDENTIFIED (MH)
CHANNEL (channel)	LIGHTING POLE
TERRACE	TELEPHONE POLE (TP)
FENCE	TRIANGULATION STATION
STREAM/RIVER	ELECTRIC SUB STATION (EL.S.S)
CULVERT/BRIDGE	ELECTRIC POLE/TELEGRAPH POLE
SPRING (Spr)	STAKE NUMBER / STAKE POINT (Num)
WELL	SPOT HEIGHT (1160.12)
DECIDUOUS/PINE TREE	PLOT No (1262)
ROCKS	BOUNDARY
DownHill / High-Hill	MAIN ROAD
	CIRCONSCRIPTION BOUNDARY
	RESERVOIR

KEY PLAN

N

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

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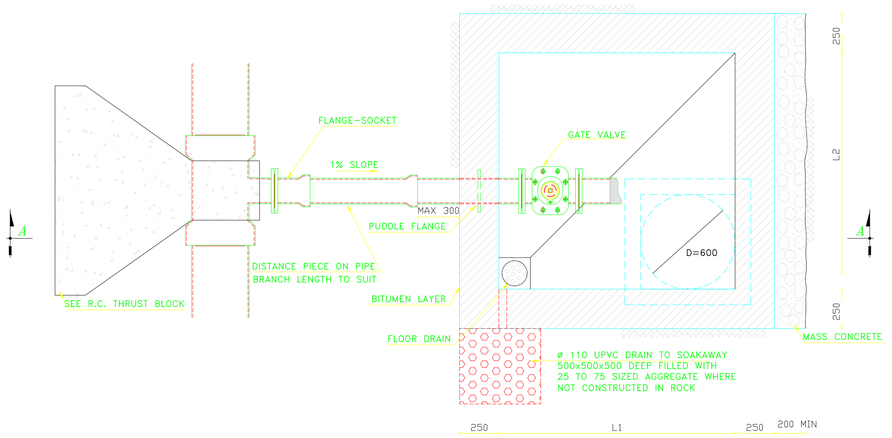
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

SYR DISTRIBUTION NETWORK — PROFILE

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–DS–PR	C.ELIAS	R.CHAMAA	W.WANNA

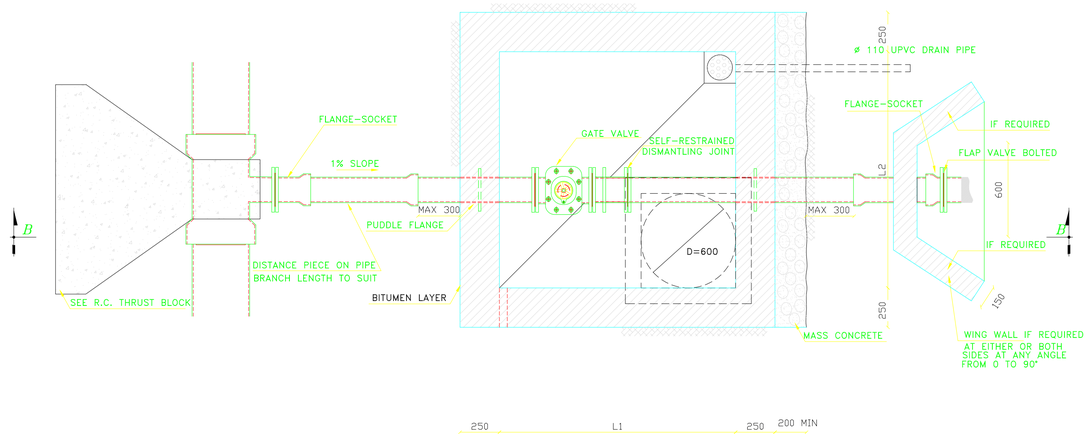
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	V: 1/200 H: 1/2000	1/1	762W–DS-PR01

TYPICAL WASHOUT CHAMBER DETAIL
TYPE I

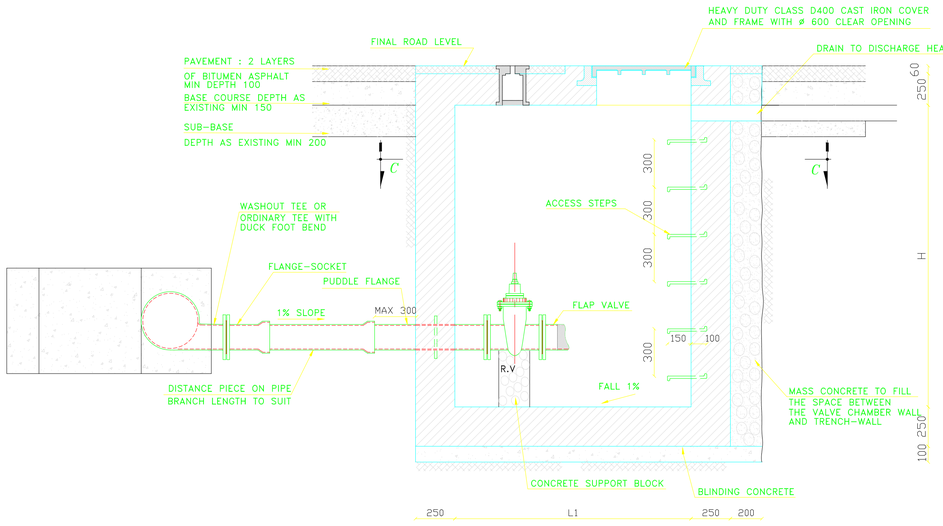


SECTION C–C

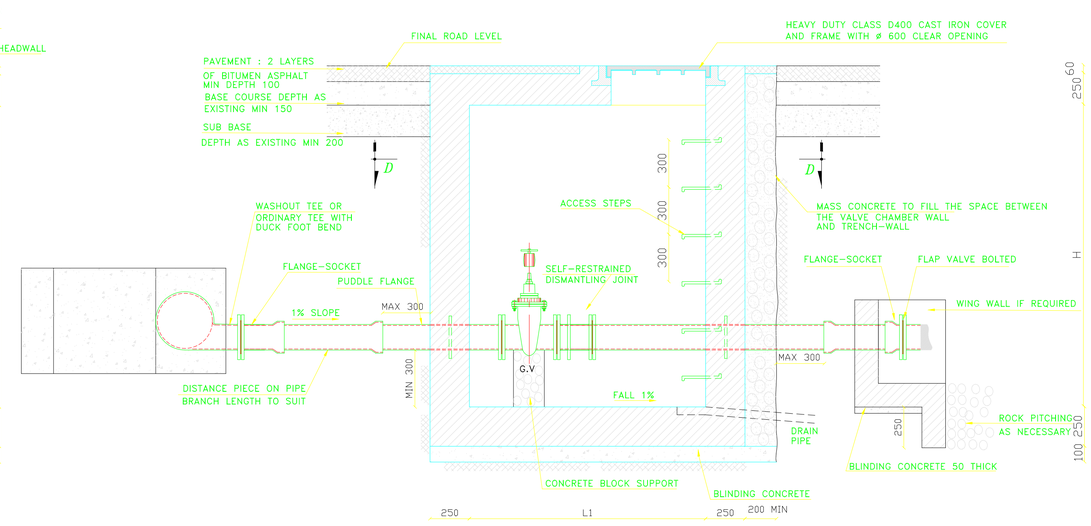
TYPICAL WASHOUT CHAMBER DETAIL
TYPE II



SECTION D–D

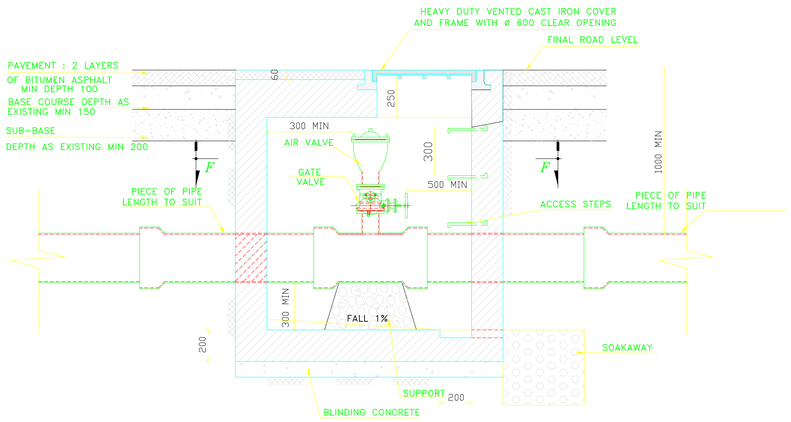


SECTION A–A

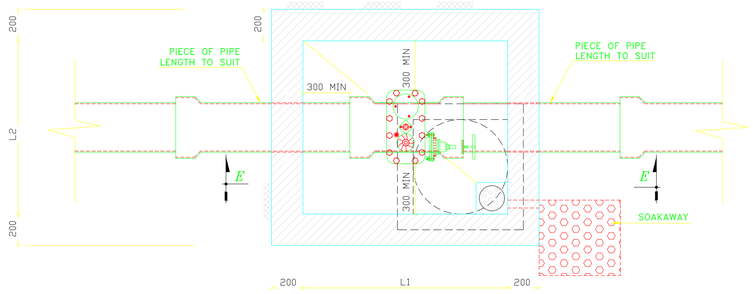


SECTION B–B

TYPICAL AIR VALVE CHAMBER DETAIL
NOT TO SCALE



SECTION E–E



SECTION F–F

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f'_c =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f'_t =2,1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER.
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50ø.
(ø= NOMINAL DIAMETER OF BAR).
LAPS SHALL BE STAGGERED FROM ONE HOOP TO THE OTHER AND/OR ONE BAR TO THE OTHER IN ORDER TO REDUCE THE NUMBER OF LAPS IN THE SAME SECTION.
STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø > 12mm MECHANICAL.
ø ≤ 12mm MANUAL (POSSIBLY).
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED CONCRETE SHALL BE FAIR FACE CONCRETE
(METALLIC OR PLYWOOD FORMWORK).

WATERPROOFING:
BITUMEN LAYER ON EXTERNAL SURFACES OF VALVE CHAMBER WALLS EXCEPT WHERE THERE IS MASS CONCRETE

REMARKS:
* HOLES MADE BY THE TIE–RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
* ALL DIMENSIONS ARE IN MILLIMETERS.
* SCALING FROM THESE DRAWINGS IS NOT ALLOWED.
* SOIL FRICTION ANGLE SHALL BE 25°
* GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 tg ø
* THE PASSIVE EARTH PRESSURE SHALL BE TAKEN INTO ACCOUNT FOR MANHOLE STABILITY BY FILLING THE VOID BETWEEN THE MANHOLE AND THE TRENCH WALL WITH MASS CONCRETE OF A MINIMUM THICKNESS "200".

SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

WASHOUT CHAMBER DIMENSIONS :
IN THE CASES WHERE THE WASHOUT CHAMBER IS TO HOUSE, AT THE SAME TIME, THE WASHOUT GATE VALVE AND THE MAIN PIPE,THE CHAMBER DIMENSIONS MAY VARY FROM THOSE INDICATED ON THIS DRAWING. CONSEQUENTLY, THE EXACT DIMENSIONS ARE TO BE TAKEN FROM THE RELEVANT SPECIFICATIONS AND/OR DRAWINGS IN THE TENDER DOCUMENTS OR AS DIRECTED BY THE ENGINEER.

* T.P. =TEST PRESSURE

* WASHOUT CHAMBER TYPE II SHALL BE USED NORMALLY.IF DETERMINED BY THE ENGINEER NOT TO BE APPLICABLE , TYPE I WILL BE USED.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

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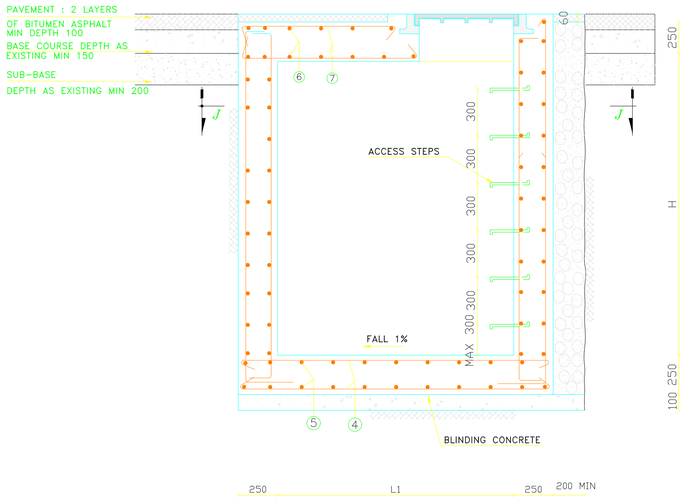
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS	WASHOUT AND AIR VALVE CHAMBER DETAILS

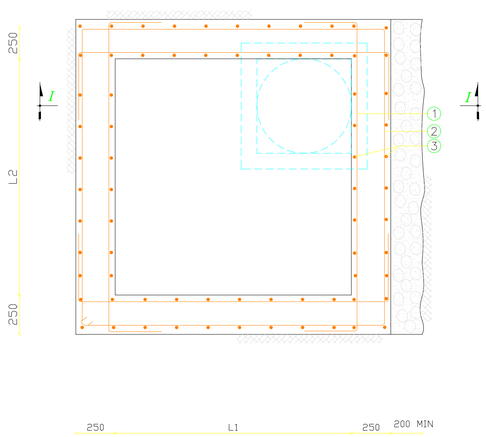
FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	1 / 18	762W–STDP01

TYPICAL REINFORCEMENT DETAIL FOR WASHOUT CHAMBER
NOT TO SCALE

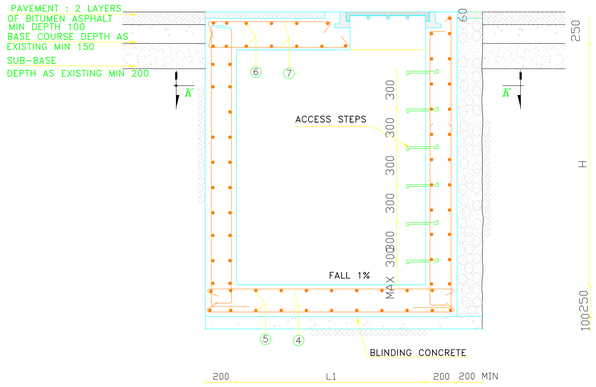


SECTION I–I

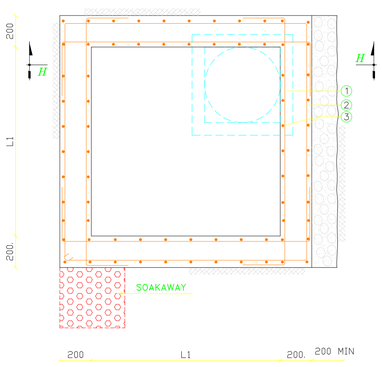


SECTION J–J

TYPICAL REINFORCEMENT DETAIL FOR AIR VALVE CHAMBER
NOT TO SCALE



SECTION H–H



SECTION K–K

TYPICAL SINGLE OR DOUBLE AIR VALVE CHAMBER
REINFORCEMENT STEEL TABLE

PIPE DIAMETER	REINFORCEMENT						
D	1	2	3	4	5	6	7
mm	mm	mm	mm	mm	mm	mm	mm
80–150	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
200–250	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
300–400	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
450–600	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
700–800	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
900–1000	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200

TYPICAL DOUBLE AIR VALVE CHAMBER
DIMENSIONS TABLE

MAIN LINE DIAMETER	AIR VALVE DIAMETER	L2	L1	H
ø mm	ø mm	mm	mm	mm
80–150	60	1000	1250	1200
200–250	60	1250	1500	1300
300–400	100	1250	1500	1500
450–600	100	1500	1500	2000
700–800	150	1500	1500	2100
900–1000	200	1750	2000	2300

TYPICAL SINGLE AIR VALVE CHAMBER
DIMENSIONS TABLE

MAIN LINE DIAMETER	AIR VALVE DIAMETER	L2	L1	H
ø mm	ø mm	mm	mm	mm
80–200	60	1000	1250	1200
250	60	1000	1500	1300
300–400	100	1000	1500	1500
450–600	100	1250	1750	2000

TYPICAL WASHOUT CHAMBER FOR TRANSMISSION PIPELINES–DIMENSIONS

TABLE 1 OF 2

MAIN PIPE DIAMETER	WASHOUT DIAMETER	DIMENSIONS		
		L1	L2	H
mm	mm	mm	mm	mm
80–150	80	1500	1500	1500
200	100	1500	1500	1500
250	150	1500	1500	1500
300–350	150	1500	1500	1500

TABLE 2 OF 2

MAIN PIPE DIAMETER	WASHOUT DIAMETER	T.P ⩽ 15 BARS		T.P > 15 BARS		
		L1	L2	L1	L2	H
mm	mm	mm	mm	mm	mm	mm
400–450	200	1500	1500	1500	1500	1600
500	250	1500	1500	2000	2000	2000
600⩽D⩽900	300	1500	1500			2150
600⩽D⩽900	250			2000	2000	2250

TYPICAL WASHOUT CHAMBER FOR TRANSMISSION PIPELINES–REINFORCEMENT

TABLE 1 OF 2

PIPE DIAMETER	REINFORCEMENT						
D	1	2	3	4	5	6	7
mm	mm	mm	mm	mm	mm	mm	mm
80–150	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
200	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
250	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
300–350	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200

TABLE 2 OF 2

PIPE DIAMETER	REINFORCEMENT						
D	1	2	3	4	5	6	7
mm	mm	mm	mm	mm	mm	mm	mm
400–450	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
500	T14 @200	T12 @200	T12 @200	T12 @200	T12 @200	T14 @200	T14 @200
600⩽D⩽900	T14 @200	T14 @200	T14 @200	T14 @200	T14 @200	T14 @200	T14 @200

TYPICAL WASHOUT CHAMBER DETAIL FOR DISTRIBUTION PIPELINES
DIMENSIONS TABLE

MAIN PIPE DIAMETER	WASHOUT DIAMETER	DIMENSIONS		
		L1	L2	H
mm	mm	mm	mm	mm
80–125	60	1500	1500	1500
150	80	1500	1500	1500
200	100	1500	1500	1500
250	150	1500	1500	1500
300 ⩽ ø ⩽ 600	150	1500	1500	1650

REINFORCEMENT STEEL TABLE

PIPE DIAMETER	REINFORCEMENT						
D	1	2	3	4	5	6	7
mm	mm	mm	mm	mm	mm	mm	mm
80–125	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T14 @200	T14 @200
150	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T14 @200	T14 @200
200	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T14 @200	T14 @200
250	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T14 @200	T14 @200
300 ⩽ ø ⩽ 600	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T14 @200	T14 @200

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f'_c =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f'_t =2,1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER.
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50ø.
(ø= NOMINAL DIAMETER OF BAR).
LAPS SHALL BE STAGGERED FROM ONE HOOP TO THE OTHER AND/OR ONE BAR TO THE OTHER IN ORDER TO REDUCE THE NUMBER OF LAPS IN THE SAME SECTION.
STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø > 12mm MECHANICAL.
ø ⩽ 12mm MANUAL (POSSIBLY).
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED CONCRETE SHALL BE FAIR FACE CONCRETE
(METALLIC OR PLYWOOD FORMWORK).

