

REPUBLIC OF LEBANON

MINISTRY OF ENERGY AND WATER

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

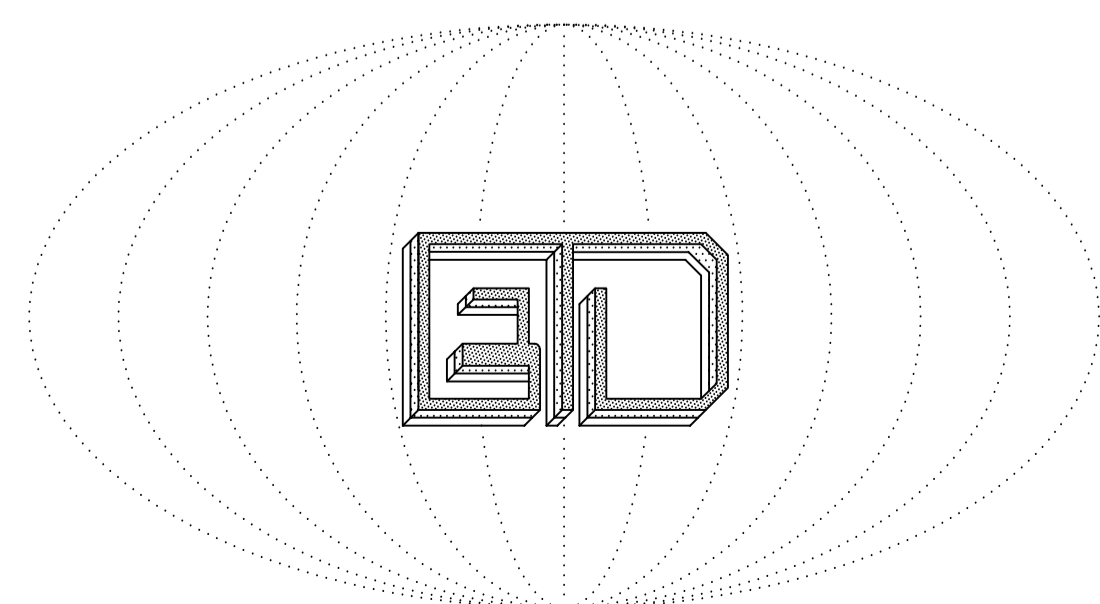
PROJECT No. ____

CONTRACT No. ____

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

VOLUME 6
DRAWINGS

MAY 2020



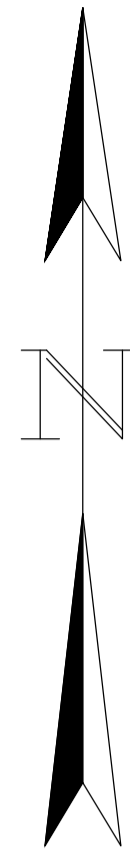
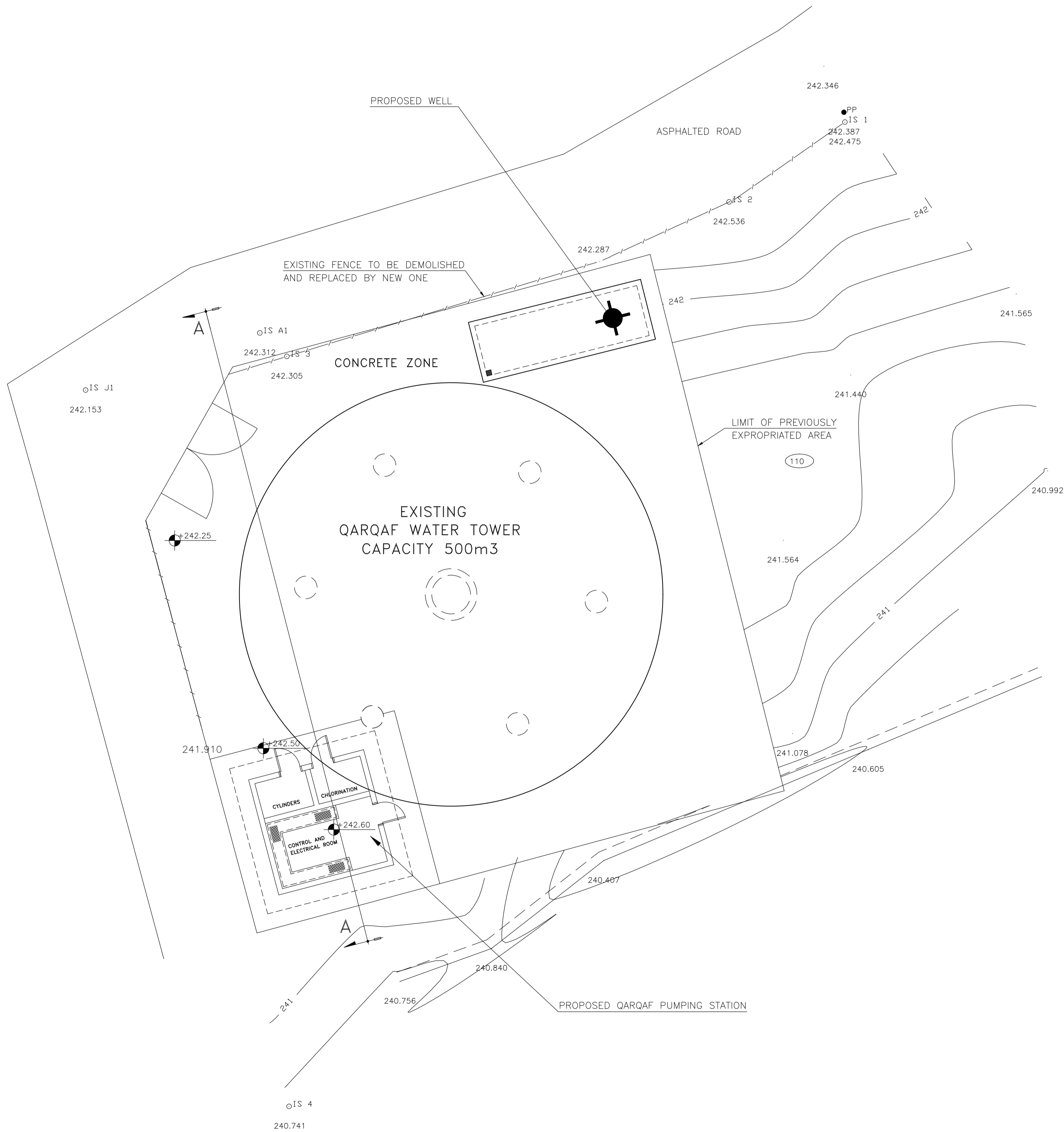
BUREAU TECHNIQUE
POUR LE
DEVELOPPEMENT

JALL ED DIB — HAJAL Bldg
P.O.BOX: 70492 — ANELIAS
PHONE: (04) 712157 / 712158
(03) 291016 — FAX: (04) 712159
E-mail: btd@btd-lb.com

TOPOGRAPHICAL SURVEY

SITE LAYOUT

SCALE 1:100



NOTES:

- GROUND LEVEL OF PUMPING STATION BUILDING = +242.60M
- DO NOT SCALE FROM THIS DRAWING
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED
- ALL LEVELS ARE IN M UNLESS OTHERWISE SPECIFIED

TOPOGRAPHICAL LEGEND

	CULVERT/BRIDGE		RETAINING WALL
	SPRING		RAILWAY
	WELL		CHANNEL
	DECIDUOUS/PINE TREE		TERRACE
	ROCKS		FENCE
	BUSHES		STREAM/RIVER
	MANHOLE SEWER		PYLON
	MANHOLE WATER		ELECTRIC SUB STATION
	MANHOLE TELEPHONE		ELECTRIC POLE/TELEGRAPH POLE
	MANHOLE NOT IDENTIFIED		OVERGROUND WATER PIPE
	LIGHTING POLE		UNDERGROUND WATER PIPE
	BUILDING		SPOT HEIGHT
	FOUNDATION/BUILDING UNDER CONSTRUCTION		TRAVERSING STATION
	ROAD		TRIANGULATION POINT
	TRACK		BENCH MARK
	REFERENCE LINE		ML
	SLOPE		LOT No
			BOUNDARY
			CIRCUMSCRIPTION BOUNDARY
			EXPROPRIATION LIMIT

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

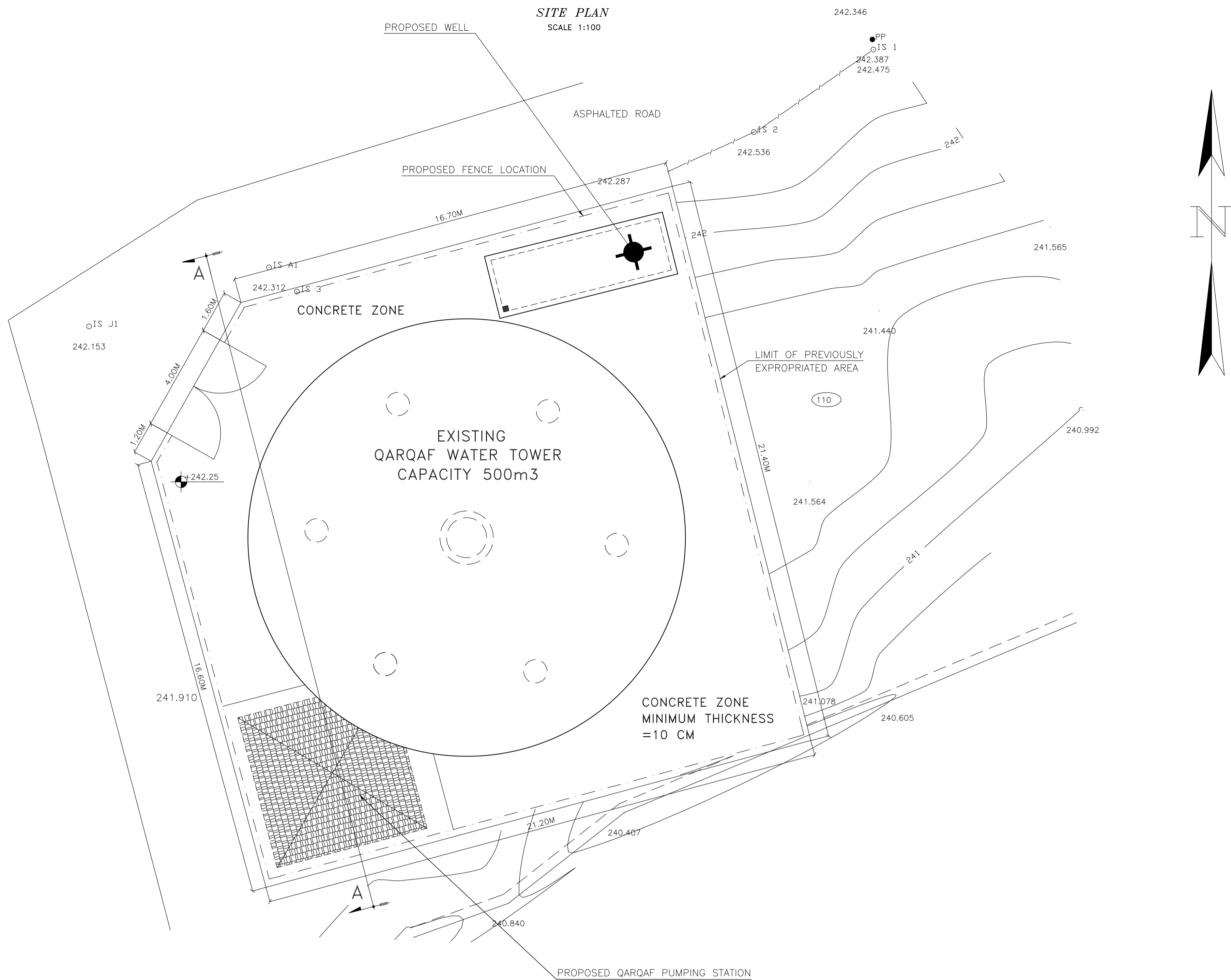
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF WATER TOWER CAPACITY 500 M3 AND PUMPING STATION	TOPOGRAPHICAL SURVEY SITE LAYOUT
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-STDPS01	T. SEIFEDDINE	T. SEIFEDDINE	W. SEIFEDDINE