WATERPROOFING:
BITUMEN LAYER ON EXTERNAL SURFACES OF VALVE CHAMBER WALLS EXCEPT WHERE THERE IS MASS CONCRETE

REMARKS:
* HOLES MADE BY THE TIE–RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
* ALL DIMENSIONS ARE IN MILLIMETERS.
* SCALING FROM THESE DRAWINGS IS NOT ALLOWED.
* SOIL FRICTION ANGLE SHALL BE 25°
* GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 tg ø
* THE PASSIVE EARTH PRESSURE SHALL BE TAKEN INTO ACCOUNT FOR MANHOLE STABILITY BY FILLING THE VOID BETWEEN THE MANHOLE AND THE TRENCH WALL WITH MASS CONCRETE OF A MINIMUM THICKNESS "200".

SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

WASHOUT CHAMBER DIMENSIONS :
IN THE CASES WHERE THE WASHOUT CHAMBER IS TO HOUSE, AT THE SAME TIME, THE WASHOUT GATE VALVE AND THE MAIN PIPE,THE CHAMBER DIMENSIONS MAY VARY FROM THOSE INDICATED ON THIS DRAWING. CONSEQUENTLY, THE EXACT DIMENSIONS ARE TO BE TAKEN FROM THE RELEVANT SPECIFICATIONS AND/OR DRAWINGS IN THE TENDER DOCUMENTS OR AS DIRECTED BY THE ENGINEER.

* T.P. =TEST PRESSURE

* WASHOUT CHAMBER TYPE II SHALL BE USED NORMALLY.IF DETERMINED BY THE ENGINEER NOT TO BE APPLICABLE , TYPE I WILL BE USED.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

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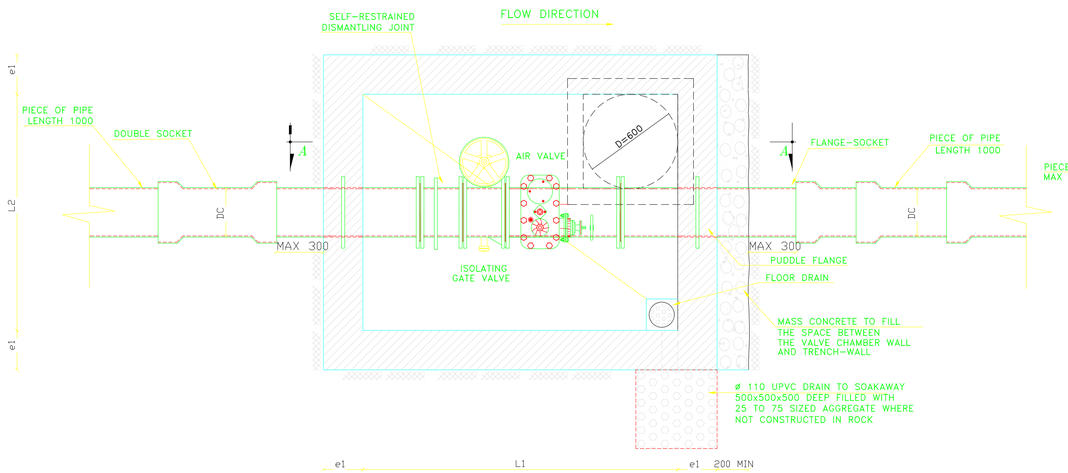
FAX:(04) 712159

DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

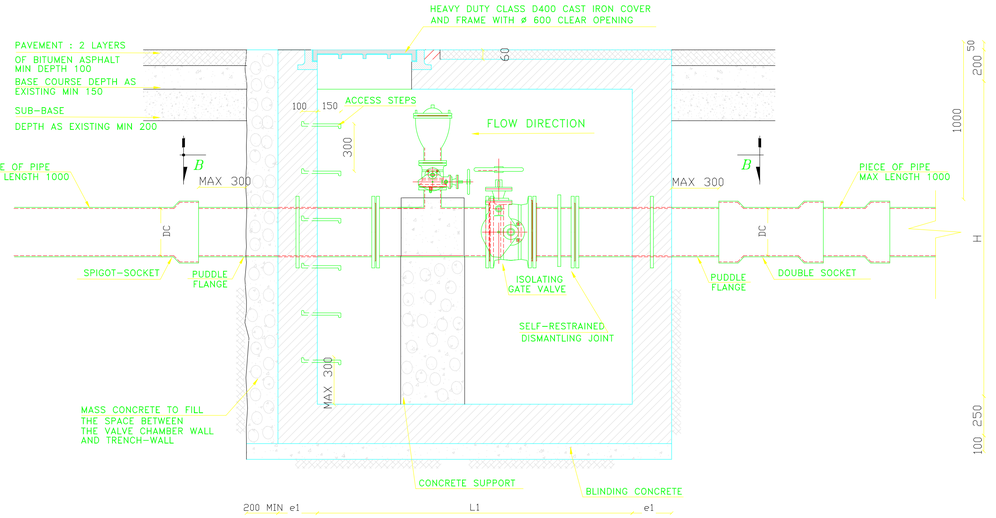
TRANSMISSION AND DISTRIBUTION SYSTEMS	WASHOUT AND AIR VALVE CHAMBER DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	1:50 - 1:20	2 /18	762W–STDP02



SECTION B–B
TYPICAL STOP VALVE CHAMBER DETAIL



SECTION A–A
TYPICAL STOP VALVE CHAMBER DETAIL

SECTION D–D
TYPICAL VALVE CHAMBER REINFORCEMENT DETAILS

SECTION A–A
TYPICAL VALVE CHAMBER REINFORCEMENT DETAILS

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f'_c =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f'_t =2,1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER.
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50ø.
(ø= NOMINAL DIAMETER OF BAR).
LAPS SHALL BE STAGGERED FROM ONE HOOP TO THE OTHER AND/OR ONE BAR TO THE OTHER IN ORDER TO REDUCE THE NUMBER OF LAPS IN THE SAME SECTION.
STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø > 12mm MECHANICAL.
ø ≤ 12mm MANUAL (POSSIBLY).
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED CONCRETE SHALL BE FAIR FACE CONCRETE
(METALLIC OR PLYWOOD FORMWORK).

WATERPROOFING:
BITUMEN LAYER ON EXTERNAL SURFACES OF VALVE CHAMBER WALLS EXCEPT WHERE THERE IS MASS CONCRETE

REMARKS:
* HOLES MADE BY THE TIE–RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
* ALL DIMENSIONS ARE IN MILLIMETERS.
* SCALING FROM THESE DRAWINGS IS NOT ALLOWED.
* SOIL FRICTION ANGLE SHALL BE 25°
* GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 tg ø
* THE PASSIVE EARTH PRESSURE SHALL BE TAKEN INTO ACCOUNT FOR MANHOLE STABILITY BY FILLING THE VOID BETWEEN THE MANHOLE AND THE TRENCH WALL WITH MASS CONCRETE OF A MINIMUM THICKNESS "200".

SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

WASHOUT CHAMBER DIMENSIONS :
IN THE CASES WHERE THE WASHOUT CHAMBER IS TO HOUSE, AT THE SAME TIME, THE WASHOUT GATE VALVE AND THE MAIN PIPE,THE CHAMBER DIMENSIONS MAY VARY FROM THOSE INDICATED ON THIS DRAWING. CONSEQUENTLY, THE EXACT DIMENSIONS ARE TO BE TAKEN FROM THE RELEVANT SPECIFICATIONS AND/OR DRAWINGS IN THE TENDER DOCUMENTS OR AS DIRECTED BY THE ENGINEER.

* T.P. =TEST PRESSURE

* WASHOUT CHAMBER TYPE II SHALL BE USED NORMALLY.IF DETERMINED BY THE ENGINEER NOT TO BE APPLICABLE , TYPE I WILL BE USED.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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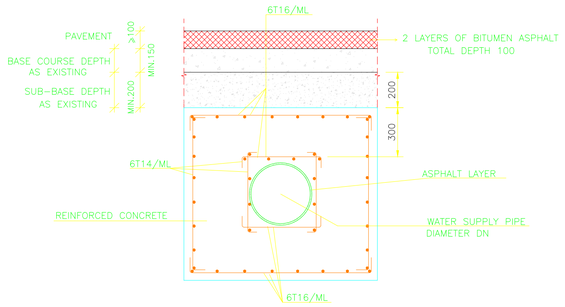
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS	STOP VALVE TYPICAL VALVE CHAMBER DETAILS

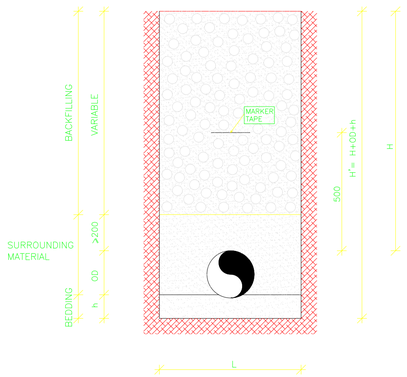
FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	3 / 18	762W–STDP03



IN ROAD TRENCH SHALLOW DEPTH

N.T.S

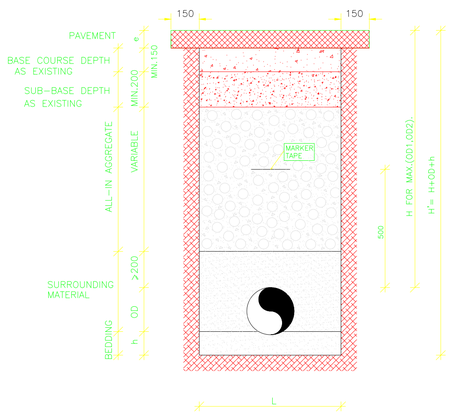


L: TRENCH WIDTH L= 4/3 OD+450(L≥600)
h: BEDDING DEPTH
h:=100+DN/10

TRENCH OFF ROAD FOR ONE PIPE

NOT TO SCALE

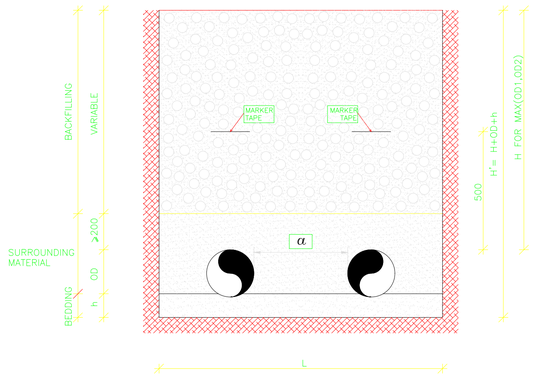
NOMINAL PIPE DIAMETER DN mm	PIPELINE COVER H mm	
	DISTRIBUTION	TRANSMISSION
80-150	800	1000
200-350	1000	1000
400-450	1100	1200
≥500	1200	1300



L: TRENCH WIDTH L= 4/3 OD+450(L≥600)
h: BEDDING DEPTH h= 100+DN/10 mm

TRENCH IN ROAD FOR ONE PIPE

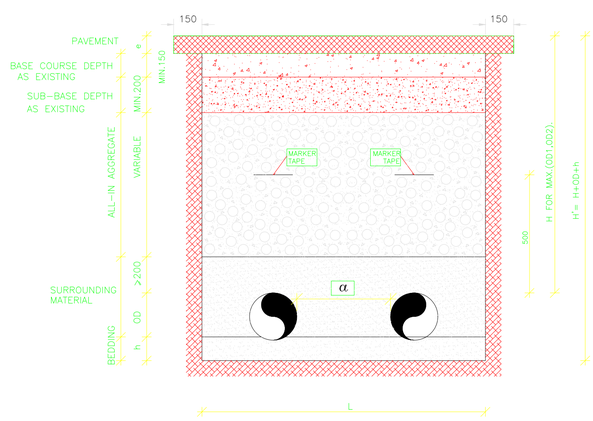
NOT TO SCALE



L: TRENCH WIDTH L= 5/4 (OD1+OD2)+800
h: BEDDING DEPTH
h= 100+MAX(DN1,DN2)/10
a= MAX(DN1/2,DN2/2,300)

TRENCH OFF ROAD FOR TWO PIPES

NOT TO SCALE



L: TRENCH WIDTH L= 5/4 (OD1+OD2)+800
h: BEDDING DEPTH h= 100+MAX(DN1,DN2)/10
a= MAX(DN1/2,DN2/2,300)

TRENCH IN ROAD FOR TWO PIPES

NOT TO SCALE

NOTES:

REINFORCED CONCRETE:
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DOSING 350 Kg/m3

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WASHOUT CHAMBER DIMENSIONS :
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* T.P. =TEST PRESSURE

* WASHOUT CHAMBER TYPE II SHALL BE USED NORMALLY.IF DETERMINED BY THE ENGINEER NOT TO BE APPLICABLE , TYPE I WILL BE USED.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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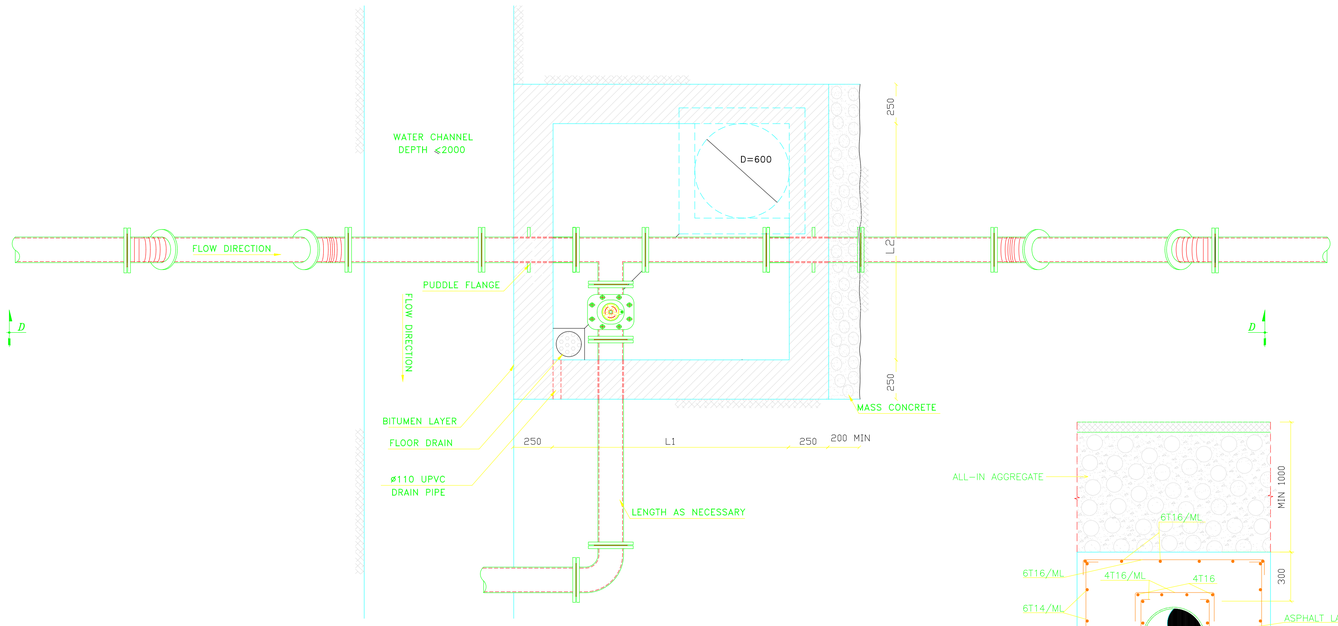
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

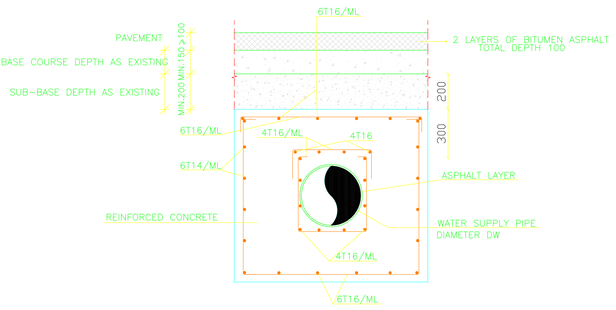
TRANSMISSION AND DISTRIBUTION SYSTEMS	STOP VALVE TYPICAL VALVE CHAMBER DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	4/18	762W-STDP04

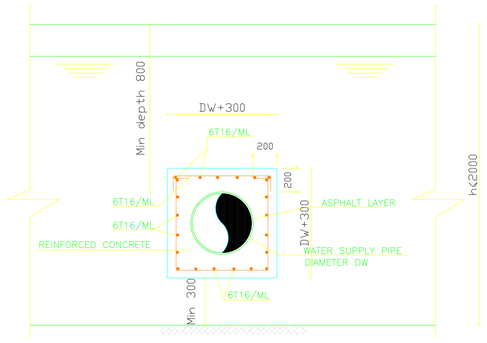


WATER CHANNEL CROSSING (TYPE I)
PLAN

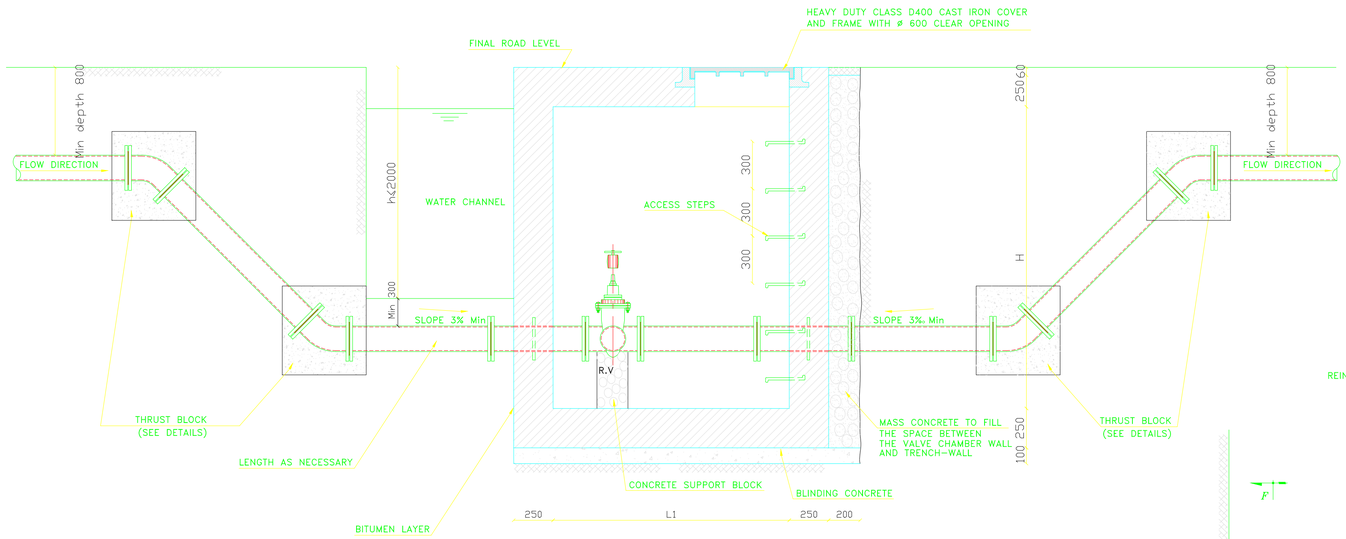


IN ROAD TRENCH SHALLOW DEPTH

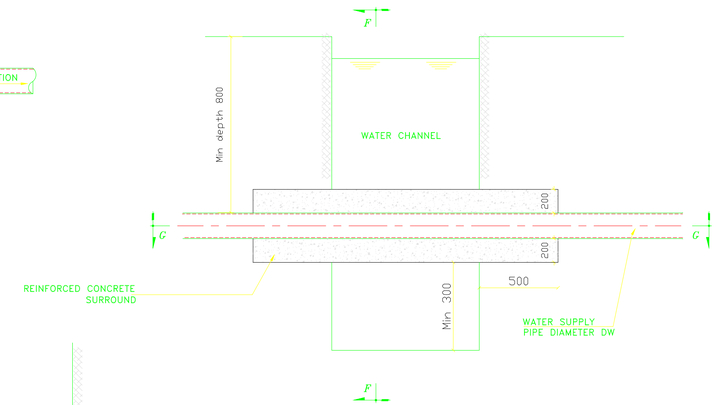
ALONG WATER COURSES
N.T.S



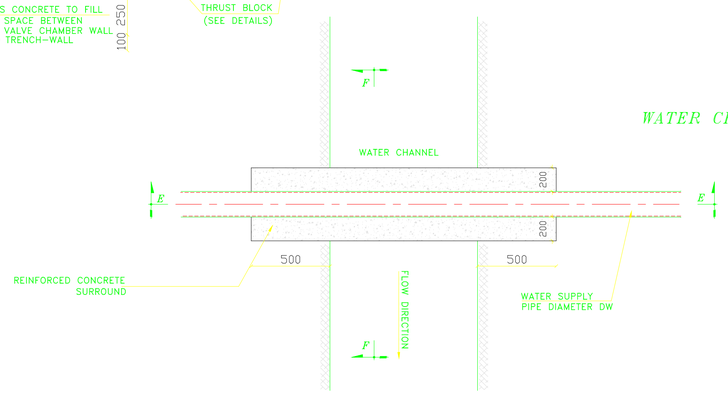
WATER CHANNEL CROSSING (TYPE II)
SECTION F-F



WATER CHANNEL CROSSING (TYPE I)
SECTION D-D



WATER CHANNEL CROSSING (TYPE II)
SECTION E-E



WATER CHANNEL CROSSING (TYPE II)
SECTION G-G

NOTES:

-ALL DIMENSIONS ARE IN MILLIMETERS.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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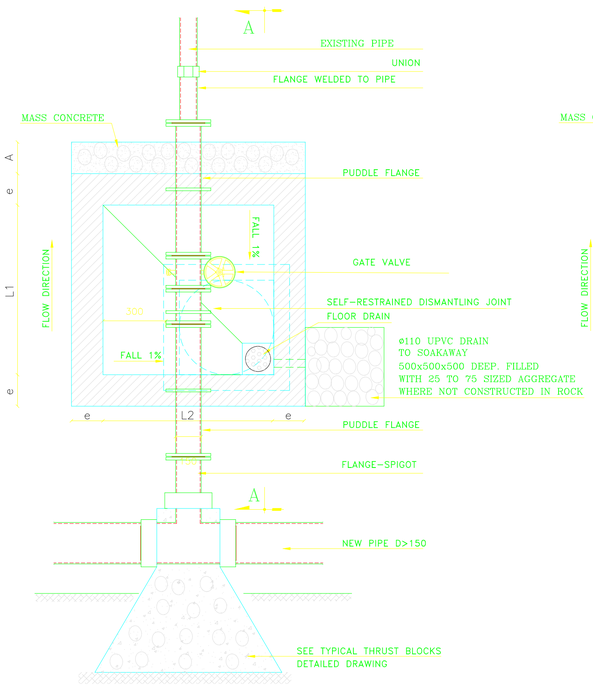
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS	PIPING UNDER SPECIAL CONDITIONS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

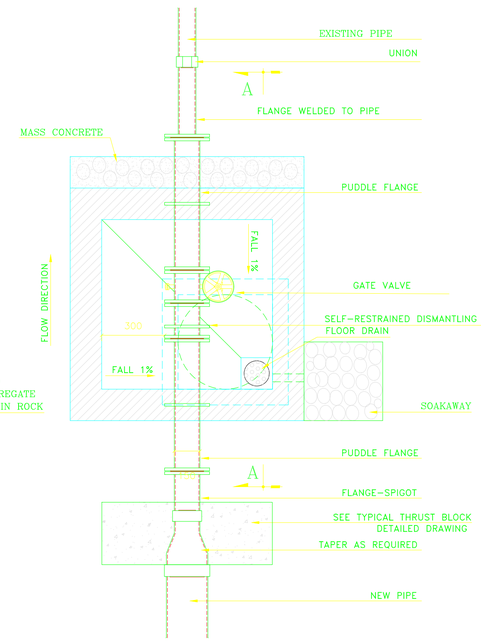
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	5/18	762W-STDP05

TYPE 1
SECTION C–C



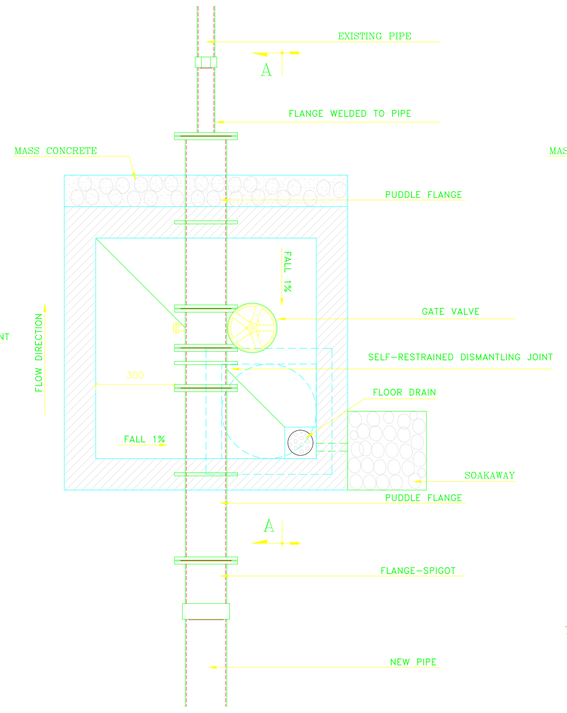
TYPE 1–A

TYPE 2
SECTION C–C



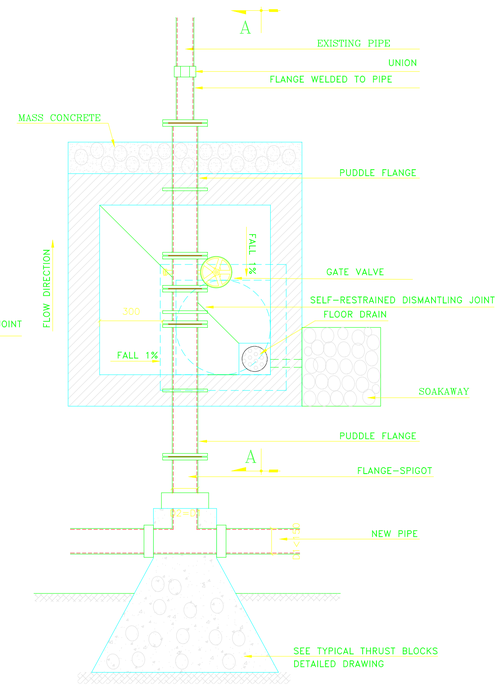
TYPE 2–A

TYPE 3
SECTION C–C



TYPE 3–A

TYPE 4
SECTION C–C



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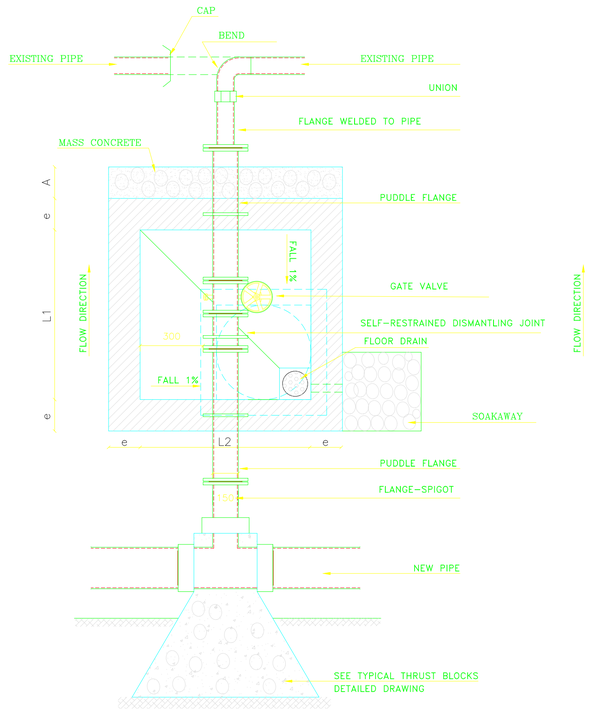
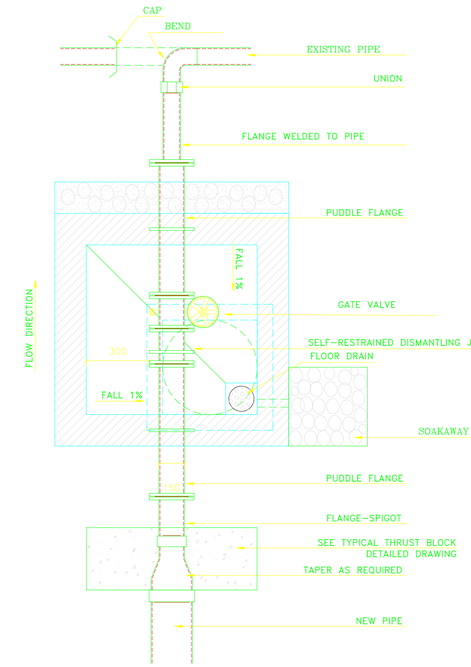


TYPE 1–B



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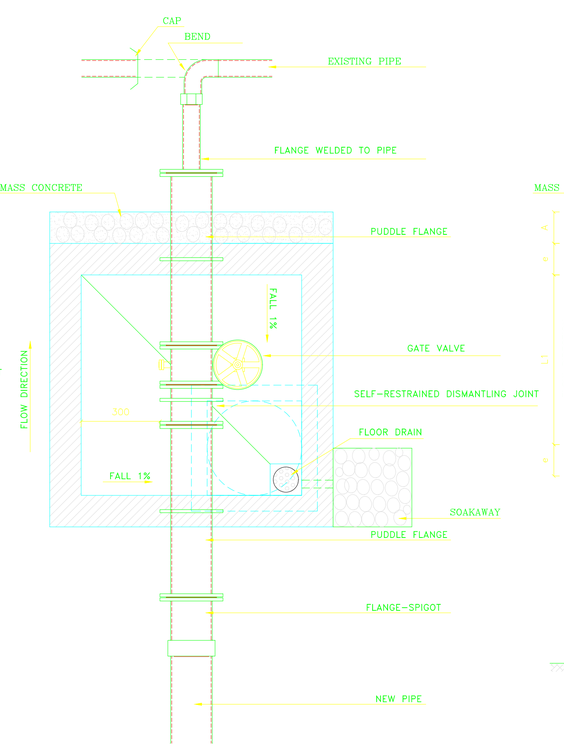
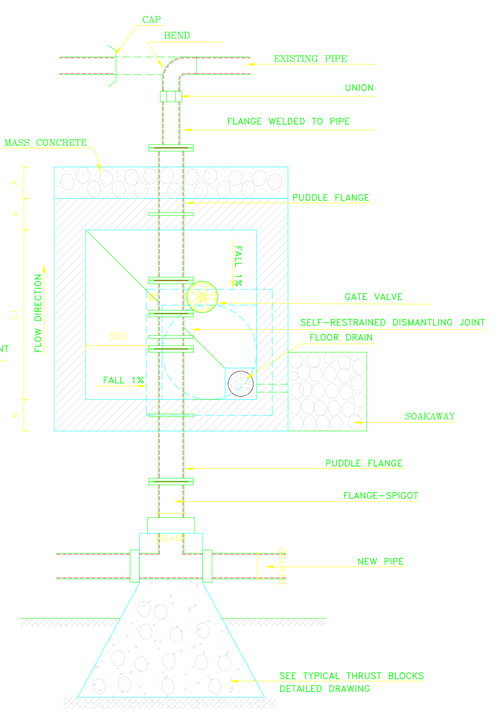


TYPE 3–B



TYPE 4–B

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f'_c =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f'_t =2,1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER.
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50ø.
(ø= NOMINAL DIAMETER OF BAR).
LAPS SHALL BE STAGGERED FROM ONE HOOP TO THE OTHER AND/OR ONE BAR TO THE OTHER IN ORDER TO REDUCE THE NUMBER OF LAPS IN THE SAME SECTION.
STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø > 12mm MECHANICAL.
ø ≤ 12mm MANUAL (POSSIBLY).
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED CONCRETE SHALL BE FAIR FACE CONCRETE
(METALLIC OR PLYWOOD FORMWORK).

WATERPROOFING:
BITUMEN LAYER ON EXTERNAL SURFACES OF VALVE CHAMBER WALLS EXCEPT WHERE THERE IS MASS CONCRETE

REMARKS:
* HOLES MADE BY THE TIE–RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
* ALL DIMENSIONS ARE IN MILLIMETERS.
* SCALING FROM THESE DRAWINGS IS NOT ALLOWED.
* SOIL FRICTION ANGLE SHALL BE 25°
* GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 tg ø
* THE PASSIVE EARTH PRESSURE SHALL BE TAKEN INTO ACCOUNT FOR MANHOLE STABILITY BY FILLING THE VOID BETWEEN THE MANHOLE AND THE TRENCH WALL WITH MASS CONCRETE OF A MINIMUM THICKNESS "200".

SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

WASHOUT CHAMBER DIMENSIONS :
IN THE CASES WHERE THE WASHOUT CHAMBER IS TO HOUSE, AT THE SAME TIME, THE WASHOUT GATE VALVE AND THE MAIN PIPE,THE CHAMBER DIMENSIONS MAY VARY FROM THOSE INDICATED ON THIS DRAWING. CONSEQUETLY, THE EXACT DIMENSIONS ARE TO BE TAKEN FROM THE RELEVANT SPECIFICATIONS AND/OR DRAWINGS IN THE TENDER DOCUMENTS OR AS DIRECTED BY THE ENGINEER.

* T.P. =TEST PRESSURE

* WASHOUT CHAMBER TYPE II SHALL BE USED NORMALLY.IF DETERMINED BY THE ENGINEER NOT TO BE APPLICABLE , TYPE I WILL BE USED.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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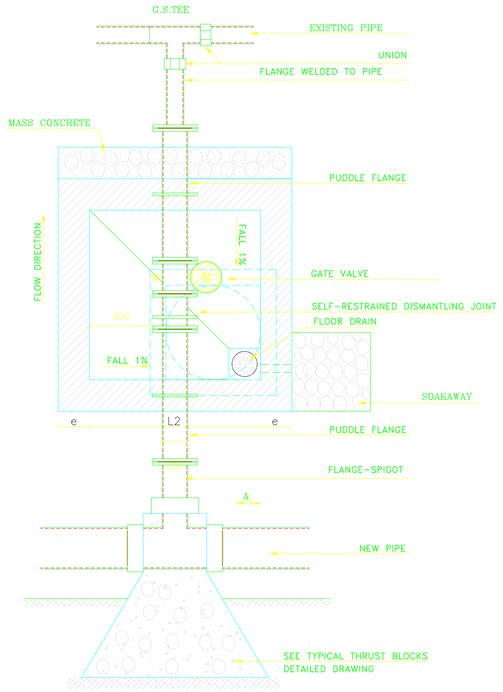
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS

TYPICAL CONNECTIONS OF NEW PIPES TO EXISTING PIPES

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	6 / 18	762W–STDP06



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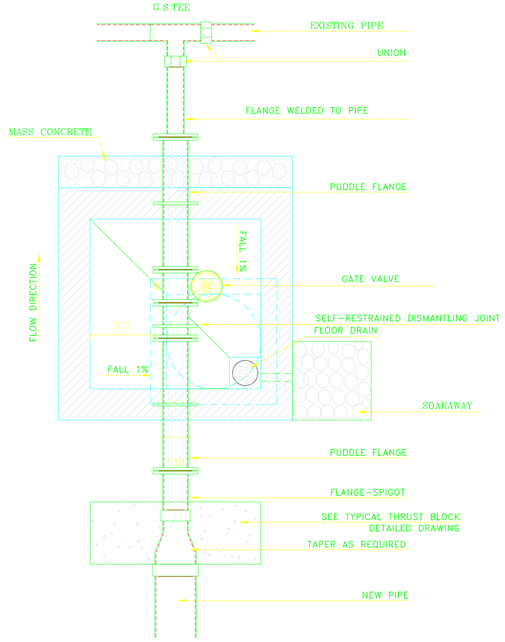

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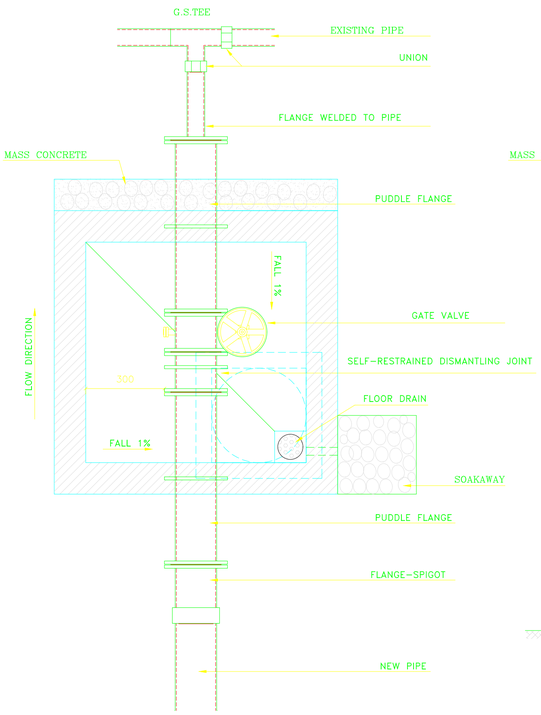

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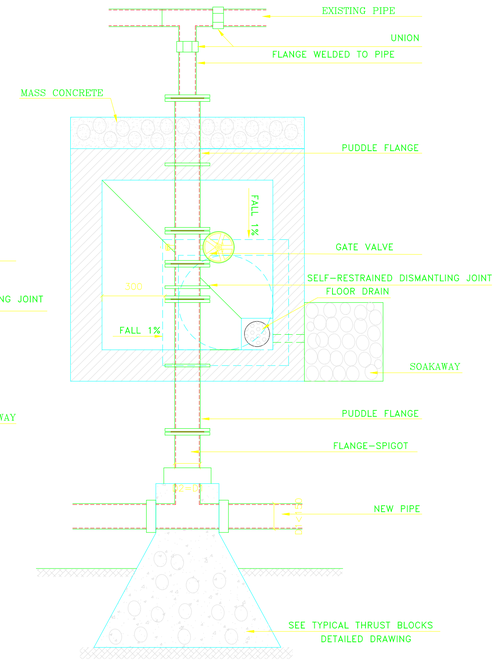