DATE	SCALE	SHEET No.	SEQ. No.
MAY 2020	1:100	1/7	1/33



NOTES:

- GROUND LEVEL OF PUMPING STATION BUILDING = +242.60M
- DO NOT SCALE FROM THIS DRAWING
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED
- ALL LEVELS ARE IN M UNLESS OTHERWISE SPECIFIED

TOPOGRAPHICAL LEGEND

	CULVERT/BRIDGE		RETAINING WALL
	SPRING		RAILWAY
	WELL		CHANNEL
	DECIDUOUS/PINE TREE		TERRACE
	ROCKS		FENCE
	BUSHES		STREAM/RIVER
	MANHOLE SEWER		PYLON
	MANHOLE WATER		ELECTRIC SUB STATION
	MANHOLE TELEPHONE		ELECTRIC POLE/TELEGRAPH POLE
	MANHOLE NOT IDENTIFIED		OVERGROUND WATER PIPE
	LIGHTING POLE		UNDERGROUND WATER PIPE
	BUILDING		SPOT HEIGHT
	FOUNDATION/BUILDING UNDER CONSTRUCTION		TRAVERSING STATION
	ROAD		TRIANGULATION POINT
	TRACK		BENCH MARK
	REFERENCE LINE		ML
	SLOPE		LOT No
			BOUNDARY
			CIRCUMSCRIPTION BOUNDARY
			EXPROPRIATION LIMIT

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

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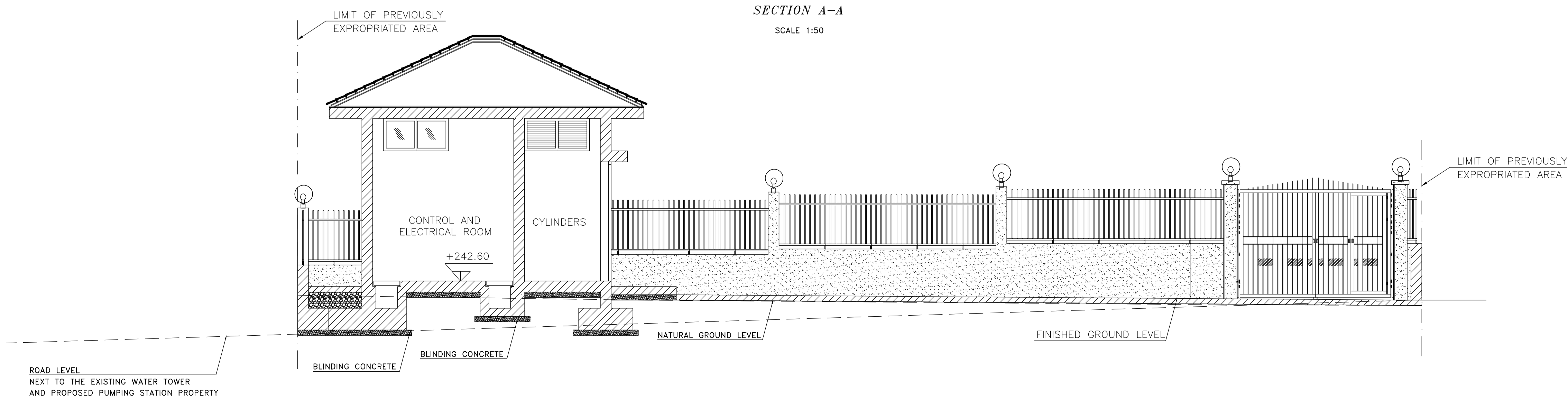
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