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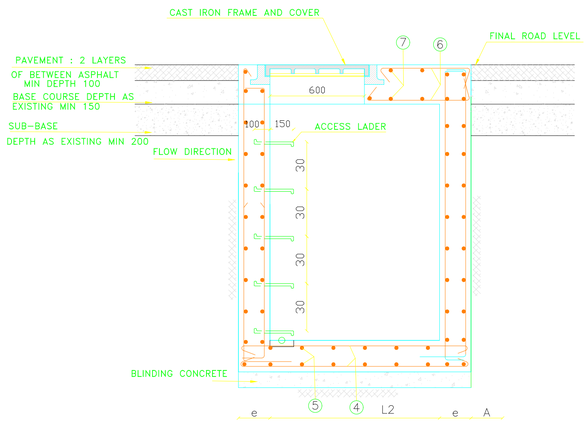
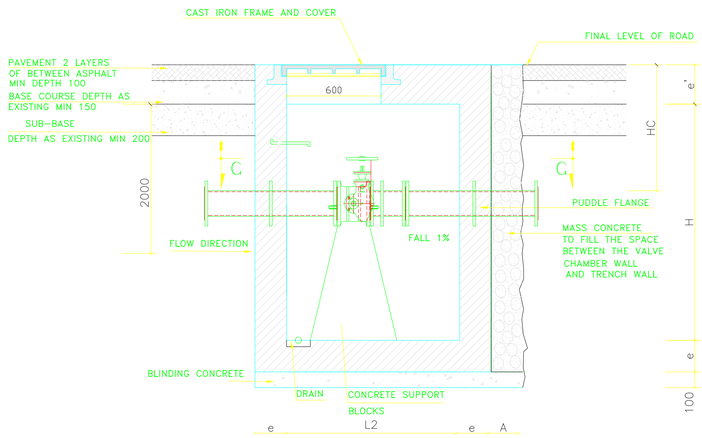
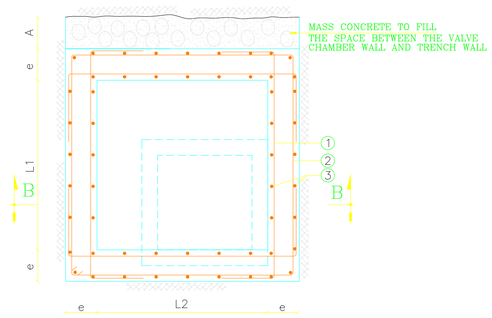


TYPICAL SECTION B-B



TYPICAL SECTION A-A



TYPICAL REINFORCEMENT OF VALVE CHAMBER

PIPE DIAMETER	LENGTH	WIDTH	HEIGHT	WALL & SLAB THICKNESS	UPPER SLAB THICKNESS	MASS CONCRETE THICKNESS	PIPE COVER
D	L1	L2	H	e	e'	A	HC
mm	mm	mm	mm	mm	mm	mm	mm
80-150	1100	1100	1500	200	250	200	800
200	1200	1200	1500	200	250	200	1000
250	1400	1400	1500	200	250	200	1000
300	1500	1500	2000	250	250	200	1000
350	1500	1500	2000	250	250	200	1000
400	1700	1700	2400	250	300	200	1100
450	1700	1700	2400	250	300	200	1100
500	2000	2000	2400	300	300	200	1200
600	2100	2100	2500	300	300	200	1200

PIPE DIAMETER	REINFORCEMENT						
D	1	2	3	4	5	6	7
mm	mm	mm	mm	mm	mm	mm	mm
80-150	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T12 @200	T12 @200
200	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T12 @200	T12 @200
250	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T12 @200	T12 @200
300	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T12 @200	T12 @200
350	T12 @200	T12 @200	T10 @200	T12 @200	T12 @200	T12 @200	T12 @200
400	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200
450	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200	T12 @200
500	T14 @200	T14 @200	T12 @200	T14 @200	T14 @200	T12 @200	T12 @200
600	T14 @200	T14 @200	T14 @200	T14 @200	T14 @200	T12 @200	T12 @200

NOTES:

REINFORCED CONCRETE:
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DOSING 350 Kg/m3

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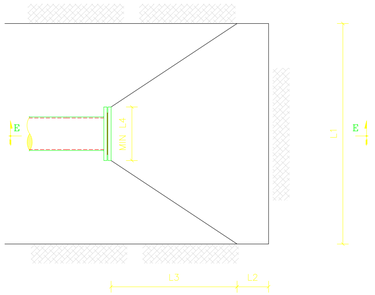
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL CONNECTIONS OF NEW PIPES TO EXISTING PIPES

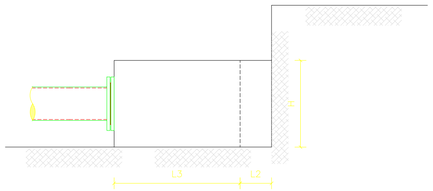
FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	7 /18	762W-STDP07

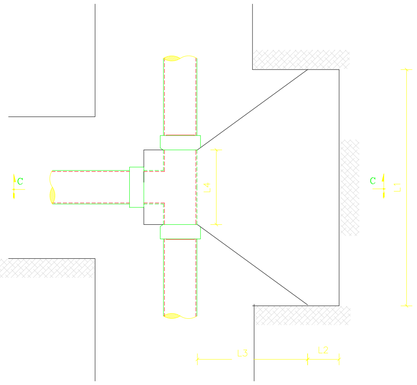
TYPICAL THRUST BLOCKS FOR TEES – HORIZONTAL BENDS – END CAPS



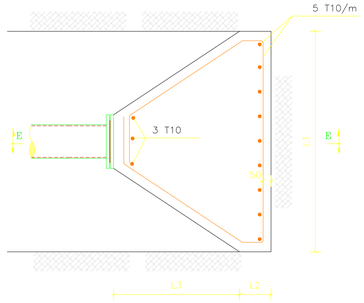
PLAN
END–CAP THRUST BLOCK



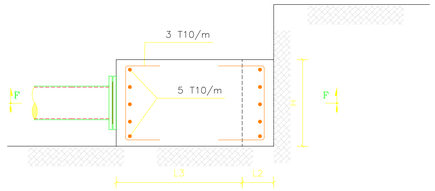
SECTION E–E
END–CAP THRUST BLOCK



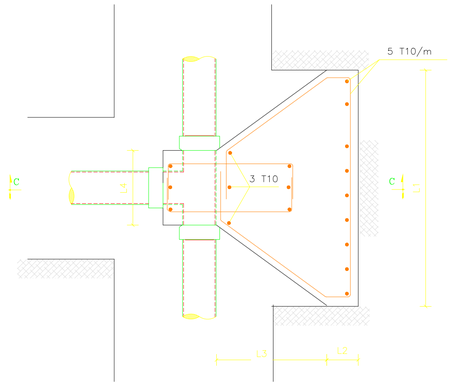
PLAN
TEE THRUST BLOCK



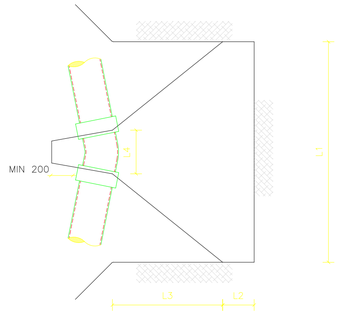
SECTION F–F
END–CAP THRUST BLOCK
TYPICAL REINFORCEMENT



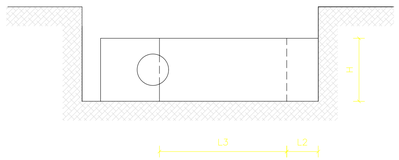
SECTION E–E
END–CAP THRUST BLOCK
TYPICAL REINFORCEMENT



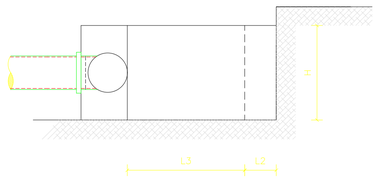
SECTION D–D
TEE THRUST BLOCK
TYPICAL REINFORCEMENT



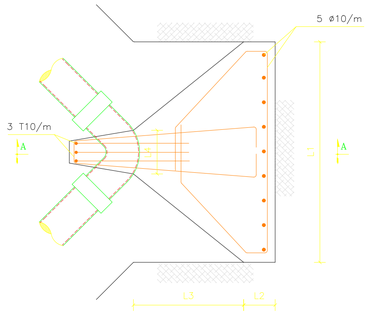
PLAN
TYPICAL HORIZONTAL BEND
THRUST BLOCK



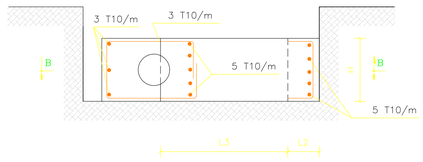
SECTION A–A
TYPICAL HORIZONTAL BEND
THRUST BLOCK



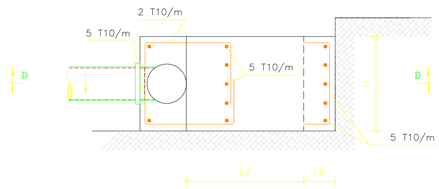
SECTION C–C
TEE THRUST BLOCK



SECTION B–B
HORIZONTAL BEND
THRUST BLOCK
TYPICAL REINFORCEMENT



SECTION A–A
HORIZONTAL BEND
THRUST BLOCK
TYPICAL REINFORCEMENT



SECTION C–C
TEE THRUST BLOCK
TYPICAL REINFORCEMENT

NOTES:

BASIC DATA :

SOIL DENSITY	1800	kg/m3
PIPE MATERIAL DENSITY (DUCTILE IRON)	7050	kg/m3
WATER SPECIFIC WEIGHT	1000	kg/m3
CONCRETE SPECIFIC WEIGHT	2300	kg/m3
SOIL INTERNAL FRICTION ANGLE	ø °	
SECURITY FACTOR	1.2	
SOIL BEARING CAPACITY	3	kg/cm2
SOIL–CONCRETE FRICTION ANGLE	2/3 * ø °	

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS	PIPELINE THRUST BLOCKS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	8 / 18	762W–STDP08

TYPICAL THRUST BLOCKS FOR TEES – HORIZONTAL BENDS – END CAPS

TABLE NO. 1 : THRUST BLOCKS TYPES

Diam.	Theta BEND ANGLE	Soil Cover	Pressure (bars)																																					
			1				5				10				15				20				25				30				35				40				45			
			Soil Internal Friction Angle (ø')																																							
(mm)	(°)	(m)	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35	20	25	30	35
200	T or E–C	1.0	2	2	2	2	5	4	4	4	7	7	6	6	9	9	8	7	11	10	9	9	13	12	10	10	14	13	12	11	15	14	13	12	16	15	14	13	–	–	15	14	–	–	16	15	–	–	–	15
200	90	1.0	2	2	2	2	6	5	5	5	9	8	8	7	12	10	10	9	13	12	12	10	15	14	13	12	–	15	14	13	–	16	15	14	–	–	–	16	–	–	–	–	–	–	–	–	–	–	–
200	45	1.0	2	2	2	2	4	4	3	3	6	6	5	5	8	7	7	6	10	9	8	7	11	10	9	9	12	11	10	9	13	12	11	10	14	13	12	11	15	14	13	12	16	15	14	13	–	16	15	14
200	22.5	1.0	2	2	2	2	2	2	2	2	4	4	3	3	5	5	4	4	7	6	5	5	7	7	6	6	8	7	7	6	9	8	7	7	10	9	8	7	10	9	9	8	11	10	9	9	12	11	10	9
200	11.25	1.0	2	2	2	2	2	2	2	2	2	2	2	2	4	3	3	2	4	4	4	3	5	4	4	4	5	5	4	4	6	5	5	5	7	6	5	5	7	6	6	5	7	7	6	6	8	7	7	6
150	T or E–C	1.0	2	2	2	2	4	3	3	2	5	5	4	4	7	6	6	5	8	7	7	6	9	9	8	7	10	9	9	8	12	10	9	9	13	12	11	10	14	13	12	10	14	13	12	11	15	14	13	12
150	90	1.0	2	2	2	2	4	4	4	3	7	6	5	5	9	8	7	7	10	9	8	8	12	10	9	9	13	12	10	10	14	13	12	12	15	14	13	12	–	15	14	13	–	16	15	14	–	16	15	14
150	45	1.0	2	2	2	2	3	2	2	2	5	4	4	3	6	5	5	4	7	6	6	5	8	7	7	6	9	8	7	7	10	9	8	7	10	9	9	8	11	10	9	9	12	11	10	9	13	12	10	10
150	22.5	1.0	2	2	2	2	2	2	2	2	3	2	2	2	4	4	3	3	5	4	4	3	5	5	4	4	6	5	5	4	7	6	5	5	8	7	6	6	8	7	7	6	9	8	7	7	9	8	7	7
150	11.25	1.0	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2	4	4	3	3	4	4	4	3	5	5	4	4	6	5	5	4	7	6	6	5	8	7	7	6	8	8	7	7	9	8	7	7
125	T or E–C	1.0	1	1	1	1	3	2	2	2	4	4	4	3	5	5	5	4	7	6	5	5	8	7	6	6	9	8	7	6	9	8	8	7	10	9	8	8	10	10	9	8	12	10	9	9	12	11	10	9
125	90	1.0	1	1	1	1	3	3	3	2	5	5	4	4	7	6	6	5	8	7	7	6	9	9	8	7	10	9	9	8	11	10	9	9	13	12	11	10	14	13	12	10	14	13	12	11	15	14	13	12
125	45	1.0	1	1	1	1	2	2	2	2	4	3	3	2	5	4	4	4	6	5	5	4	7	6	5	5	7	7	6	5	8	7	7	6	9	8	7	7	9	8	8	7	10	9	8	7	10	9	9	8
125	22.5	1.0	1	1	1	1	2	1	1	1	2	2	2	2	3	3	2	2	4	3	3	3	4	4	4	3	5	4	4	4	5	5	4	4	6	5	5	5	7	6	6	5	7	7	6	5	8	7	7	6
125	11.25	1.0	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2	2	2	2	2	2	3	3	2	2	4	3	3	3	4	4	4	3	5	4	4	4	5	4	4	4	5	5	4	4	6	5	5	4
100	T or E–C	1.0	1	1	1	1	2	2	2	2	3	3	2	2	4	4	4	3	5	5	4	4	6	5	5	4	7	6	5	5	7	7	6	5	8	7	7	6	9	8	7	7	9	9	8	7	10	9	8	7
100	90	1.0	1	1	1	1	2	2	2	2	4	4	3	3	5	5	4	4	6	6	5	5	7	7	6	5	8	7	7	6	9	8	8	7	10	9	9	8	11	10	9	8	12	10	9	9	12	11	10	9
100	45	1.0	1	1	1	1	2	2	2	1	3	2	2	2	4	3	3	2	4	4	4	3	5	4	4	4	5	5	5	4	6	5	5	5	7	6	5	5	7	6	6	5	7	7	6	6	8	7	7	6
100	22.5	1.0	1	1	1	1	1	1	1	1	2	2	2	1	2	2	2	2	3	2	2	2	4	3	3	2	4	4	3	3	5	4	4	4	5	5	4	4	5	5	4	4	5	5	5	4	6	5	5	4
100	11.25	1.0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	2	1	3	2	2	2	3	3	2	2	4	3	3	3	4	4	3	3	4	4	4	3	5	5	4	4	5	5	5	5
80	T or E–C	1.0	1	1	1	1	2	2	1	1	2	2	2	2	3	3	2	2	4	4	3	3	4	4	4	3	5	4	4	4	5	5	4	4	6	5	5	4	6	6	5	5	7	6	6	5	7	7	6	5
80	90	1.0	1	1	1	1	2	2	2	2	3	3	2	2	4	4	3	3	5	4	4	4	5	5	5	4	6	5	5	5	7	7	6	5	8	7	7	6	8	8	7	6	9	8	8	7	9	9	8	7
80	45	1.0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	2	2	4	3	3	3	4	4	3	3	5	4	4	4	5	5	4	4	6	5	5	4	6	5	5	5	7	6	5	5
80	22.5	1.0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	2	2	3	2	2	2	4	3	3	2	4	4	3	3	4	4	4	3	5	5	4	4	5	5	5	4	6	6	5	5
80	11.25	1.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	2	1	2	2	2	2	2	3	2	2	3	3	2	2	4	3	3	3	4	4	4	3

TE : TEE
E–C : END CUP

*N.B.: * WHERE " – " EXIST REFER TO THE TABLE No. 2 (SELF ANCHORED PIPES)*
** FOR TEES " DIAM" IN THE FIRST COLUMN OF TABLE No. 1 REPRESENT THE BRANCH DIAM OF THE TEE*

LENGTH (IN METER) OF PIPE TO BE SELF ANCHORED AT EACH SIDE OF BENDS
WHERE THRUST BLOCKS ARE NOT USED (TEST PRESSURE=10 BARS)

TABLE No. 2

DIAM (mm)	Bend 90°			Bend 45°			Bend 22.5°			Bend 11.25°			Blank flange		
Soil cover(m)	1	1.5	2	1	1.5	2	1	1.5	2	1	1.5	2	1	1.5	2
200	9.9	6.8	5.2	6.1	4.2	3.2	3.4	2.4	1.8	1.8	1.3	1.0	12.6	8.7	6.6
150	7.7	5.3	4.0	4.8	3.3	2.5	2.7	1.8	1.4	1.4	1.0	0.7	9.8	6.7	5.1
125	6.6	4.5	3.4	4.1	2.8	2.1	2.3	1.6	1.2	1.2	0.8	0.6	8.4	5.7	4.4
100	5.4	3.7	2.8	3.4	2.3	1.8	1.9	1.3	1.0	1.0	0.7	0.5	6.9	4.7	3.6
80	4.5	3.1	2.3	2.8	1.9	1.5	1.6	1.1	0.8	0.8	0.6	0.5	5.7	3.9	3.0

WHERE TEST PRESSURE P ≠ 10 BARS, ANCHORING LENGTHS SHALL BE MULTIPLIED BY P/10
WHERE P.E SLEEVING IS USED, MULTIPLY BY 2.