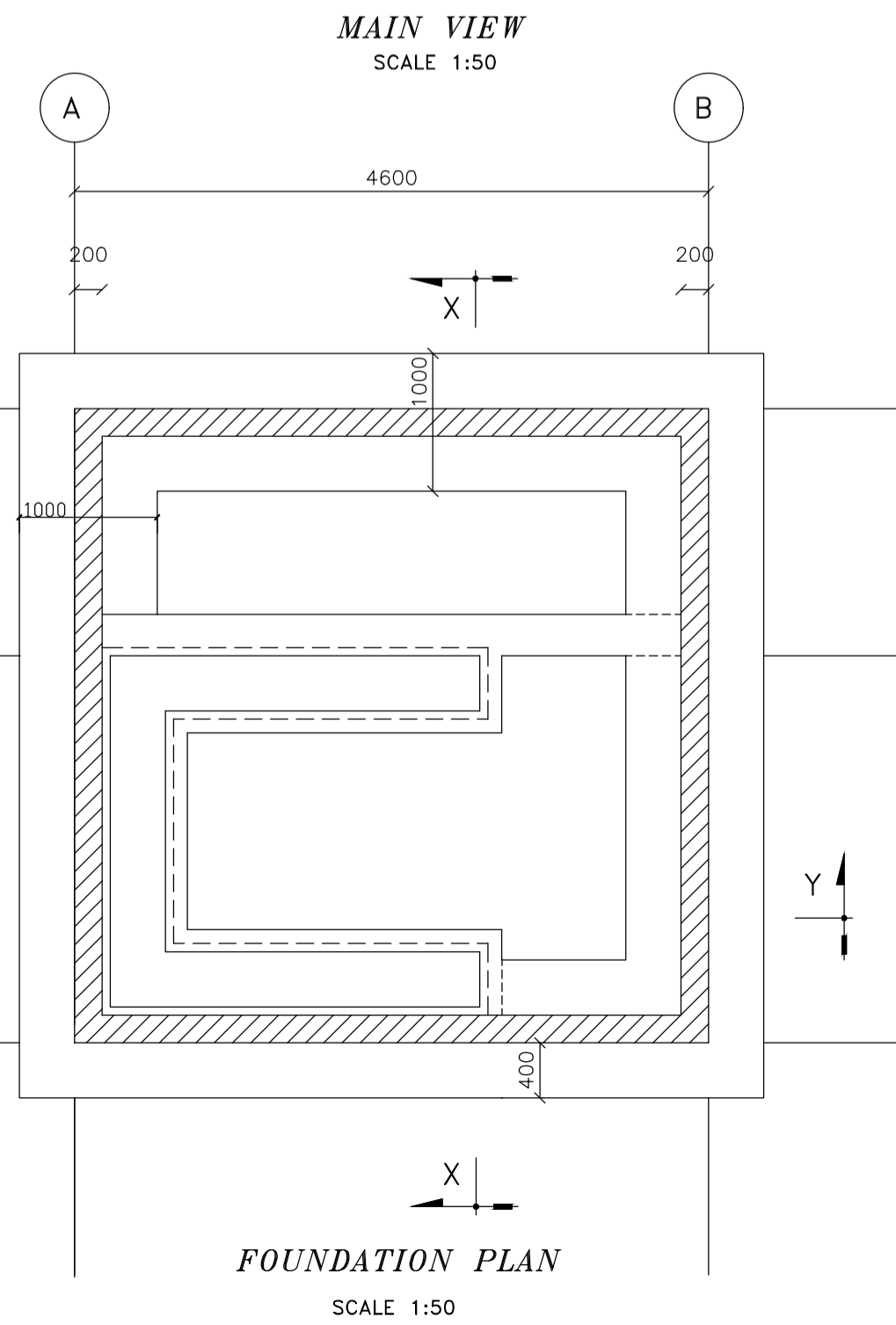
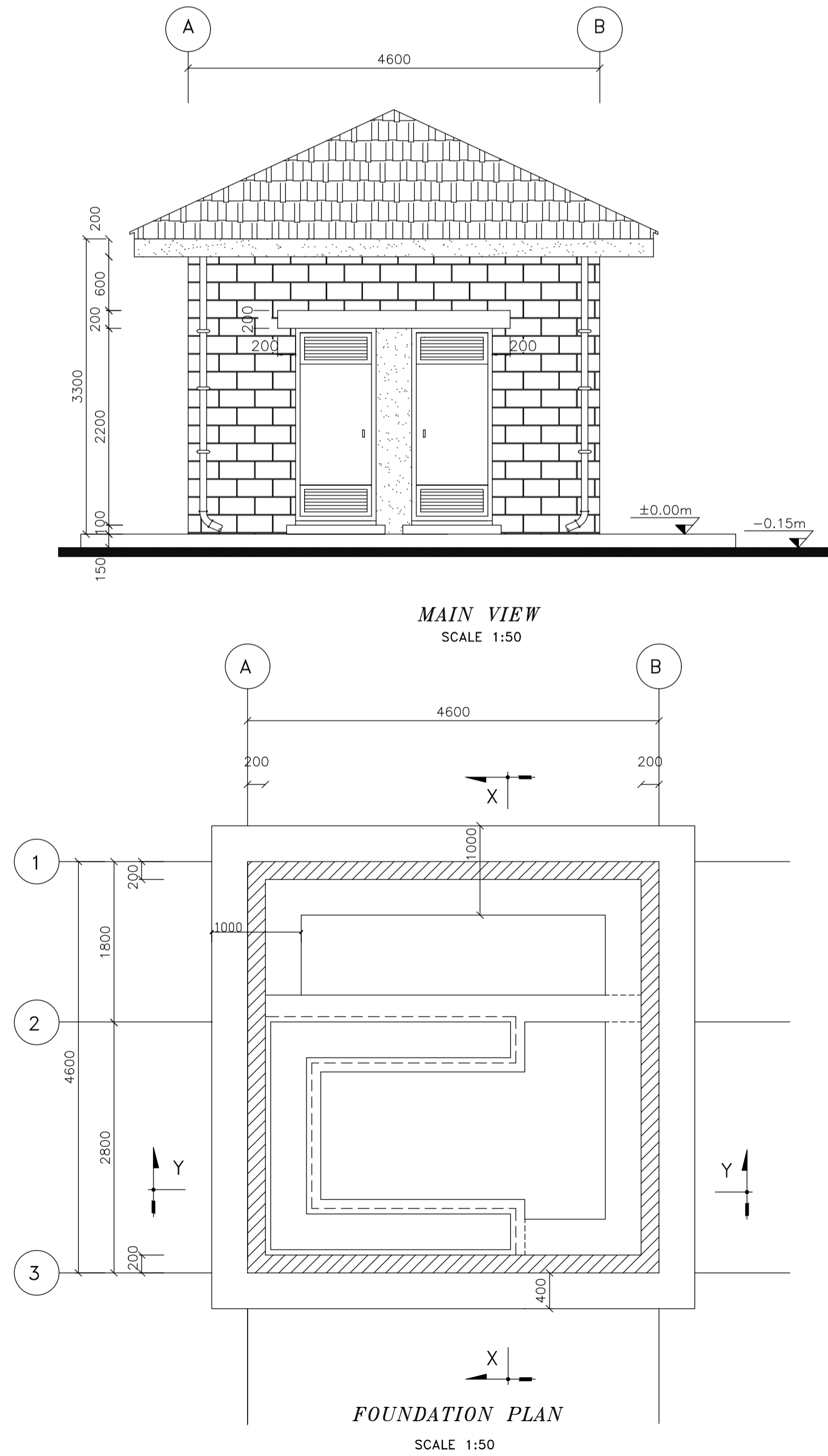
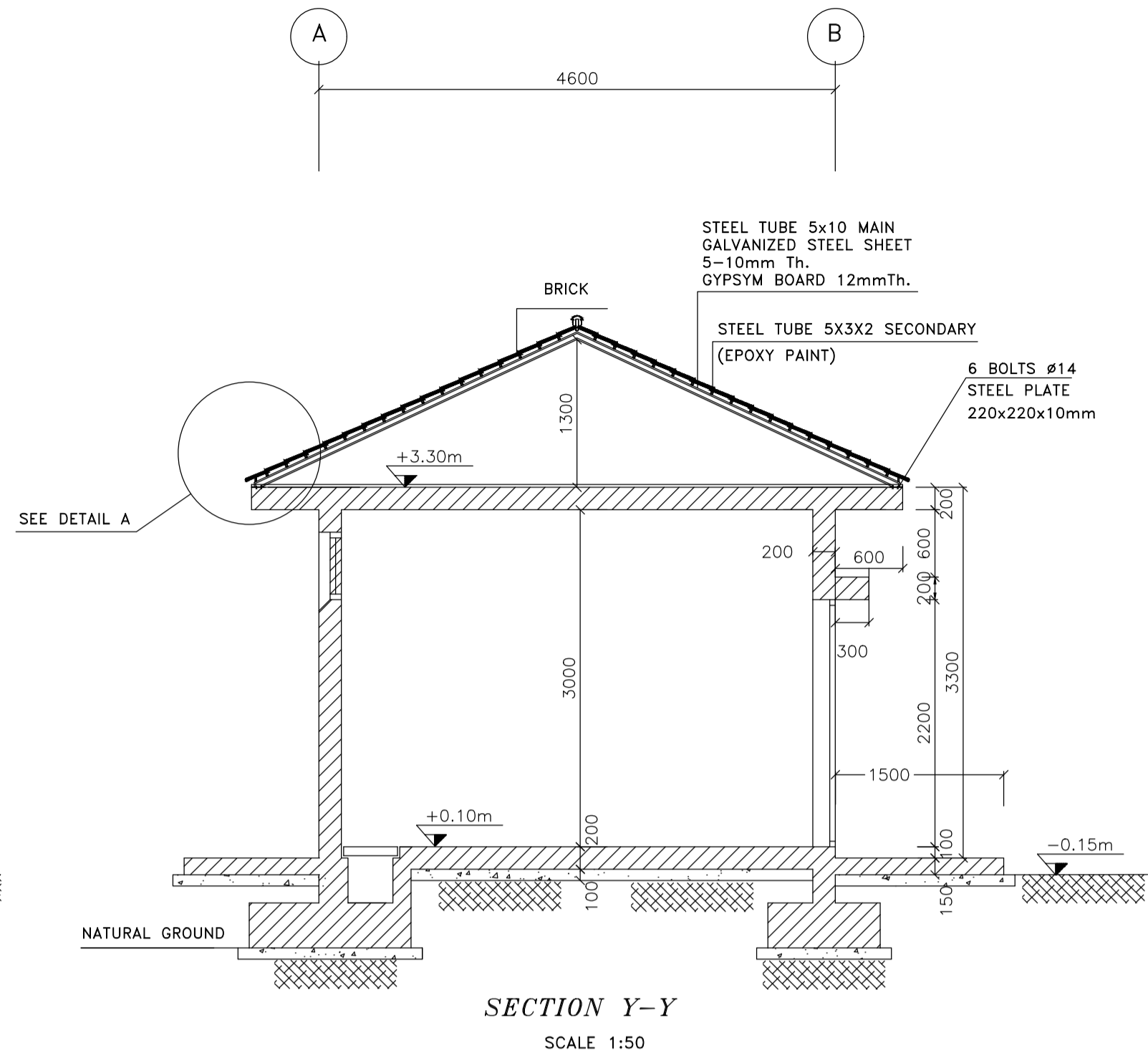
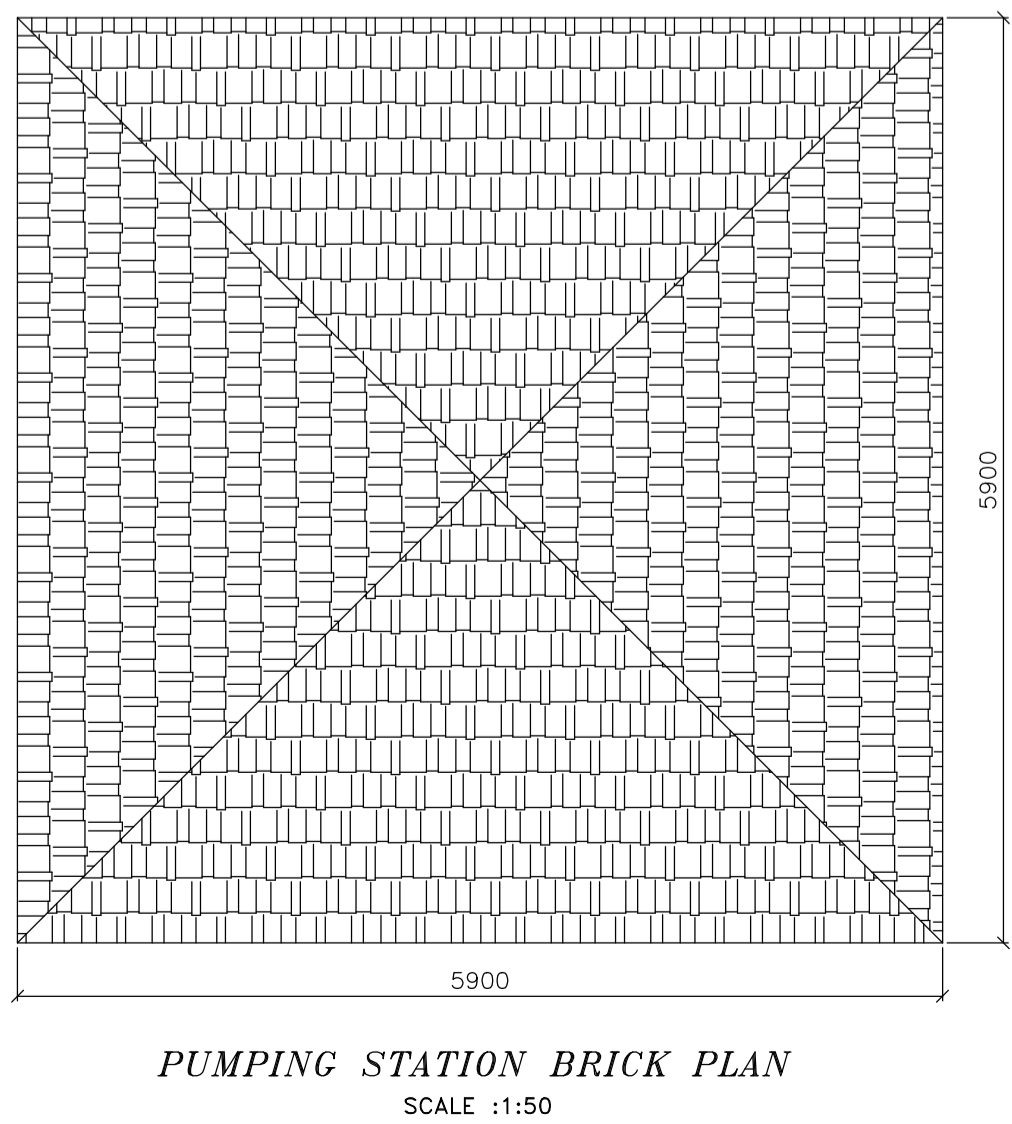