TABLE No. 3 : THRUST BLOCKS DIMENSIONS

Type	L1 (m)	L2 (m)	L3 (m)	L4 (m)	H (m)	Volume(m3)
1	0.50	0.1	0.20	0.15	0.20	0.023
2	0.80	0.15	0.30	0.20	0.35	0.095
3	1.00	0.15	0.40	0.25	0.40	0.160
4	1.20	0.15	0.45	0.30	0.50	0.259
5	1.40	0.15	0.55	0.30	0.60	0.406
6	1.60	0.15	0.65	0.30	0.65	0.557
7	1.80	0.15	0.75	0.30	0.75	0.793
8	2.00	0.15	0.85	0.30	0.80	1.022
9	2.20	0.15	0.95	0.30	0.90	1.366
10	2.40	0.15	1.05	0.30	1.00	1.778
11	2.60	0.15	1.15	0.30	1.00	2.058
12	2.80	0.15	1.25	0.30	1.10	2.593
13	3.00	0.15	1.35	0.30	1.20	3.213
14	3.20	0.15	1.45	0.30	1.30	3.923
15	3.40	0.15	1.55	0.30	1.40	4.729
16	3.60	0.15	1.65	0.30	1.45	5.448
–	SEE TABLE " LENGTH OF PIPE TO BE SELF ANCHORED "					

TYPICAL THRUST BLOCKS FOR VERTICAL BENDS

DOWNWARD DIRECTION TYPES

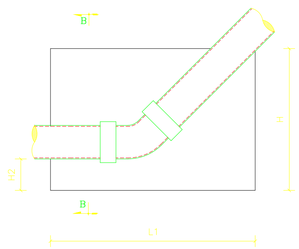
Diam (mm)	Theta Bend angle(°)	cover depth (m)	Test pressure 1	5	10	15	20	25	30	35	40	45	50	55	60
200	90	1.00	6	6	7	9	10	10	11	11	12	12	12	–	–
200	45	1.00	6	6	6	6	6	6	6	6	6	6	6	6	7
200	22.5	1.00	6	6	6	6	6	6	6	6	6	6	6	6	6
200	11.25	1.00	6	6	6	6	6	6	6	6	6	6	6	6	6
150	90	0.80	5	5	6	7	8	9	10	10	10	11	11	11	12
150	45	0.80	5	5	5	5	5	5	5	5	5	5	5	5	6
150	22.5	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
150	11.25	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
125	90	0.80	5	5	5	6	7	8	8	9	10	10	10	10	11
125	45	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
125	22.5	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
125	11.25	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
100	90	0.80	5	5	5	5	6	6	7	7	8	8	9	9	10
100	45	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
100	22.5	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
100	11.25	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
80	90	0.80	4	4	4	4	4	5	5	6	6	7	7	7	8
80	45	0.80	4	4	4	4	4	4	4	4	4	4	4	4	4
80	22.5	0.80	4	4	4	4	4	4	4	4	4	4	4	4	4
80	11.25	0.80	4	4	4	4	4	4	4	4	4	4	4	4	4

DIMENSIONS OF THRUST BLOCKS FOR VERTICAL BENDS

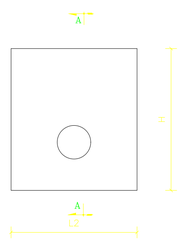
Type	L2(m)	L1(m)	H(m)	Volume (m3)
1	0.20	0.30	0.24	0.01
2	0.30	0.45	0.36	0.05
3	0.40	0.60	0.48	0.12
4	0.50	0.75	0.60	0.23
5	0.60	0.90	0.72	0.39
6	0.70	1.05	0.84	0.62
7	0.80	1.20	0.96	0.92
8	0.90	1.35	1.08	1.31
9	1.00	1.50	1.20	1.80
10	1.20	1.80	1.44	3.11
11	1.40	2.10	1.68	4.94
12	1.60	2.40	1.92	7.37

UPWARD DIRECTION TYPES

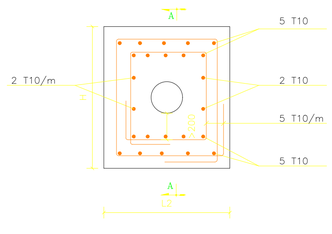
Diam (mm)	Theta Bend angle(°)	cover depth (m)	Test pressure 1	5	10	15	20	25	30	35	40	45	50	55	60
200	90	1.00	6	10	12	–	–	–	–	–	–	–	–	–	–
200	45	1.00	6	7	10	11	11	12	12	–	–	–	–	–	–
200	22.5	1.00	6	6	6	8	9	9	10	10	11	11	11	11	12
200	11.25	1.00	6	6	6	6	6	7	7	8	8	9	9	9	9
150	90	0.80	5	9	11	12	–	–	–	–	–	–	–	–	–
150	45	0.80	5	6	8	10	10	11	11	12	12	12	12	–	–
150	22.5	0.80	5	5	5	6	7	8	8	9	9	10	10	10	10
150	11.25	0.80	5	5	5	5	5	5	6	6	6	7	7	7	8
125	90	0.80	5	8	10	11	12	12	–	–	–	–	–	–	–
125	45	0.80	5	5	7	8	9	10	10	11	11	11	12	12	12
125	22.5	0.80	5	5	5	6	7	7	8	8	9	9	9	9	10
125	11.25	0.80	5	5	5	5	5	5	5	5	5	6	6	6	6
100	90	0.80	5	6	9	10	11	11	12	12	12	–	–	–	–
100	45	0.80	5	5	6	7	8	8	9	10	10	10	10	11	11
100	22.5	0.80	5	5	5	5	5	6	6	7	7	7	8	8	
100	11.25	0.80	5	5	5	5	5	5	5	5	5	5	5	5	5
80	90	0.80	4	5	7	9	10	10	10	11	11	11	12	12	12
80	45	0.80	4	4	5	6	6	7	8	8	9	9	9	10	10
80	22.5	0.80	4	4	4	4	4	5	5	6	6	6	6	6	7
80	11.25	0.80	4	4	4	4	4	4	4	4	4	4	4	4	4



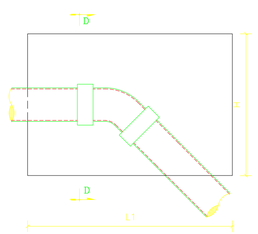
SECTION A–A
UPWARD FLOW DIRECTION



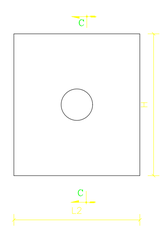
SECTION B–B
VERTICAL BEND ANCHOR BLOCK
UPWARD FLOW DIRECTION



SECTION B–B
VERTICAL BEND ANCHOR BLOCK
TYPICAL REINFORCEMENT DETAIL



SECTION C–C
DOWNWARD FLOW DIRECTION



SECTION D–D
VERTICAL BEND ANCHOR BLOCK
DOWNWARD FLOW DIRECTION

NOTES:

BASIC DATA :

SOIL DENSITY	1800	kg/m3
PIPE MATERIAL DENSITY (DUCTILE IRON)	7050	kg/m3
WATER SPECIFIC WEIGHT	1000	kg/m3
CONCRETE SPECIFIC WEIGHT	2300	kg/m3
SOIL INTERNAL FRICTION ANGLE	ø '	
SECURITY FACTOR	1.2	
SOIL BEARING CAPACITY	3	kg/cm2
SOIL–CONCRETE FRICTION ANGLE	2/3 * ø '	

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB – HAJAL Bldg
P.O.BOX:70492 – ANTELIAS
TEL:(04) 712157 / 712158
FAX:(04) 712159

DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS

PIPELINE THRUST BLOCKS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	9 / 18	762W–STDP09

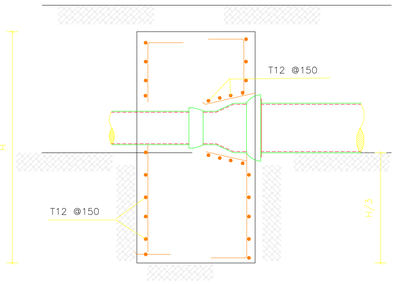
TYPICAL THRUST BLOCKS FOR TAPERS

THRUST BLOCKS TYPE

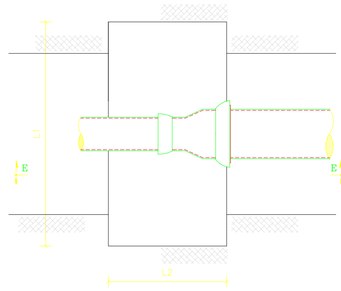
Large Diam (mm)	Small Diam (mm)	PRESSURE (BARS) 1	5	10	15	20	25	30	35	40	45	50	55	60
200	150	3	6	8	9	10	11	11	–	–	–	–	–	–
200	125	3	7	9	10	11	–	–	–	–	–	–	–	–
200	100	3	7	9	11	–	–	–	–	–	–	–	–	–
150	125	2	3	5	7	7	8	8	9	9	9	10	10	10
150	100	2	5	7	8	9	9	10	11	11	–	–	–	–
150	80	2	6	8	9	10	10	11	–	–	–	–	–	–
125	100	2	2	4	6	7	7	8	8	9	9	9	9	10
125	80	2	4	6	7	8	9	9	10	10	10	11	11	11
100	80	2	2	3	4	5	6	7	7	7	8	8	8	8

THRUST BLOCK DIMENSIONS

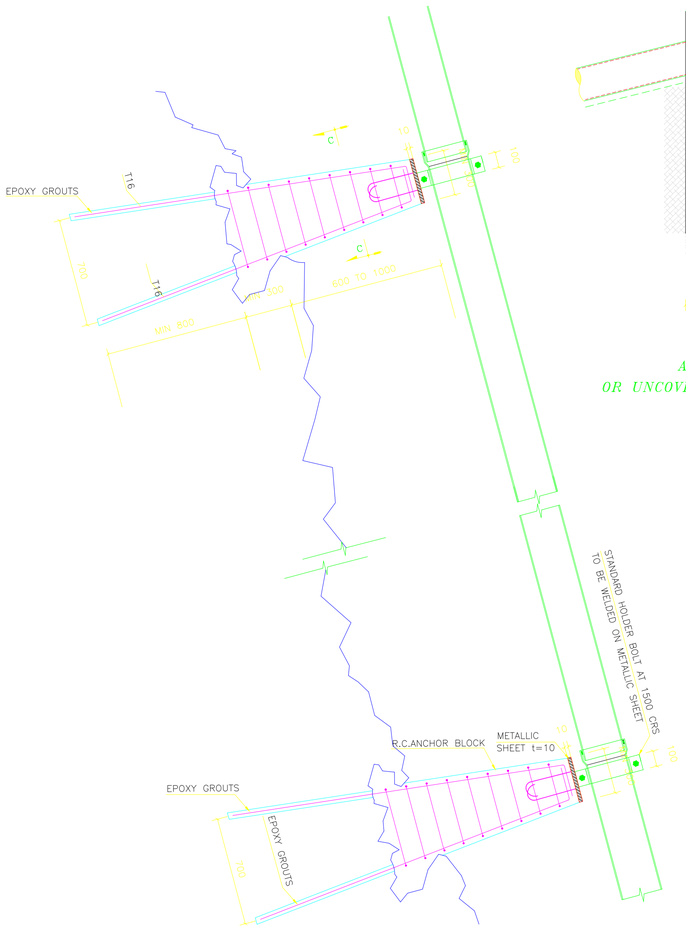
Type	L1 (m)	L2 (m)	H (m)	Volume (m3)
1	0.50	0.40	0.50	0.10
2	0.60	0.48	0.60	0.17
3	0.70	0.56	0.70	0.27
4	0.80	0.64	0.80	0.41
5	0.90	0.72	0.90	0.58
6	1.00	0.80	1.00	0.80
7	1.20	0.96	1.20	1.38
8	1.40	1.12	1.40	2.20
9	1.60	1.28	1.60	3.28
10	1.80	1.44	1.80	4.67
11	2.00	1.60	2.00	6.40



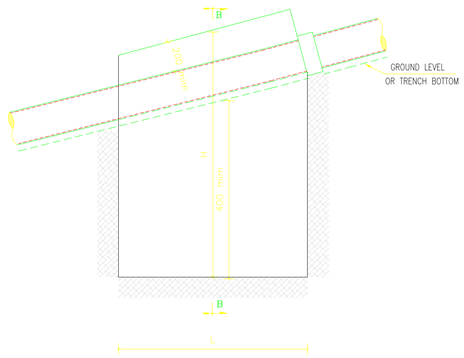
SECTION I–I
TYPICAL REINFORCEMENT DETAILS



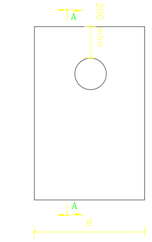
PLAN



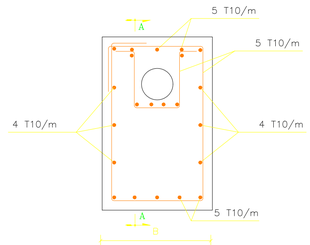
ANCHORS ON ROCK
FOR SLOPE > 50 % AND FOR UNCOVERED PIPES



SECTION A–A
ANCHOR BLOCK FOR BURIED
OR UNCOVERED PIPES (ONE BLOCK PER PIPE)
SLOPE ⩽ 50%



SECTION B–B
ANCHOR BLOCK FOR BURIED
OR UNCOVERED PIPES
SLOPE ⩽ 50%

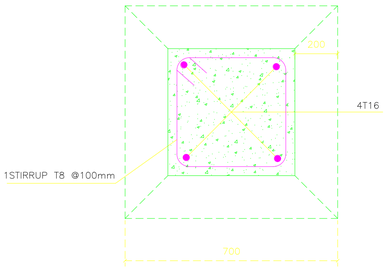


SECTION B–B
ANCHOR BLOCK FOR BURIED OR UNCOVERED PIPES
TYPICAL REINFORCEMENT DETAIL
SLOPE ⩽ 50%

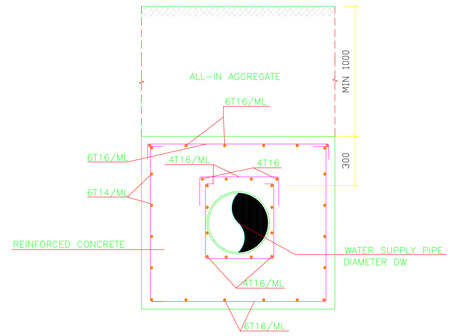
ANCHOR BLOCKS FOR BURIED SLOPED PIPES

Diam (mm)	SLOPE 25% L (m)	H (m)	B (m)	30% L (m)	H (m)	B (m)	35% L (m)	H (m)	B (m)	40% L (m)	H (m)	B (m)	45% L (m)	H (m)	B (m)	50% * L (m)	H (m)	B (m)
200	0.300	0.850	0.800	0.300	0.900	0.800	0.300	0.900	0.800	0.300	0.900	0.800	0.300	0.950	0.800	0.300	0.950	0.800
150	0.300	0.800	0.750	0.300	0.850	0.750	0.300	0.850	0.750	0.300	0.850	0.750	0.300	0.900	0.750	0.300	0.900	0.750
125	0.300	0.800	0.700	0.300	0.800	0.700	0.300	0.800	0.700	0.300	0.850	0.700	0.300	0.850	0.700	0.300	0.850	0.700
100	0.300	0.750	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.850	0.650
80	0.300	0.700	0.650	0.300	0.750	0.650	0.300	0.750	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.800	0.650

* FOR SLOPE > 50% SEE NOTE



SECTION C–C
N.T.S



REINFORCED CONCRETE SURROUND
N.T.S

ANCHOR BLOCKS FOR UNCOVERED SLOPED PIPES.

Diam (mm)	Slope 25% L (m)	H (m)	B (m)	30% L (m)	H (m)	B (m)	35% L (m)	H (m)	B (m)	40% L (m)	H (m)	B (m)	45% L (m)	H (m)	B (m)	50% L (m)	H (m)	B (m)
200	0.300	0.850	0.600	0.300	0.900	0.800	0.300	0.900	0.800	0.400	0.950	0.800	0.400	0.950	0.800	0.400	0.950	0.800
150	0.300	0.800	0.550	0.300	0.850	0.750	0.300	0.850	0.750	0.300	0.850	0.750	0.350	0.900	0.750	0.350	0.900	0.750
125	0.300	0.800	0.525	0.300	0.800	0.700	0.300	0.800	0.700	0.300	0.850	0.700	0.300	0.850	0.700	0.300	0.850	0.700
100	0.300	0.750	0.500	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.850	0.650
80	0.300	0.750	0.480	0.300	0.750	0.650	0.300	0.750	0.650	0.300	0.800	0.650	0.300	0.800	0.650	0.300	0.800	0.650

NOTES:

BASIC DATA :

SOIL DENSITY	1800	kg/m3
PIPE MATERIAL DENSITY (DUCTILE IRON)	7050	kg/m3
WATER SPECIFIC WEIGHT	1000	kg/m3
CONCRETE SPECIFIC WEIGHT	2300	kg/m3
SOIL INTERNAL FRICTION ANGLE	25°	
SECURITY FACTOR	1.2	
SOIL BEARING CAPACITY	3	kg/cm2
SOIL–CONCRETE FRICTION ANGLE	2/3 * 25°	

FOR ANCHOR BLOCKS WHEN THE SLOPE IS GREATER THAN 50 %
ALL THE PIPELINE TRENCH SHALL BE FILLED BY MASS CONCRETE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
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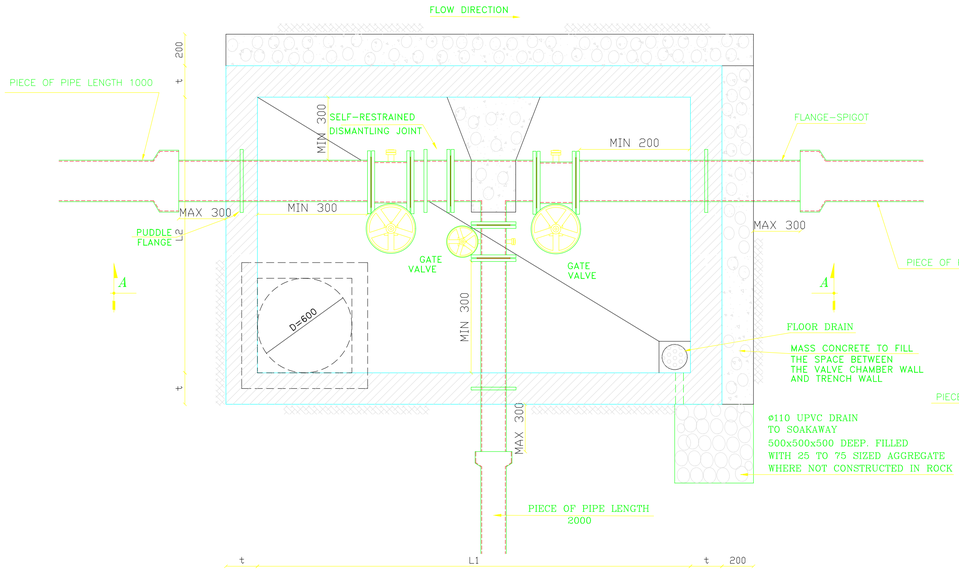
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS

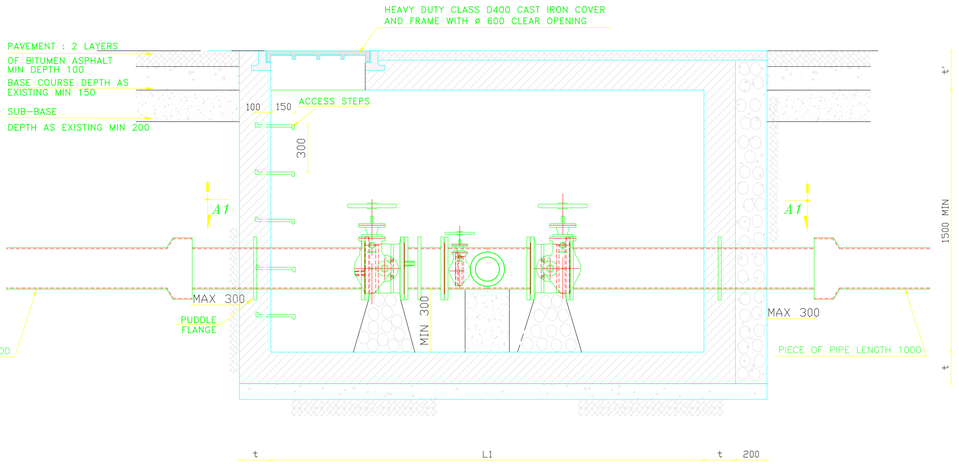
PIPELINE THRUST BLOCKS
PIPELINE ANCHOR BLOCKS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

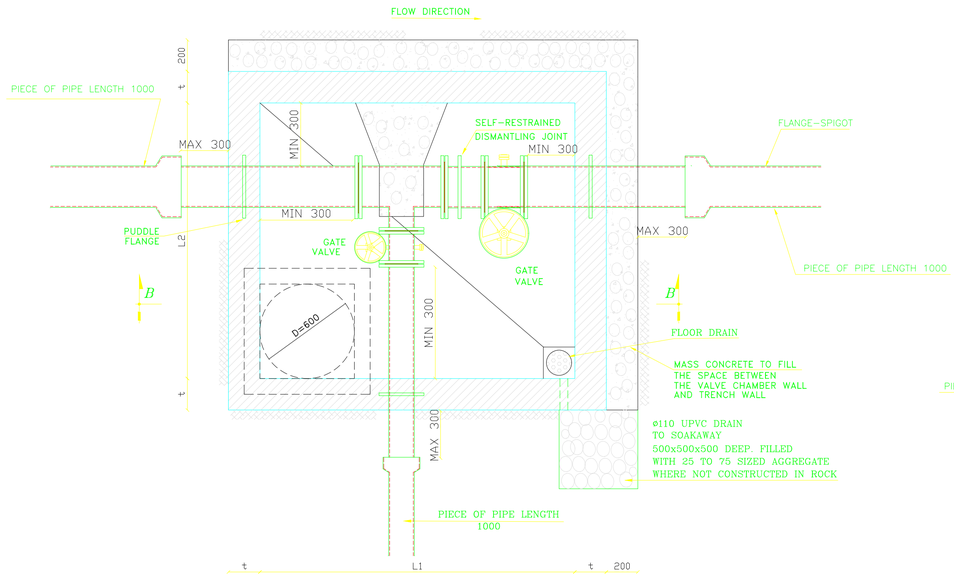
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	10/18	762W–STDP10



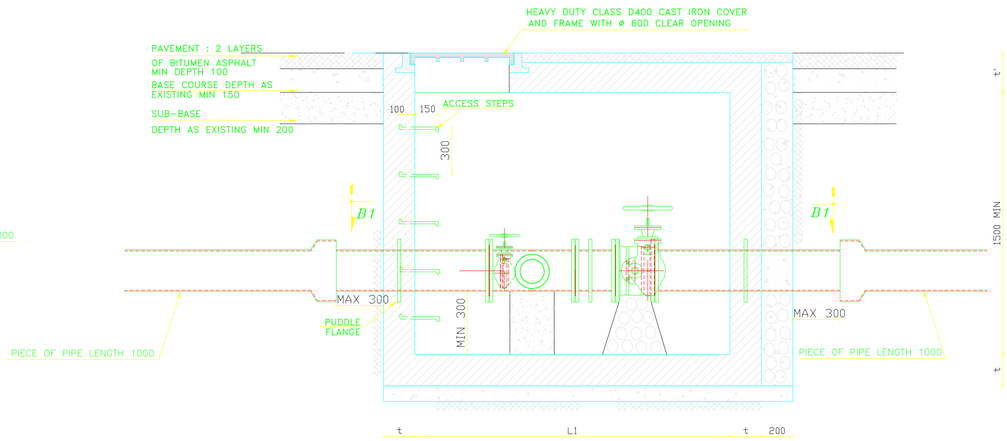
SECTION A1–A1



SECTION A–A



SECTION B1–B1



SECTION B–B

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f_c' =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f_t' =2.1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER.
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50ø.
(ø= NOMINAL DIAMETER OF BAR).
LAPS SHALL BE STAGGERED FROM ONE HOOP TO THE OTHER AND/OR ONE BAR TO THE OTHER IN ORDER TO REDUCE THE NUMBER OF LAPS IN THE SAME SECTION.
STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø > 12mm MECHANICAL.
ø ≤ 12mm MANUAL (POSSIBLY).
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED CONCRETE SHALL BE FAIR FACE CONCRETE (METALLIC OR PLYWOOD FORMWORK).

WATERPROOFING:
BITUMEN LAYER ON EXTERNAL SURFACES OF VALVE CHAMBER WALLS EXCEPT WHERE THERE IS MASS CONCRETE

REMARKS:
* HOLES MADE BY THE TIE-RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
* ALL DIMENSIONS ARE IN MILLIMETERS.
* SCALING FROM THESE DRAWINGS IS NOT ALLOWED.
* SOIL FRICTION ANGLE SHALL BE 25°
* GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 tg ø
* THE PASSIVE EARTH PRESSURE SHALL BE TAKEN INTO ACCOUNT FOR MANHOLE STABILITY BY FILLING THE VOID BETWEEN THE MANHOLE AND THE TRENCH WALL WITH MASS CONCRETE OF A MINIMUM THICKNESS "200".

SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

* T.P. =TEST PRESSURE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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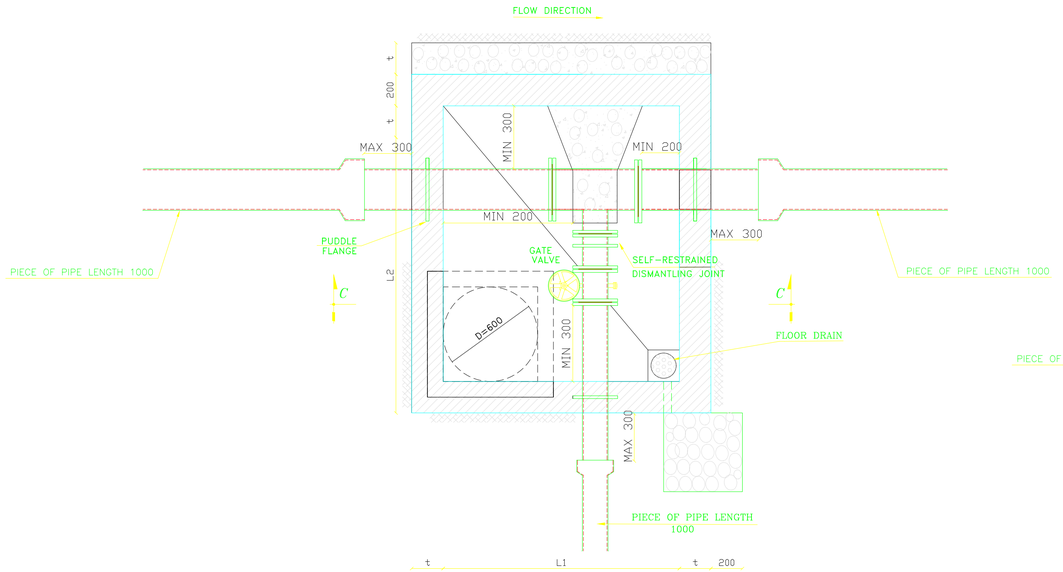
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

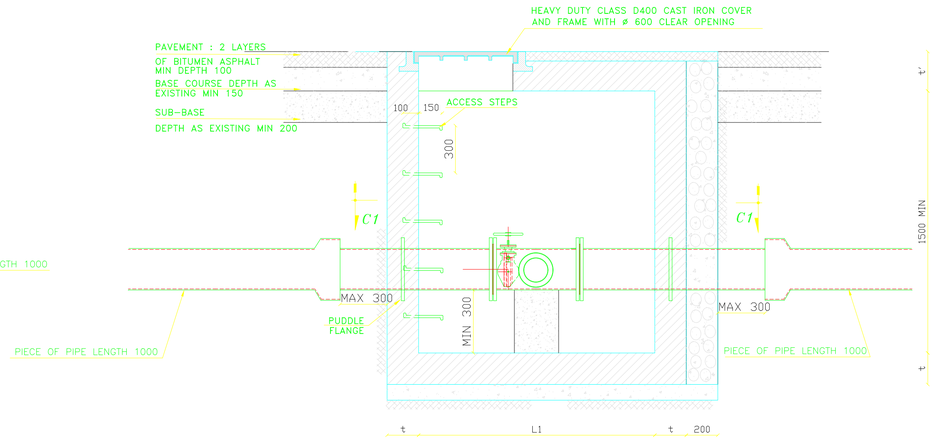
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL VALVE CHAMBER DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

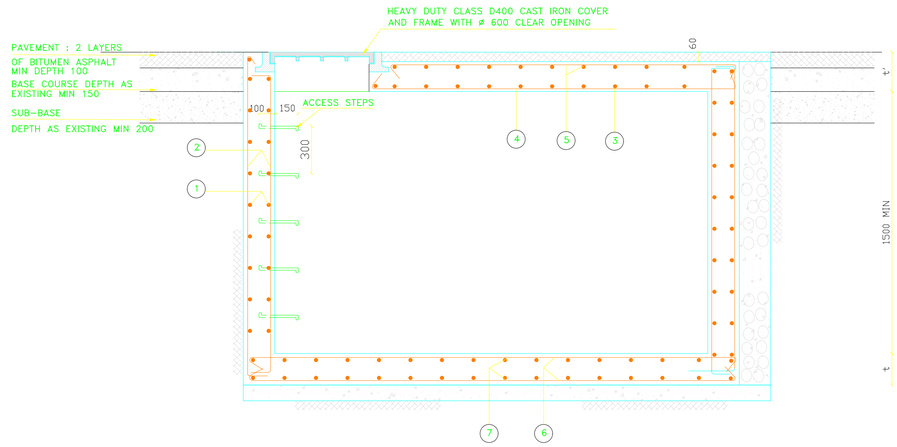
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	11/18	762W-STDP11

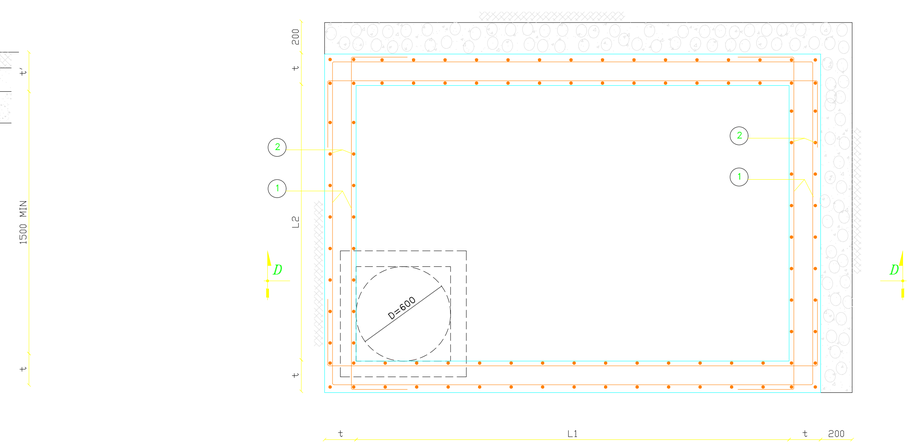


SECTION C1–C1



SECTION C–C





VALVE CHAMBER DIMENSIONS	
TYPE	LIxL2
R1	1000x1250
R2	1250x1000
R3	1250x1500
R4	1250x1750
R5	1500x1000
R6	1500x1500
R7	1500x1750
R8	1750x1250
R9	1750x1500
R10	1750x2000
R11	1750x2250
R12	2000x1500
R13	2000x1750
R14	2250x1500
R15	2250x1750
R16	2250x2000
R17	2500x1500
R18	2500x1750
R19	2500x2000
R20	2500x2250
R21	2750x1500

VALVE CHAMBER DIMENSIONS	
TYPE	LIxL2
R22	2750x1750
R23	2750x2000
R24	2750x2250
R25	2750x2500
R26	3000x1750
R27	3000x2000
R28	3000x2250
R29	3000x2500
R30	3000x2750
R31	3250x1750
R32	3500x1750
R33	3500x2000
R34	3500x2250
R35	3750x1750
R36	3750x2000
R37	3750x2250
R38	3750x2500
R39	4250x2000
R40	4250x2250
R41	4250x2500
R42	4250x2750

VALVE CHAMBER TYPE

BRANCH DIAM / NBR OF VALVES / MAIN PIPE	60			80			100			125			150			200			250			300			350			400			450			500			600		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
80	R1	–	–	–	R6	R12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100	R1	–	–	R3	R6	R12	–	R6	R12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
125	R1	–	–	R3	R9	R14	R3	R9	R14	–	R9	R14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
150	–	–	–	R3	R9	R17	R3	R9	R17	R3	R9	R17	–	R9	R17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
200	–	–	–	R3	R12	R21	R4	R12	R21	R4	R12	R21	–	R13	R22	–	R13	R22	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
250	–	–	–	R12	R21	–	R12	R21	R4	R12	R21	R7	R13	R22	–	R13	R22	–	R13	R22	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
300	–	–	–	R14	R26	–	R15	R26	–	R15	R26	R7	R15	R26	R7	R15	R26	–	R15	R26	–	R16	R27	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
350	–	–	–	R15	R31	–	R18	R32	–	R20	R34	R7	R18	R32	R7	R18	R32	R10	R19	R33	–	R19	R33	–	R19	R33	–	–	–	–	–	–	–	–	–	–	–	–	–
400	–	–	–	R18	R32	–	R18	R32	–	R20	R34	–	R18	R32	R10	R19	R33	R10	R19	R33	–	R19	R33	–	R20	R34	–	R20	R34	–	–	–	–	–	–	–	–	–	–
450	–	–	–	R19	R33	–	R18	R32	–	R20	R34	–	R19	R33	R10	R19	R33	R10	R19	R33	R11	R20	R34	–	R20	R34	–	R20	R34	–	R20	R34	–	–	–	–	–	–	–
500	–	–	–	R23	R36	–	R22	R35	–	R24	R37	–	R23	R36	–	R23	R36	R10	R23	R36	R11	R24	R37	R11	R24	R37	–	R24	R37	–	R25	R38	–	R25	R38	–	–	–	–
600	–	–	–	R28	R40	–	R27	R39	–	R29	R41	–	R27	R39	–	R27	R39	R11	R28	R40	R11	R28	R40	R11	R28	R40	R11	R29	R41	–	R29	R41	–	R29	R41	–	R30	R42	–	–

REINFORCEMENT STEEL TABLE

VALVE CHAMBER TYPE	THICKNESS t mm	THICKNESS t' mm	REINFORCEMENT 1	2	3	4	5	6	7
R1–R5	200	250	T14 @200	T14 @200	T16 @200	T14 @200	2xT12 @200	T14 @200	T14 @200
R6–R11	200	250	T14 @165	T14 @165	T16 @165	T14 @165	2xT12 @165	T14 @165	T14 @165
R11–R23	200	250	T14 @150	T14 @150	T14 @150	T14 @150	2xT12 @150	T14 @150	T14 @150
R23–R38	250	300	T16 @200	T16 @200	T20 @200	T14 @200	2xT12 @200	T16 @200	T16 @200
R39–R42	300	300	T16 @165	T16 @165	T20 @165	T14 @165	2xT12 @165	T16 @165	T16 @165

NOTES:

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DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
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(METALLIC OR PLYWOOD FORMWORK).

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SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

* T.P. =TEST PRESSURE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

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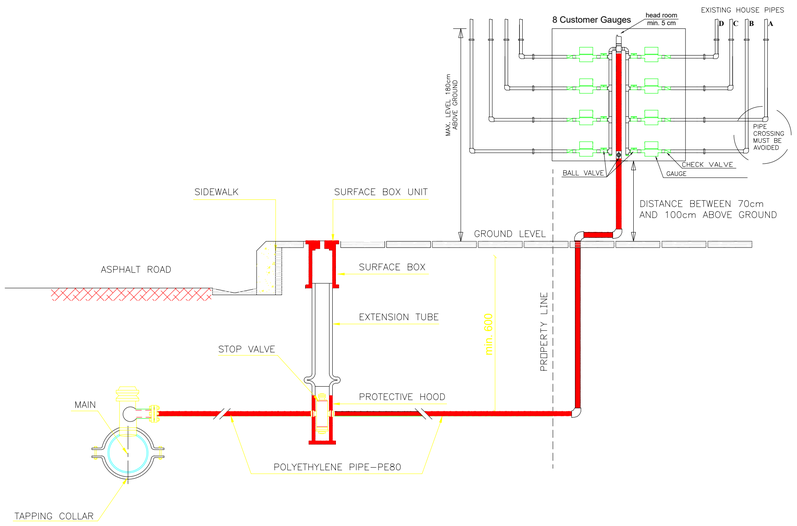
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS

TYPICAL VALVE CHAMBER DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	12/18	762W–STDP12

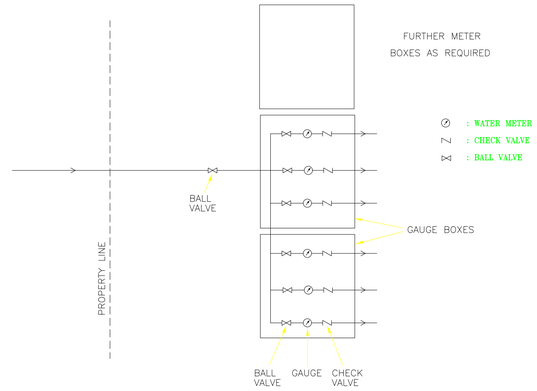


SERVICE CONNECTION

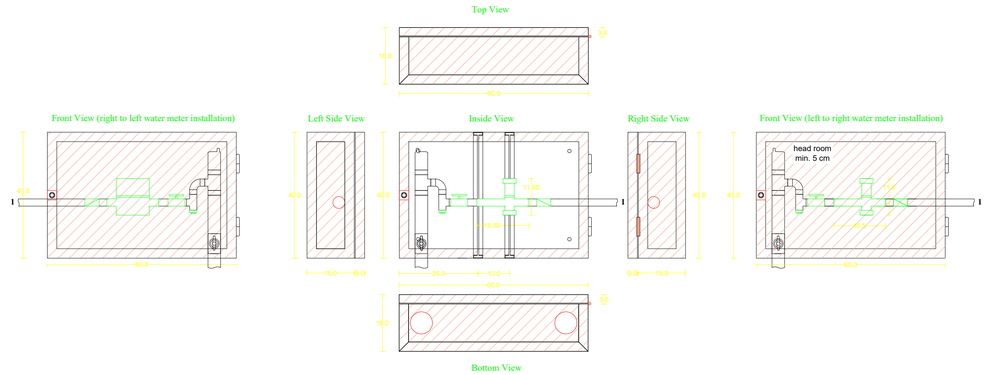
NUMBER OF CONSUMERS	SERVICE PIPE OUTER DIAMETER
1-6	20 mm
7-16	25 mm
17-26	32 mm
>27 OR BIG CONSUMERS	40 mm

Note:

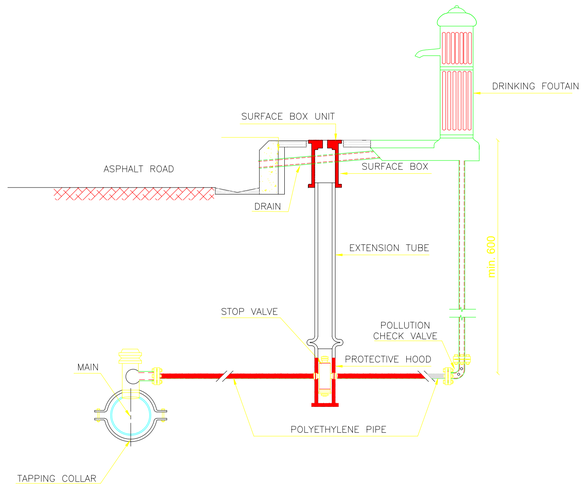
- Protection box shall be installed at a level that allows easy reading and opening for maintenance reasons.
- Minimum level above ground shall be not less than 70 cm.
- Maximum level above ground shall not be more than 180 cm.
- Pipe crossings as shown for connections A and B must to be avoided.
- Pipes must be installed in a straight alignment (vertical or horizontal). Adequate fittings must be provided by Contractor.