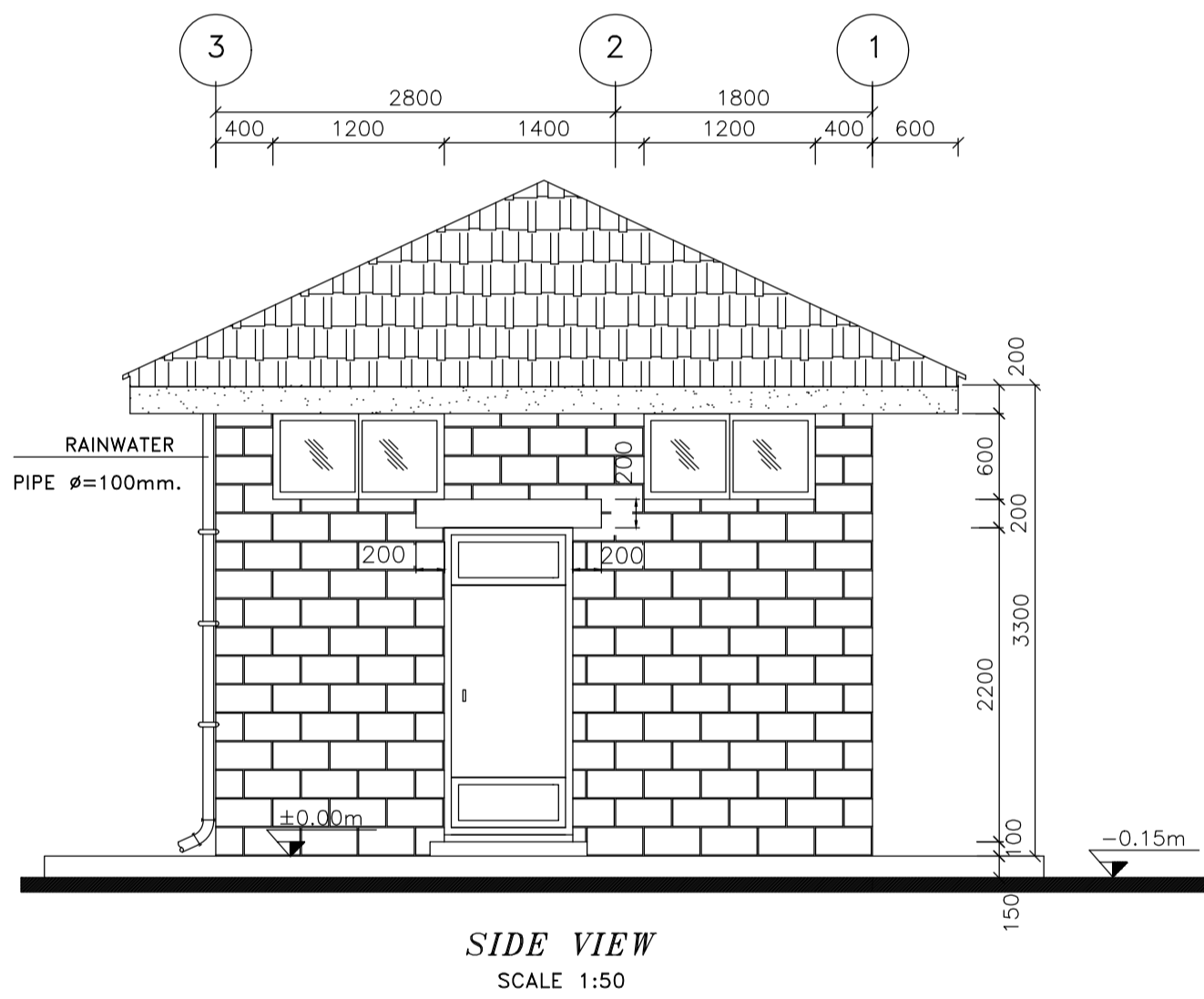
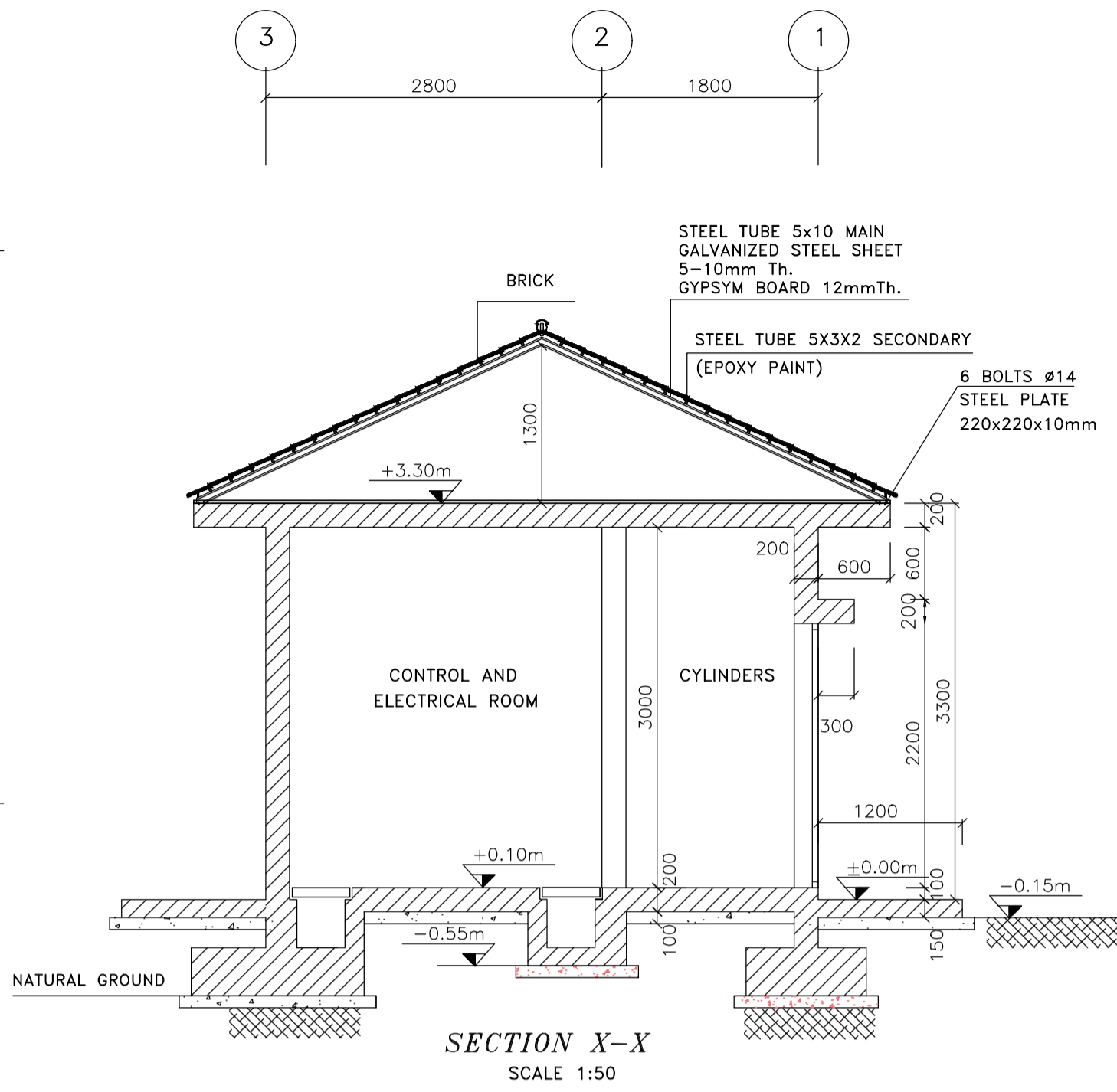
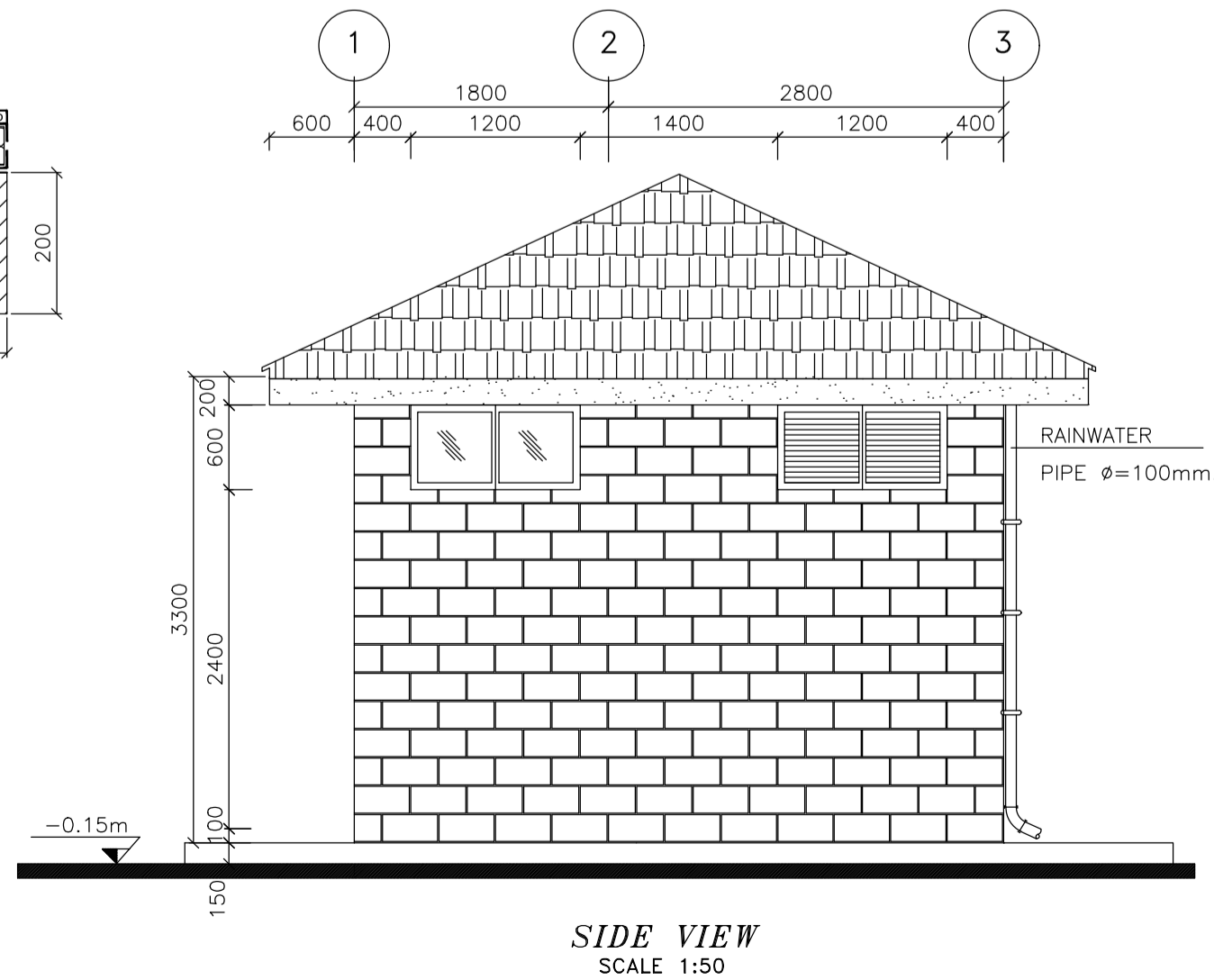
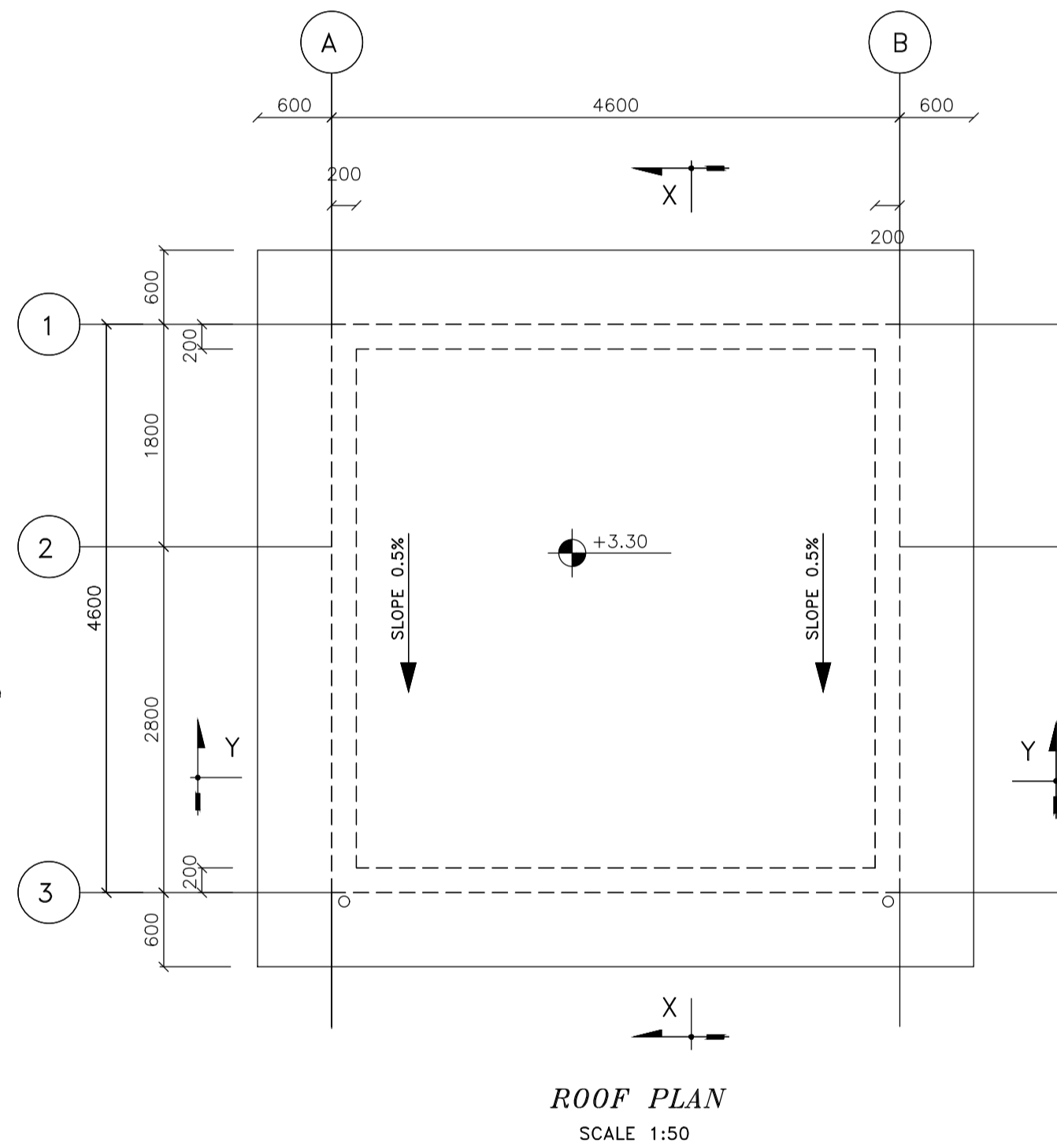
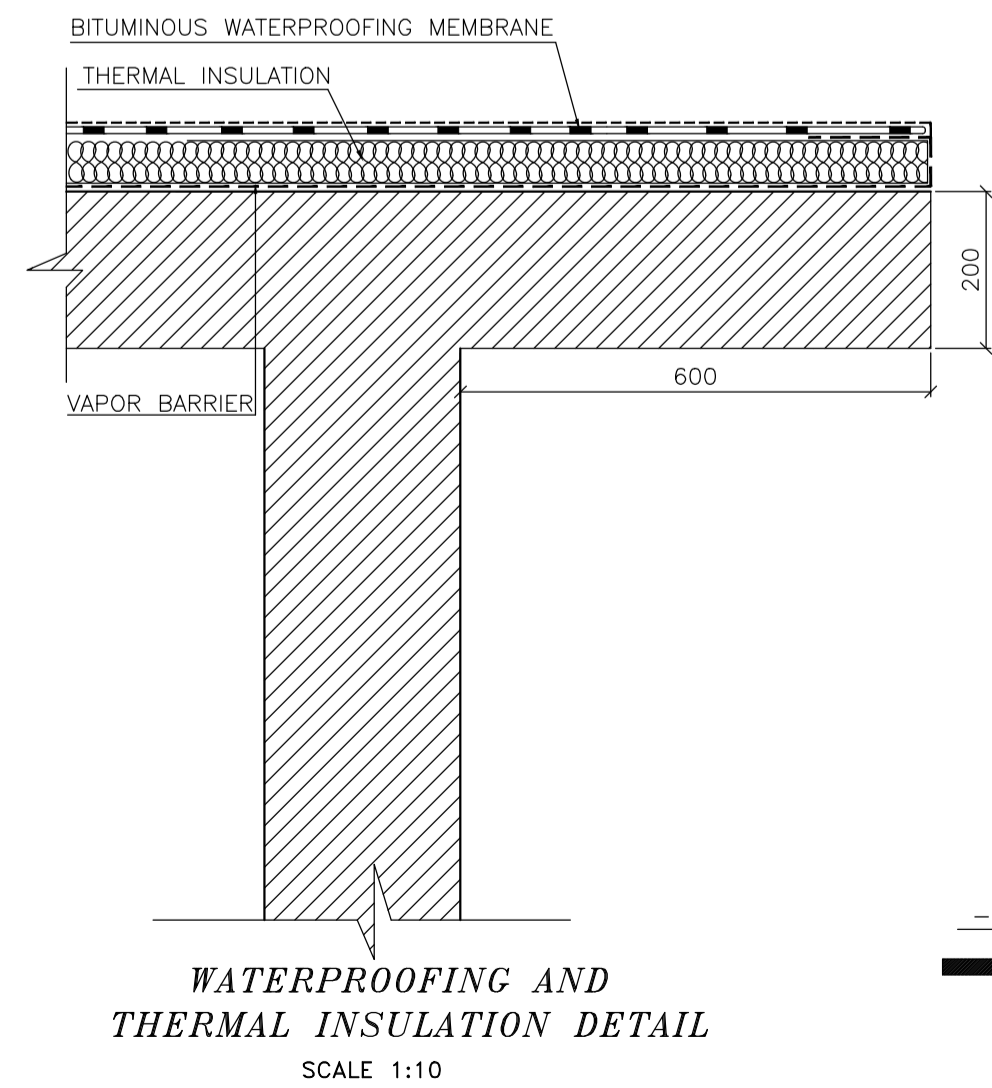
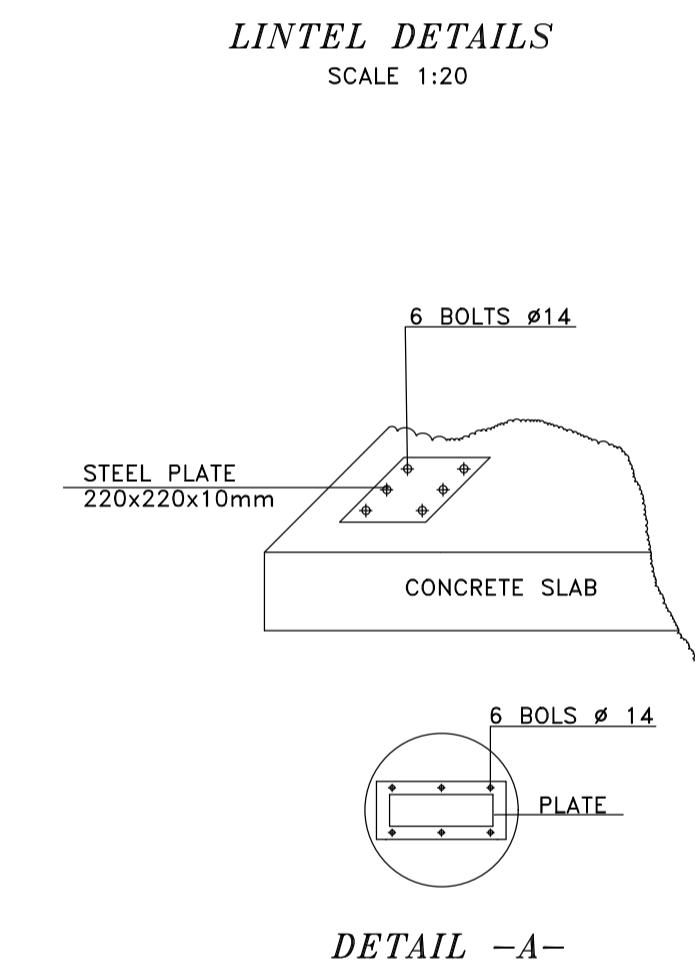
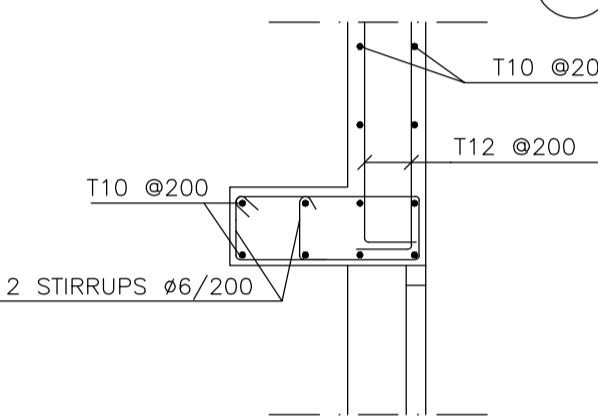
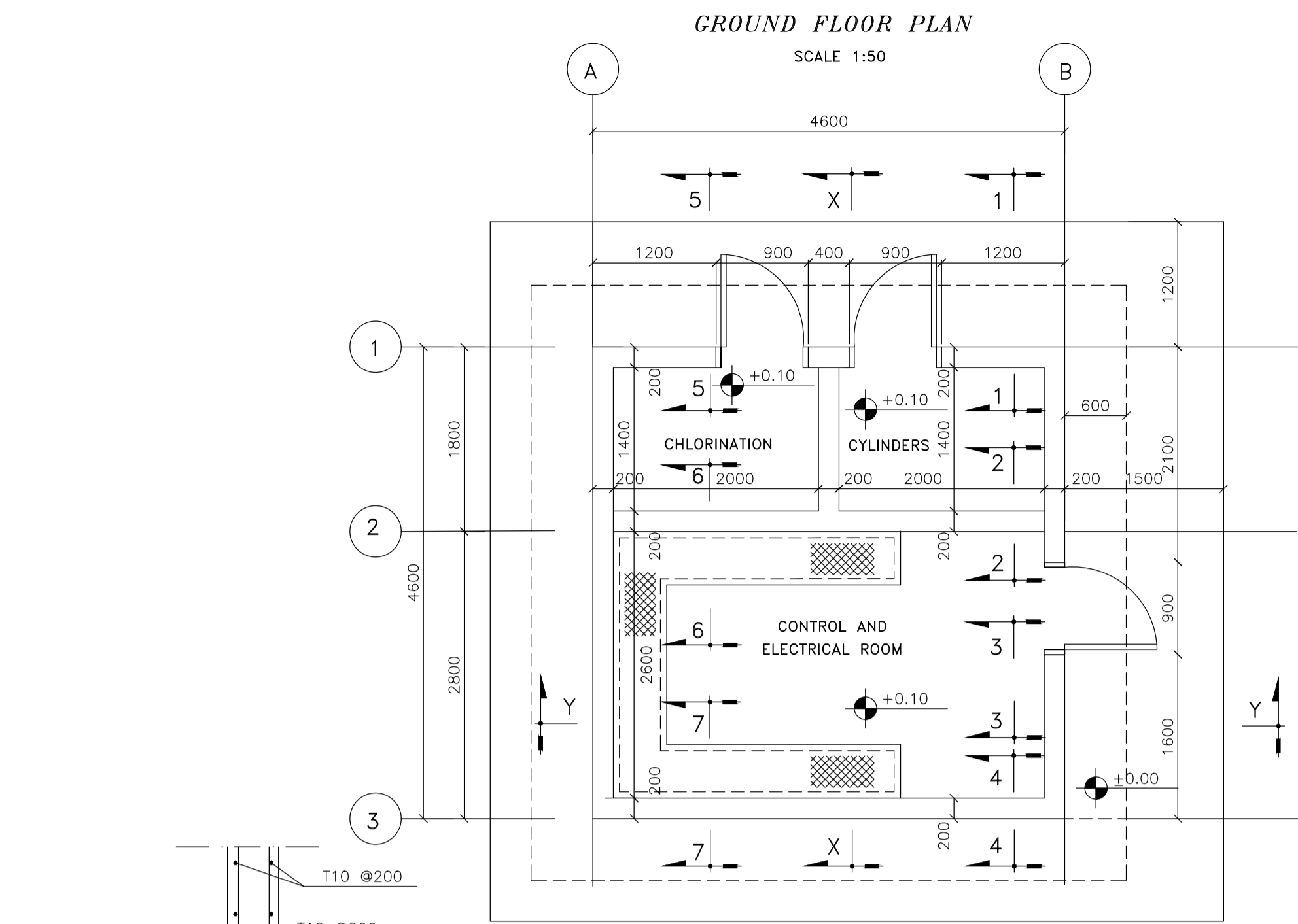
QARQAF WATER TOWER
CAPACITY 500 M3
AND PUMPING STATION