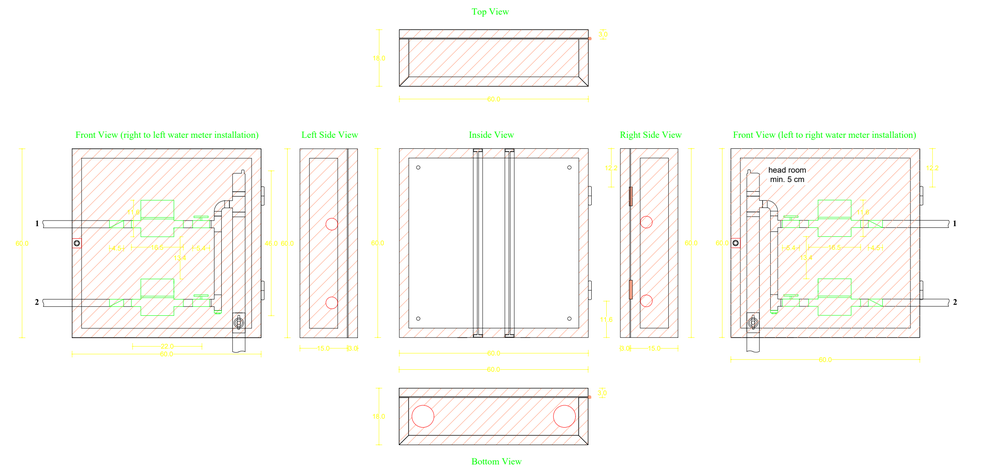
MULTIPLE SERVICE CONNECTION DETAIL



TYPICAL PROTECTION BOX FOR 1 GAUGE



TYPICAL DRINKING FOUNTAIN INSTALLATION



TYPICAL PROTECTION BOX FOR 2 GAUGES

NOTES:

1- MULTIPLE HOUSE CONNECTIONS MAY INVOLVE SEVERAL WATER METER BOXES OF TYPICAL SIZE
2- ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
3- ALL EXPOSED PIPING SHALL BE GALVANIZED IRON AND SHALL BE TAMPER PROOF
4- ALL WATER METER BOXES SHALL BE MADE OF COLORED, RUST-PROOF, AND ELECTRO-PLATED STEEL OR THE EQUIVALENT, UP TO THE APPROVAL OF THE ENGINEER
5- PRIOR TO MANUFACTURING THE BOXES, THE CONTRACTOR SHALL SUBMIT FOR APPROVAL A COMPLETE SAMPLE OF EACH BOX SIZE WITH ALL PIPING, FITTINGS, WATER METERS, LOCKS, KEYS, AS WELL AS EXTERNAL FINISH AND WALL FIXING SCREWS

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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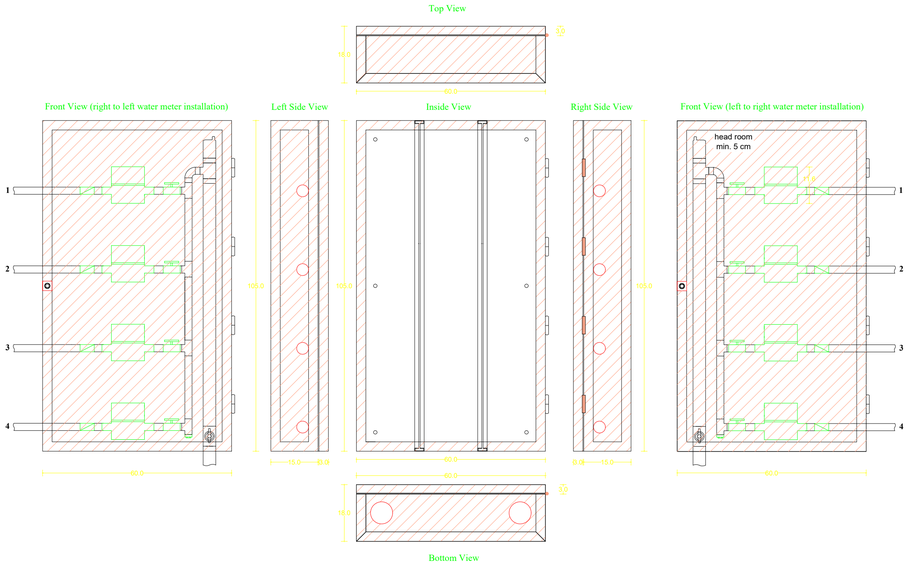
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

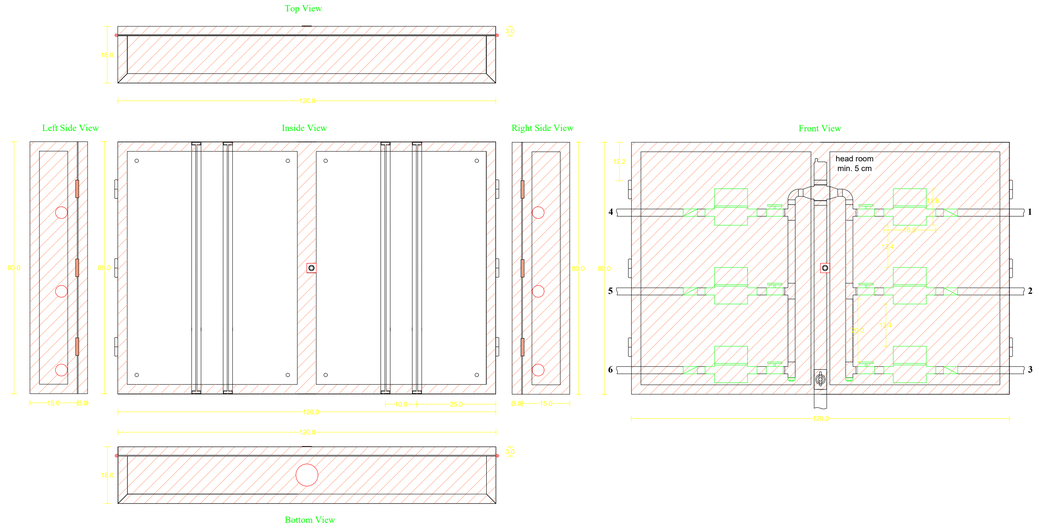
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL SERVICE AND HOUSE CONNECTIONS TYPICAL WATER METER PROTECTION BOXES FOR 1& 2 WATER METERS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

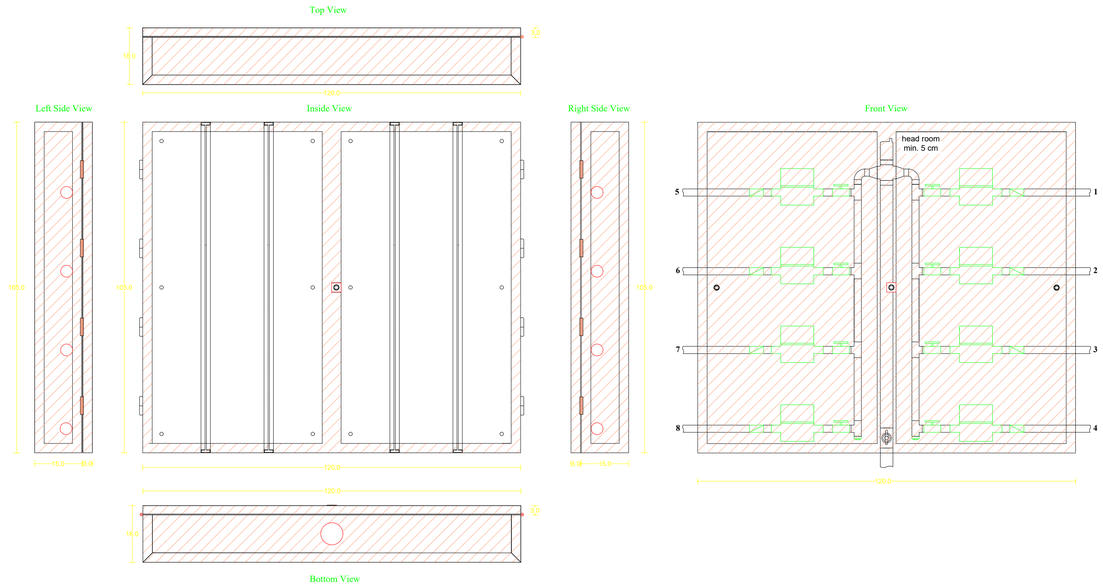
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	13/18	762W-STDP13



TYPICAL PROTECTION BOX FOR 4 GAUGES



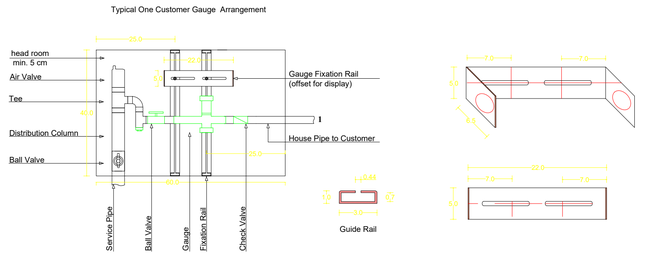
TYPICAL PROTECTION BOX FOR 6 GAUGES



TYPICAL PROTECTION BOX FOR 8 GAUGES

Water Meters		Width	Height	Depth
	1	60cm	40cm	15cm
	2	60cm	60cm	15cm
	4	60cm	105cm	15cm
	6	120cm	80cm	15cm
	8	120cm	105cm	15cm

GAUGE BOX DIMENSIONS



PROTECTION BOX GEOMETRY

NOTES:

1- MULTIPLE HOUSE CONNECTIONS MAY INVOLVE SEVERAL WATER METER BOXES OF TYPICAL SIZE
2- ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
3- ALL EXPOSED PIPING SHALL BE GALVANIZED IRON AND SHALL BE TAMPER PROOF
4- ALL WATER METER BOXES SHALL BE MADE OF COLORED, RUST-PROOF, AND ELECTRO-PLATED STEEL OR THE EQUIVALENT, UP TO THE APPROVAL OF THE ENGINEER
5- PRIOR TO MANUFACTURING THE BOXES, THE CONTRACTOR SHALL SUBMIT FOR APPROVAL A COMPLETE SAMPLE OF EACH BOX SIZE WITH ALL PIPING, FITTINGS, WATER METERS, LOCKS, KEYS, AS WELL AS EXTERNAL FINISH AND WALL FIXING SCREWS

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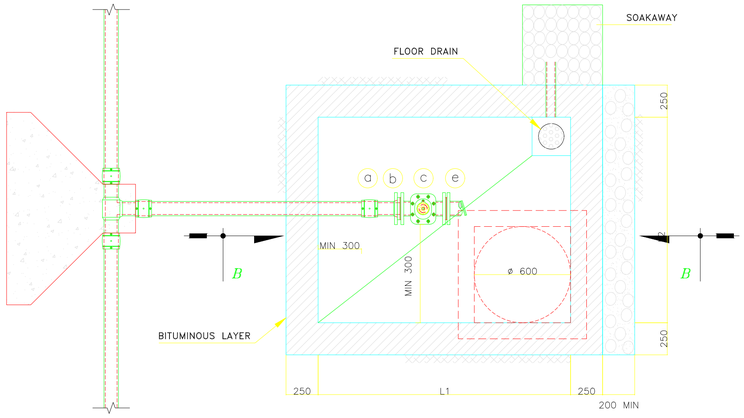
TRANSMISSION AND DISTRIBUTION SYSTEMS

TYPICAL WATER METER PROTECTION BOXES FOR 4- 6 &8 WATER METERS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

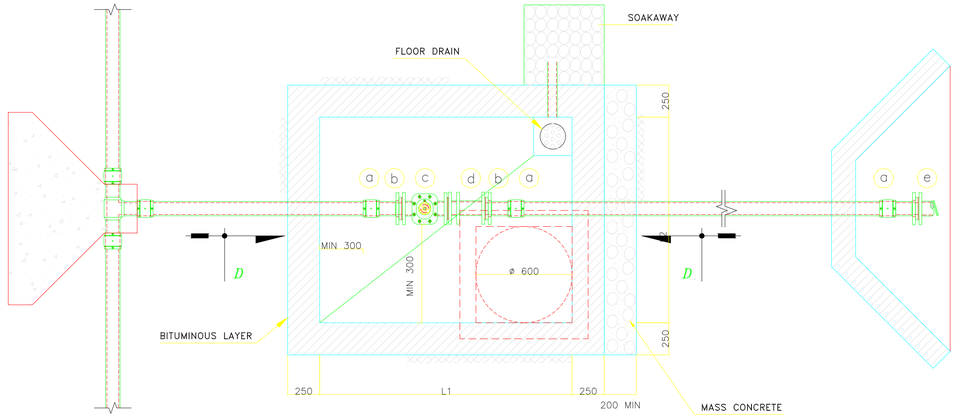
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	14/18	762W-STDP14

TYPICAL WASHOUT CHAMBER DETAIL
TYPE I

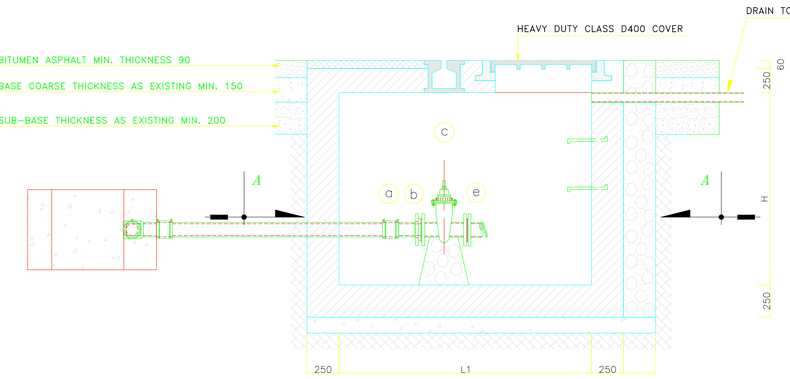


SECTION A–A

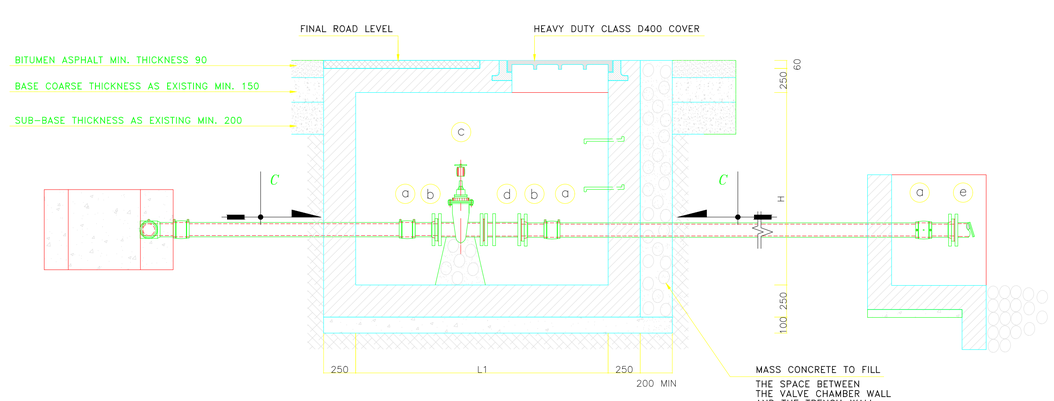
TYPICAL WASHOUT CHAMBER DETAIL
TYPE II



SECTION C–C

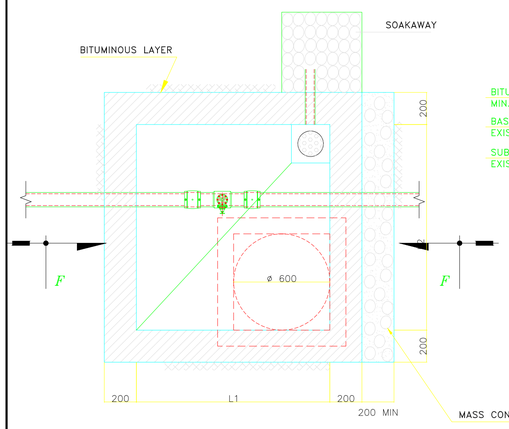


SECTION B–B

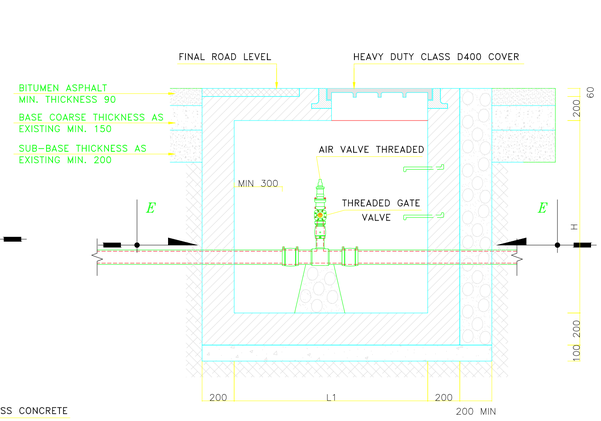


SECTION D–D

TYPICAL AIR VALVE CHAMBER DETAIL
TYPE I

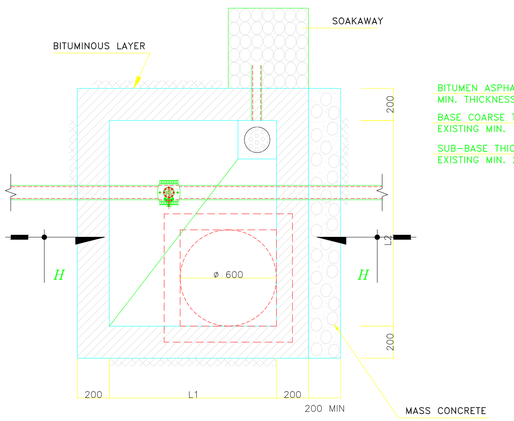


SECTION E–E

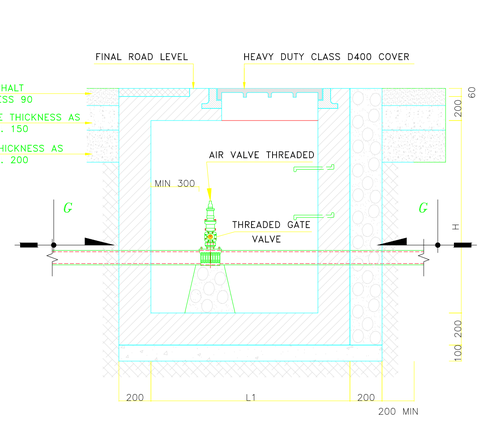


SECTION F–F

TYPICAL AIR VALVE CHAMBER DETAIL
TYPE II



SECTION G–G



SECTION H–H

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f'_c =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f'_t =2.1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER.
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50ø.
(ø= NOMINAL DIAMETER OF BAR).
LAPS SHALL BE STAGGERED FROM ONE HOOP TO THE OTHER AND/OR ONE BAR TO THE OTHER IN ORDER TO REDUCE THE NUMBER OF LAPS IN THE SAME SECTION.
STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø > 12mm MECHANICAL.
ø ≤ 12mm MANUAL (POSSIBLY).
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED CONCRETE SHALL BE FAIR FACE CONCRETE
(METALLIC OR PLYWOOD FORMWORK).