SITE PLAN
SECTION A-A

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-STDP02	T. SEIFEDDINE	T. SEIFEDDINE	W. SEIFEDDINE

DATE	SCALE	SHEET No.	SEQ. No.
MAY 2020	1:50 - 1:100	2/7	2/33





NOTES:

REINFORCED CONCRETE:
CONCRETE GRADE C30 FOR ALL STRUCTURES

MIX ELEMENTS:
ORDINARY PORTLAND CEMENT, 350Kg/m³.

STRESSES:
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS:
- ON A CUBE, a= 150mm : 30N/mm²
- ON A CYLINDER ø150mm, h=300mm : 28N/mm²
CONCRETE TENSILE STRENGTH AT 28 DAYS: 2.1N/mm²
MAXIMUM POURING HEIGHT :1500mm.

CONCRETE COVER:
CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30mm FOR STRUCTURES FLOOR SLAB, WALLS AND COVER.

LEAN CONCRETE/ CYCLOPEAN CONCRETE:
MIX MADE WITH ORDINARY PORTLAND CEMENT, 250Kg/m³.

REINFORCEMENT:
DEFORMED HIGH STRENGTH STEEL: BARS SYMBOL : T YIELD STRESS : Fy= 420N/mm²
MILD STEEL BARS : SYMBOL : ø YIELD STRESS : Fy= 250N/mm²

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x5ø (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 A SECTION. PINS ø8 SHALL BE USED ON EACH LAP.

BENDING:
ø> 12mm MECHANICALLY COMPULSIONLY
ø< 12mm MANUALLY EVENTUALLY
STRAITENING OF BENDED BARS IS NOT ALLOWED.

DRAWINGS CONSIDERATION:
- TOP BARS
- BOTTOM BARS

CONSTRUCTION JOINTS:
REDUCED TO THE STRICT MINIMUM IN ALL ELEMENTS PROVIDED THAT NECESSARY PRECAUTIONS ARE TAKEN: SETTING RETARDERS, BONDING MATERIALS.

SETTING RETARDERS (CONSTRUCTION JOINTS), PLASTISIZERS, ...
THE USE OF CHLORINE BASED ADMIXTURES IS NOT ALLOWED.

ALL EXECUTED INTERIOR CONCRETE SHALL BE FAIR FACE CONCRETE.
TIE RODS HOLES MADE BY THE TIE-RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
ALL MATERIALS AND EXECUTION PROCESSES SHOULD BE SUBMITTED FOR APPROVAL.
THE USE OF ø6mm BARS AS TIE-RODS IS NOT ALLOWED.

METALWORKS:
DOORS ARE MADE OF 3mm MINIMUM SHEET PLATE AND SHALL BE EPOXY PAINTED (PRIMER AND A MINIMUM OF TWO COATS). OPENINGS AND VENTILATIONS SHALL BE TAKEN INTO CONSIDERATION ACCORDING TO THE EQUIPMENT TO BE INSTALLED.

FINISHING SCHEDULE			
ROOM	FLOOR	WALLS	CEILING
CHLORINATION	INDUSTRIAL RESIN	INTERNAL USE COATING, WASHABLE	INTERNAL USE COATING, WASHABLE
CYLINDERS	INDUSTRIAL RESIN	INTERNAL USE COATING, WASHABLE	INTERNAL USE COATING, WASHABLE
CONTROL + ELECTRICAL ROOM	INDUSTRIAL RESIN	INTERNAL USE COATING, WASHABLE	INTERNAL USE COATING, WASHABLE
EXTERNAL FACE OF EXTERIOR WALLS	NATURAL STONE		
FRAME OF DOORS AND WINDOWS	POLISHED NATURAL STONE min. width= 30 cm ; min. thickness= 5 cm		

EXTERIOR DOORS	WINDOWS	PROTECTION BARS FOR EXTERIOR WINDOWS
STEEL THICK (ACCORDING TO DRAWINGS)	ALUMINUM (ACCORDING TO DRAWINGS)	STEEL SQUARE BARS 10x10 (ACCORDING TO DRAWINGS)

- N.B.**
- SCALING FROM THIS DRAWING IS NOT ALLOWED.
ALL LEVELS ARE IN M UNLESS OTHERWISE SPECIFIED.
ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - THIS DESIGN HAS BEEN FOUND ON AN HYPOTHESIS STATING THAT THE SOIL IN THE PROJECT AREA IS CONSTITUTED COMPLETELY OF A HARD AND CONTINUOUS LIMESTONE FORMATION. IF DURING EXECUTION A CONTRADICTION REALITY APPEARS. THE DESIGN SHALL BE REVISED TO COMPLY WITH THE EVENTUAL NEW DATA REVEALED.
 - THE TRENCH LOCATION COULD BE MODIFIED ACCORDING TO THE EQUIPMENT TO BE INSTALLED.

Rev.	Date	Dsgn	Drawn	Chk'd	Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BUREAU TECHNIQUE POUR LE DEVELOPEMENT
JALL ED DIB - HAJAL Bldg TEL:(04) 712157/712158
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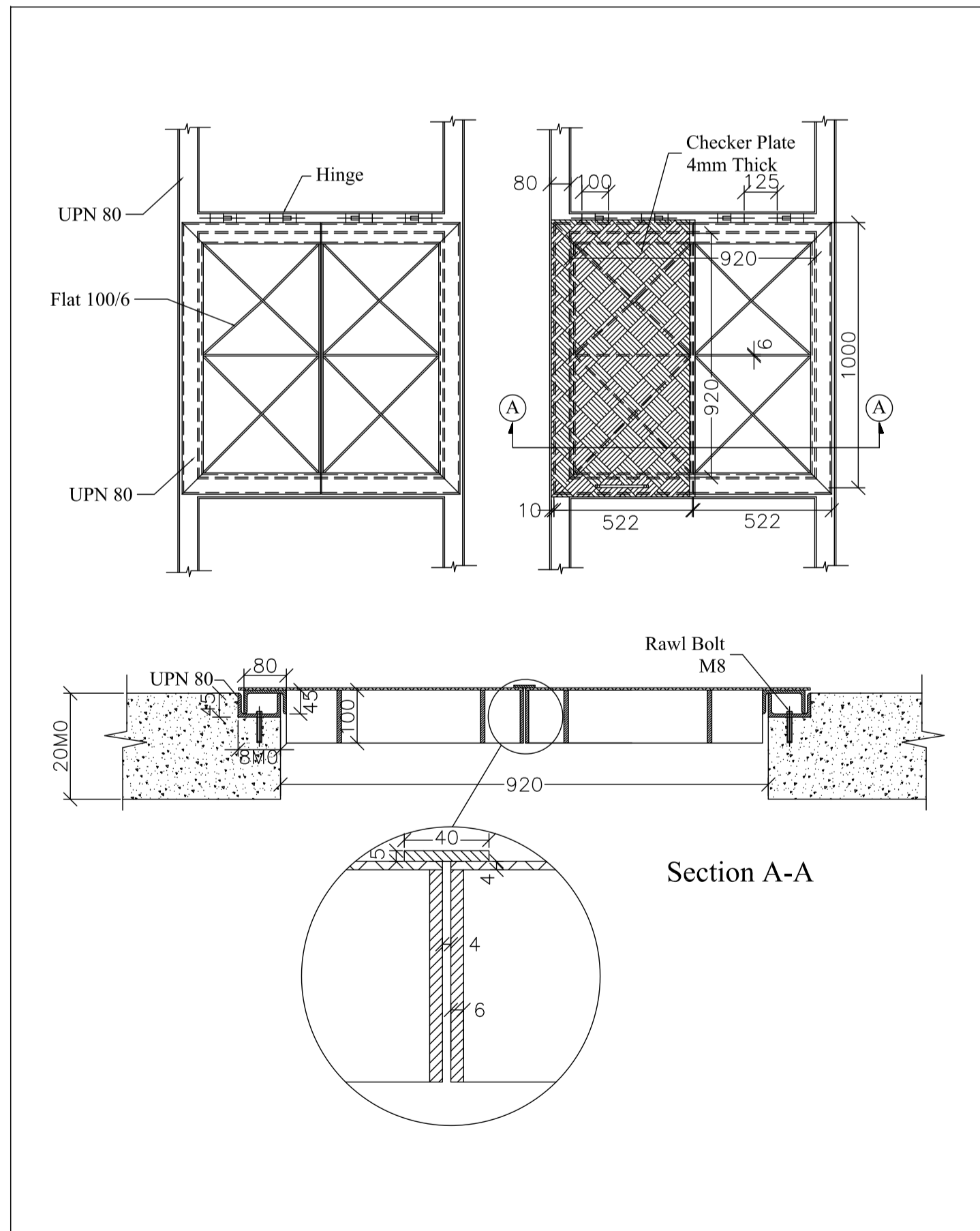
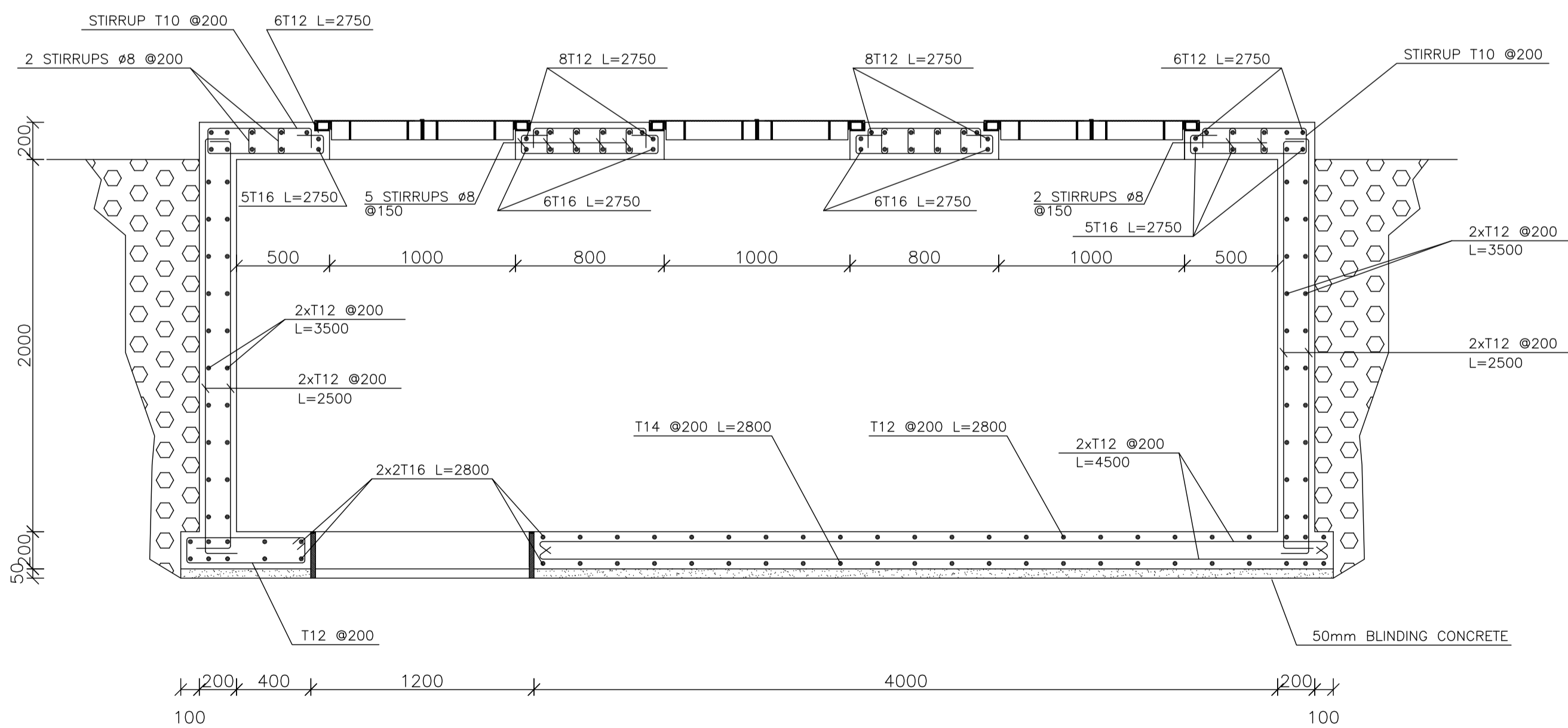
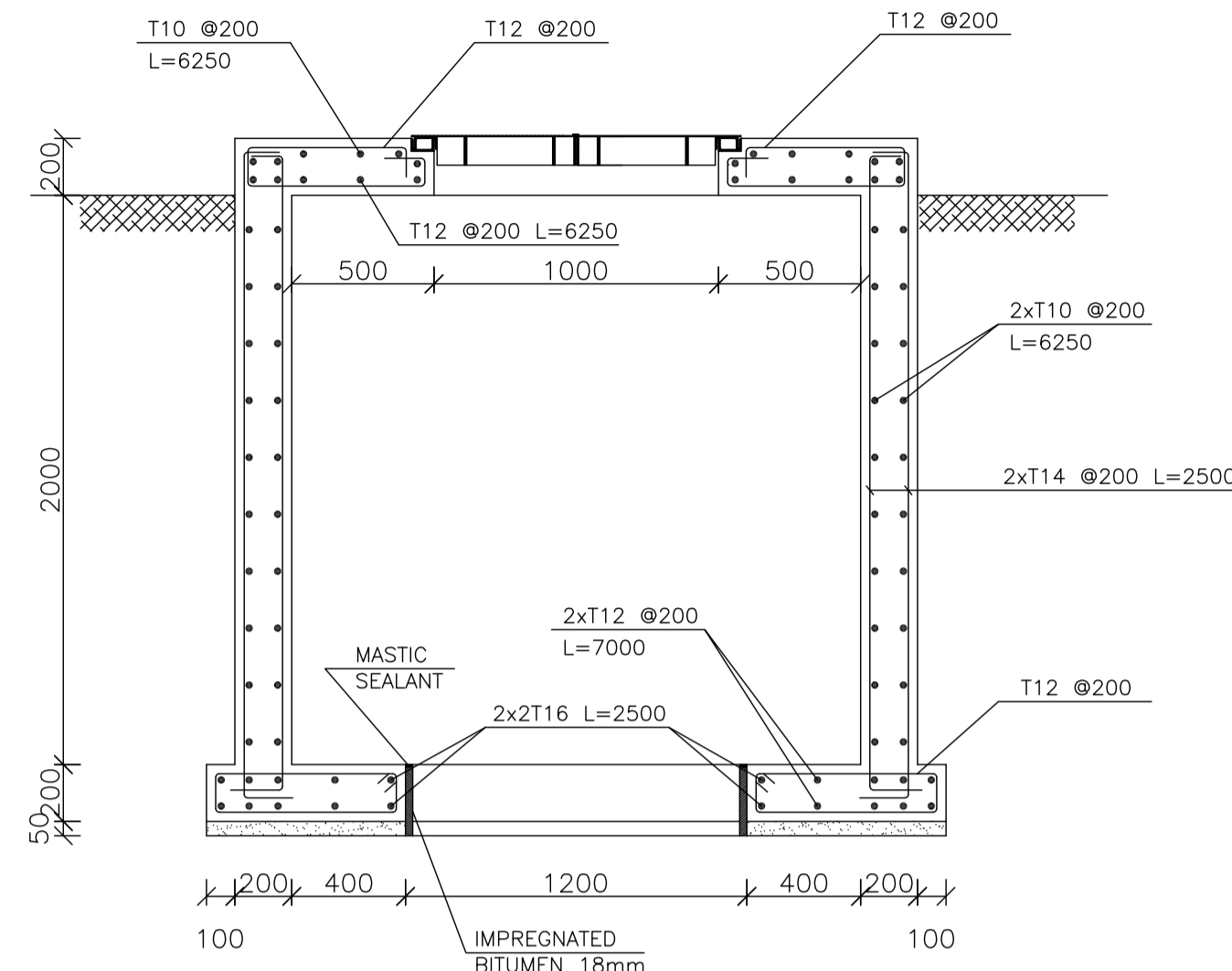
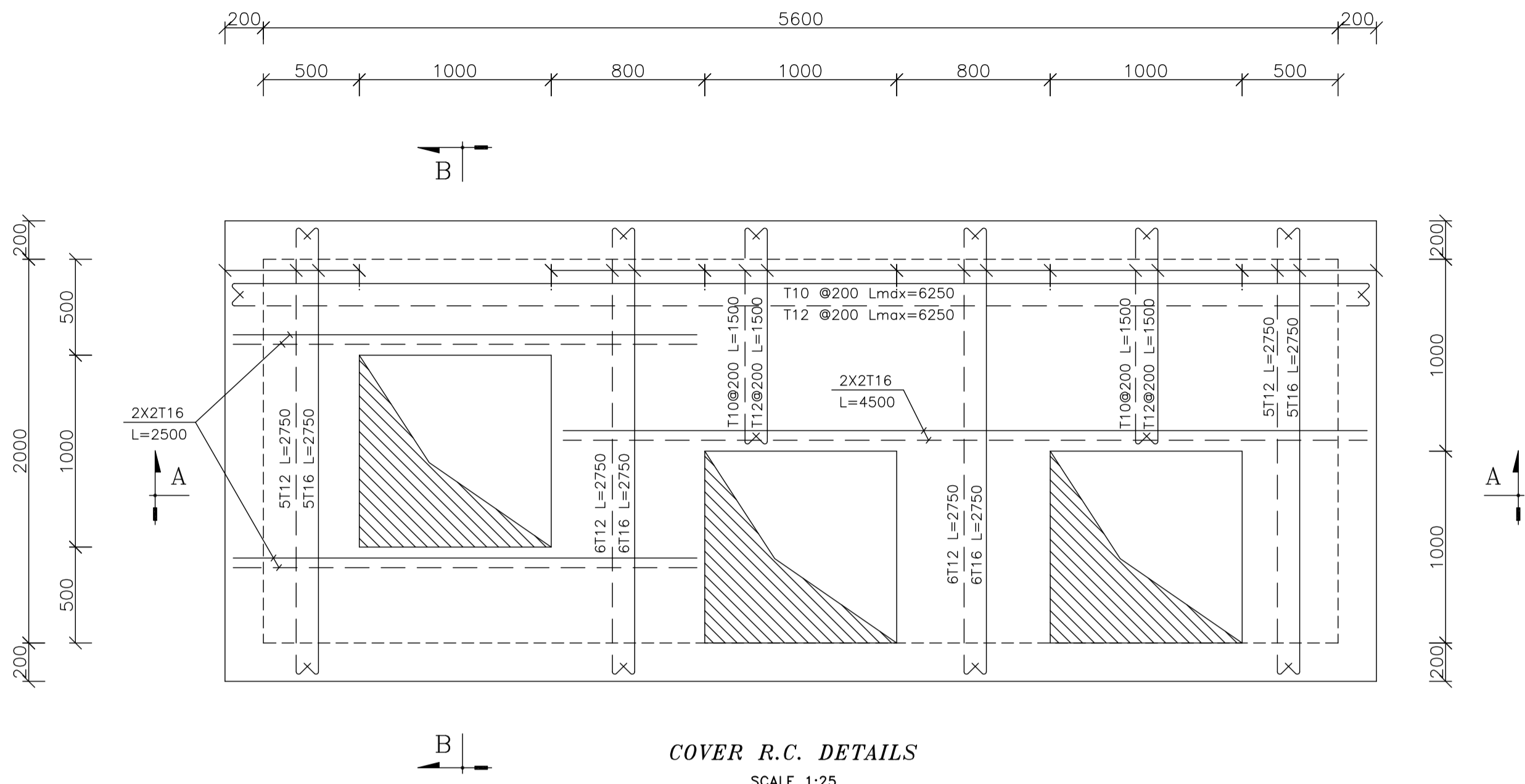
UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF WATER TOWER CAPACITY 500 M3 AND PUMPING STATION