WATERPROOFING:
BITUMEN LAYER ON EXTERNAL SURFACES OF VALVE CHAMBER WALLS EXCEPT WHERE THERE IS MASS CONCRETE

REMARKS:
* HOLES MADE BY THE TIE–RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
* ALL DIMENSIONS ARE IN MILLIMETERS.
* SCALING FROM THESE DRAWINGS IS NOT ALLOWED.
* SOIL FRICTION ANGLE SHALL BE 25°
* GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 tg ø
* THE PASSIVE EARTH PRESSURE SHALL BE TAKEN INTO ACCOUNT FOR MANHOLE STABILITY BY FILLING THE VOID BETWEEN THE MANHOLE AND THE TRENCH WALL WITH MASS CONCRETE OF A MINIMUM THICKNESS "200".

SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

* T.P. =TEST PRESSURE

LEGEND:
- a ELECTROFUSION COUPLING
- b PE–FLANGE ADAPTOR WITH BACKING FLANGE
- c GATE VALVE
- d SELF–RESTRAINED DISMANTLING JOINT
- e FLANGED FLAP VALVE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

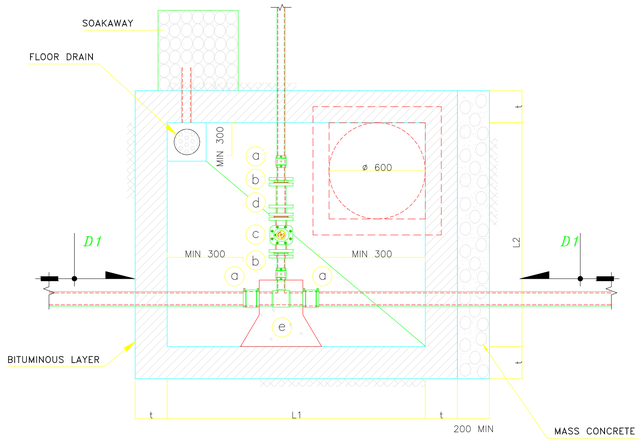
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB – HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 – ANTELIAS FAX:(04) 712159

DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

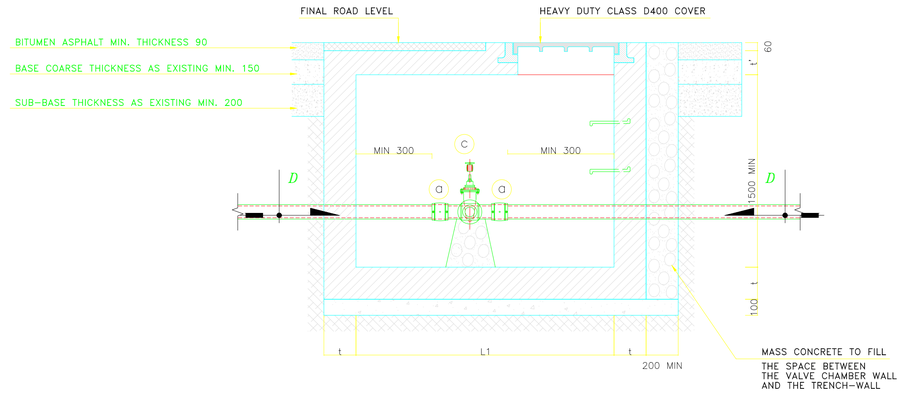
TRANSMISSION AND DISTRIBUTION SYSTEMS	WASHOUT AND AIR VALVE CHAMBER DETAILS FOR HDPE PIPES

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

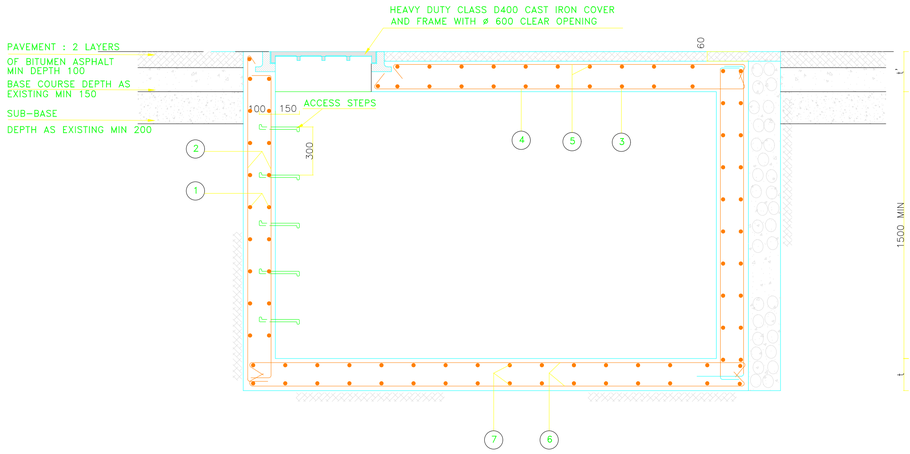
DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	15/18	762W–STDP15

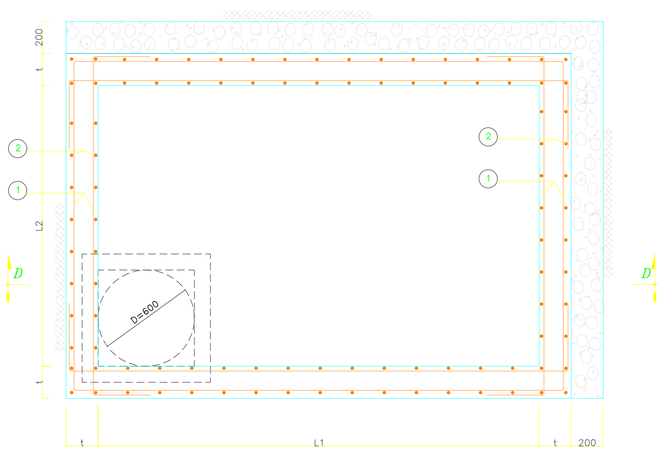


SECTION D–D



SECTION D1–D1





VALVE CHAMBER DIMENSIONS	
TYPE	LIxL2
R1	1000x1250
R2	1250x1000
R3	1250x1500
R4	1250x1750
R5	1500x1000
R6	1500x1500
R7	1500x1750
R8	1750x1250
R9	1750x1500
R10	1750x2000
R11	1750x2250
R12	2000x1500
R13	2000x1750
R14	2250x1500
R15	2250x1750
R16	2250x2000
R17	2500x1500
R18	2500x1750
R19	2500x2000
R20	2500x2250
R21	2750x1500

VALVE CHAMBER DIMENSIONS	
TYPE	LIxL2
R22	2750x1750
R23	2750x2000
R24	2750x2250
R25	2750x2500
R26	3000x1750
R27	3000x2000
R28	3000x2250
R29	3000x2500
R30	3000x2750
R31	3250x1750
R32	3500x1750
R33	3500x2000
R34	3500x2250
R35	3750x1750
R36	3750x2000
R37	3750x2250
R38	3750x2500
R39	4250x2000
R40	4250x2250
R41	4250x2500
R42	4250x2750

VALVE CHAMBER TYPE

BRANCH DIAM	63			75			90			110			125			140		
NBR OF VALVES / MAIN PIPE	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
63	–	R8	R12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
75	R4	R8	R12	–	R8	R12	–	–	–	–	–	–	–	–	–	–	–	–
90	R4	R8	R12	R4	R8	R12	–	R8	R12	–	–	–	–	–	–	–	–	–
110	R4	R12	R14	R4	R12	R14	R4	R12	R14	–	R12	R14	–	–	–	–	–	–
125	R4	R12	R14	R4	R12	R14	R4	R12	R14	R4	R12	R14	–	R12	R14	–	–	–
140	R4	R12	R14	R4	R12	R14	R4	R12	R14	R4	R12	R14	R4	R12	R14	–	R12	R14

REINFORCEMENT STEEL TABLE

VALVE CHAMBER	THICKNESS		REINFORCEMENT						
TYPE	t mm	t' mm	1	2	3	4	5	6	7
R1–R5	200	250	T14 @200	T14 @200	T16 @200	T14 @200	2xT12 @200	T14 @200	T14 @200
R6–R11	200	250	T14 @165	T14 @165	T16 @165	T14 @165	2xT12 @165	T14 @165	T14 @165
R11–R23	200	250	T14 @150	T14 @150	T14 @150	T14 @150	2xT12 @150	T14 @150	T14 @150
R23–R38	250	300	T16 @200	T16 @200	T20 @200	T14 @200	2xT12 @200	T16 @200	T16 @200
R39–R42	300	300	T16 @165	T16 @165	T20 @165	T14 @165	2xT12 @165	T16 @165	T16 @165

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f'_c =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f'_t =2.1 MPa.

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CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

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STIRRUPS ø8 SHALL BE USED ON EACH LAP.

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FORMWORK:
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SOAKAWAY
TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

* T.P. =TEST PRESSURE

LEGEND:
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- b PE–FLANGE ADAPTOR WITH BACKING FLANGE
- c GATE VALVE
- d SELF–RESTRAINED DISMANTLING JOINT
- e REDUCED PE TEE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

LEB RELIEF

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TEL:(04) 712157 / 712158
FAX:(04) 712159

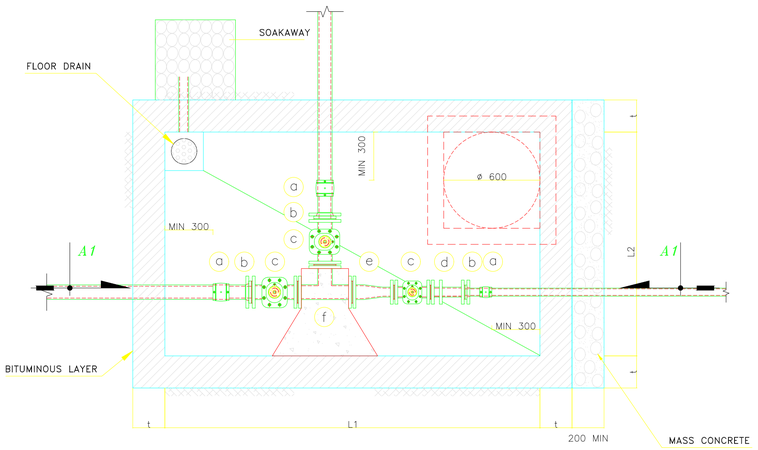
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE–DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS

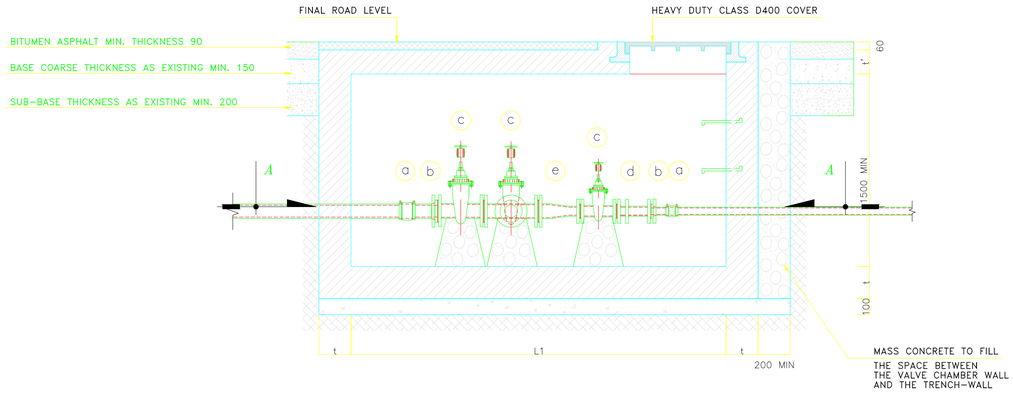
TYPICAL VALVE CHAMBER DETAILS FOR HDPE PIPES

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W–STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	16/18	762W–STDP16



SECTION A–A



SECTION A1–A1

ø 600

SECTION B–B

SECTION B1–B1

SECTION C–C

SECTION C1–C1

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 250 kg/m3.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL T YIELD STRESS: Fy=400 MPa.
MILD STEEL BARS : SYMBOL ø YIELD STRESS: Fy=215 MPa.

STRESSES:
SEVERE CONTROL.
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS: f_c' =25 MPa.
CONCRETE TENSILE STRENGTH AT 28 DAYS: f_t' =2.1 MPa.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30 mm

OVERLAPPING:
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STIRRUPS ø8 SHALL BE USED ON EACH LAP.

BENDING:
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* T.P. =TEST PRESSURE

LEGEND:

a	ELECTROFUSION COUPLING
b	PE-FLANGE ADAPTOR WITH BACKING FLANGE
c	GATE VALVE
d	SELF-RESTRAINED DISMANTLING JOINT
e	REDUCER
f	ALL FLANGED TEE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

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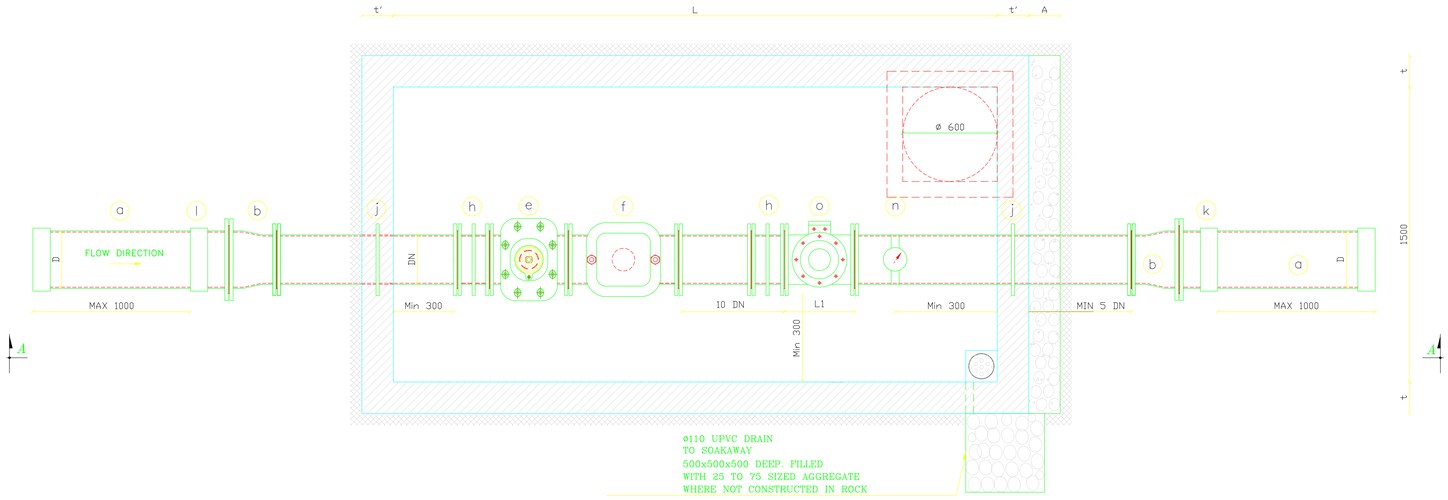
DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

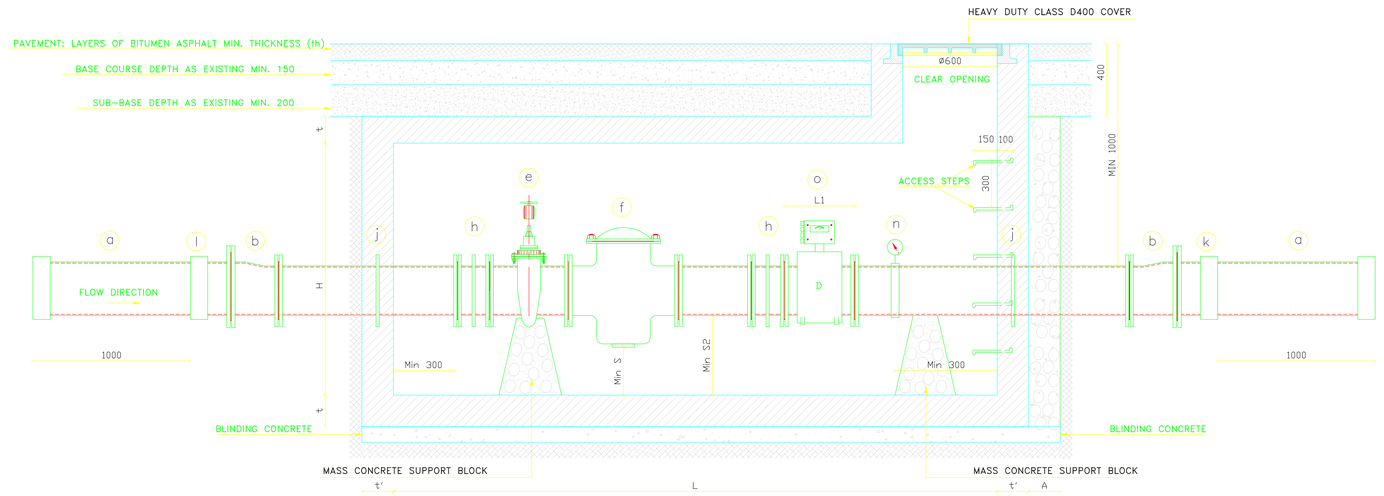
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL VALVE CHAMBER DETAILS FOR HDPE PIPES

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	17/18	762W-STDP17



PLAN VIEW



SECTION A-A

MAIN PIPE DIAMETER	ACCESSORIES DIAMETER	LENGTH	WATER METER LENGTH	BLOCK THICKNESS	THICKNESS	THICKNESS	MINIMUM CLEARANCE	MINIMUM CLEARANCE	HEIGHT	MANHOLE SIZE
D	DN	L	L1	A	t	t'	S	S2	H	L x Wx H
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm x mm x mm
63	63	2500	200	200	200	200	80	300	1500	2500 x 1500 x 1500
75	75	2500	200	200	200	200	80	300	1500	2500 x 1500 x 1500
90	90	2750	200	200	200	200	100	300	1500	2750 x 1500 x 1500
110	110	3000	250	200	200	200	120	300	1500	3000 x 1500 x 1500
125	125	3250	250	200	200	200	150	350	1500	3250 x 1500 x 1500
140	140	3250	250	200	200	200	150	350	1500	3250 x 1500 x 1500
150	150	3500	300	200	200	200	175	400	2000	3500 x 1500 x 2000
160	160	3750	300	200	200	200	175	400	2000	3750 x 1500 x 2000

NOTES:

REINFORCED CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
DOSING 350 Kg/m3

BLINDING AND MASS CONCRETE:
NORMAL PORTLAND CEMENT, GRADE C45.
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TO BE USED ONLY IF THE INSTALLATION OF AN ADEQUATE GRAVITY DRAIN PIPE TO A FREE OUTLET IS DETERMINED BY THE ENGINEER NOT TO BE POSSIBLE.

* T.P. =TEST PRESSURE

* th : FOR THE THICKNESS OF THE ASPHALT LAYERS REFER TO TYPE OF THE ROAD

LEGEND:

- a PIECE OF PIPE MAX. LENGTH 1000
- b FLANGED REDUCER
- e GATE VALVE
- f FILTER WITH WASHOUT VALVE
- h SELF-RESTRAINED DISMANTLING JOINT
- j PUDDLE FLANGE
- k FLANGE-SPIGOT
- l FLANGE-SOCKET
- n PRESSURE GAUGE WITH COLLAR
- o FLOW METER

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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DESIGN AND SUPERVISION CONSULTANCY FOR REHABILITATION OF 1 KM OF WATER NETWORKS IN MENYE-DENNIYE AREA

TRANSMISSION AND DISTRIBUTION SYSTEMS	FLOW METER DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
762W-STDP	BTD	BTD	BTD

DATE	SCALE	SHEET No.	DRAWING No.
JUNE 2024	N.T.S	18/18	762W-STDP18