PLANS-SECTIONS-ELEVATIONS REINFORCEMENT

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-STDP03	W. SEIFFEDDINE	W. SEIFFEDDINE	W. SEIFFEDDINE

DATE	SCALE	SHEET No.	SEQ. No.
MAY 2020	1:50 - 1:20 - 1:10	3/7	3/33



NOTES:

REINFORCED CONCRETE:
CONCRETE GRADE C30 FOR ALL STRUCTURES

MIX ELEMENTS: ORDINARY PORTLAND CEMENT

STRESSES:
CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS:
- ON A CUBE, $a = 150\text{mm}$: 30N/mm^2
- ON A CYLINDER $\phi 150\text{mm}$, $h=300\text{mm}$: 25N/mm^2
CONCRETE TENSILE STRENGTH AT 28 DAYS: 2.1N/mm^2
MAXIMUM POURING HEIGHT : 1500mm .

CONCRETE COVER: CLEARANCE BETWEEN THE EXTERNAL GENERATRIX OF BARS AND THE FACINGS SHALL BE 30mm FOR STRUCTURES FLOOR SLAB, WALLS AND COVER.

LEAN CONCRETE (BLINDING) / CYCLOPEAN CONCRETE:
MIX MADE WITH ORDINARY PORTLAND CEMENT, 250Kg/m^3 .

REINFORCEMENT: DEFORMED HIGH STRENGTH STEEL BARS : SYMBOL : T
YIELD STRESS : $F_y = 420\text{N/mm}^2$
MILD STEEL BARS : SYMBOL ϕ YIELD STRESS: $F_y = 215\text{ N/mm}^2$.

OVERLAPPING:
LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER
WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN $2 \times 5\phi$ (ϕ = 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 A SECTION.
PINS $\phi 8$ SHALL BE USED ON EACH LAP.

BENDING:
 $\phi > 12\text{mm}$ MECHANICALLY COMPULSONILY
 $\phi \leq 12\text{mm}$ MANUALLY EVENTUALLY
STRAIGHTENING OF BENDED BARS IS NOT ALLOWED.

DRAWINGS CONSIDERATION:
--- TOP BARS
--- BOTTOM BARS

CONSTRUCTION JOINTS:
REDUCED TO THE STRICT MINIMUM IN ALL ELEMENTS PROVIDED THAT NECESSARY PRECAUTIONS ARE TAKEN: SETTING RETARDERS, BONDING MATERIALS.

ADMIXTURES:
SETTING RETARDERS (CONSTRUCTION JOINTS), PLASTISIZERS, ...
THE USE OF CHLORINE BASED ADMIXTURES IS NOT ALLOWED.

FORMWORK:
ALL EXECUTED INTERIOR CONCRETE SHALL BE FAIR FACE CONCRETE.
TIE RODS HOLES MADE BY THE TIE-RODS SHALL BE FILLED WITH A NON SHRINK GROUT BY MEANS OF SPECIAL INJECTION METHODS.
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THE USE OF $\phi 6\text{mm}$ BARS AS TIE-RODS IS NOT ALLOWED.

METALWORKS:
DOORS ARE MADE OF 3mm MINIMUM SHEET PLATE AND SHALL BE EPOXY PAINTED (PRIMER AND A MINIMUM OF TWO COATS). OPENINGS AND VENTILATIONS SHALL BE TAKEN INTO CONSIDERATION ACCORDING TO THE EQUIPEMENT TO BE INSTALLED.

N.B.

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- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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MINISTRY OF ENERGY AND WATER
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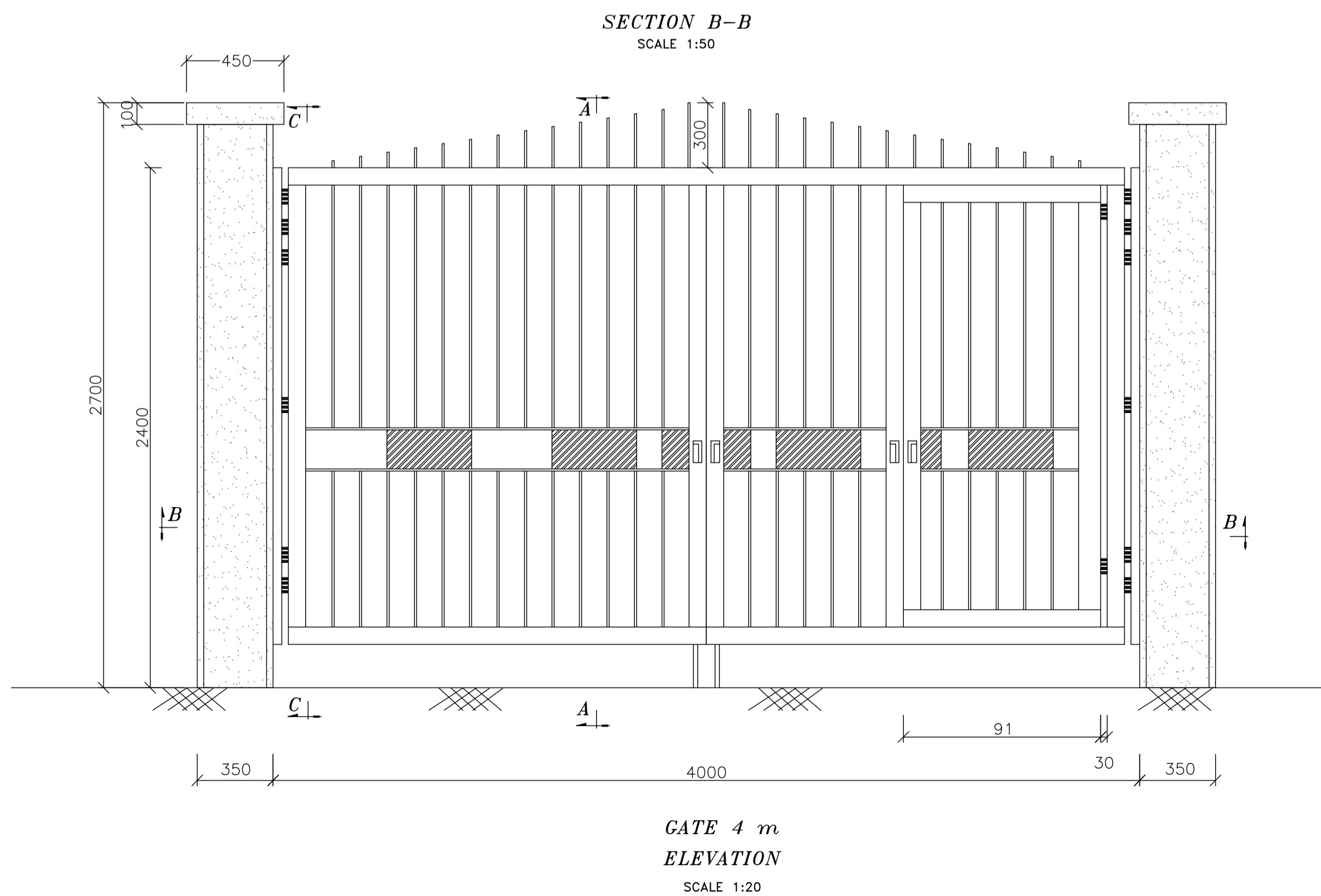
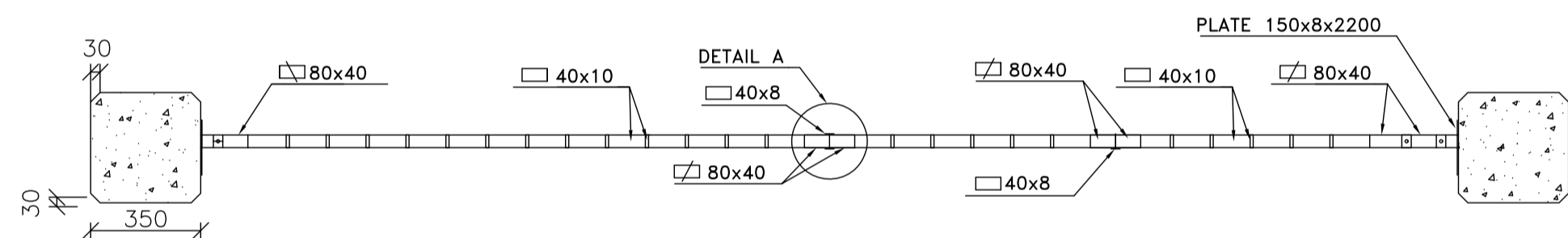
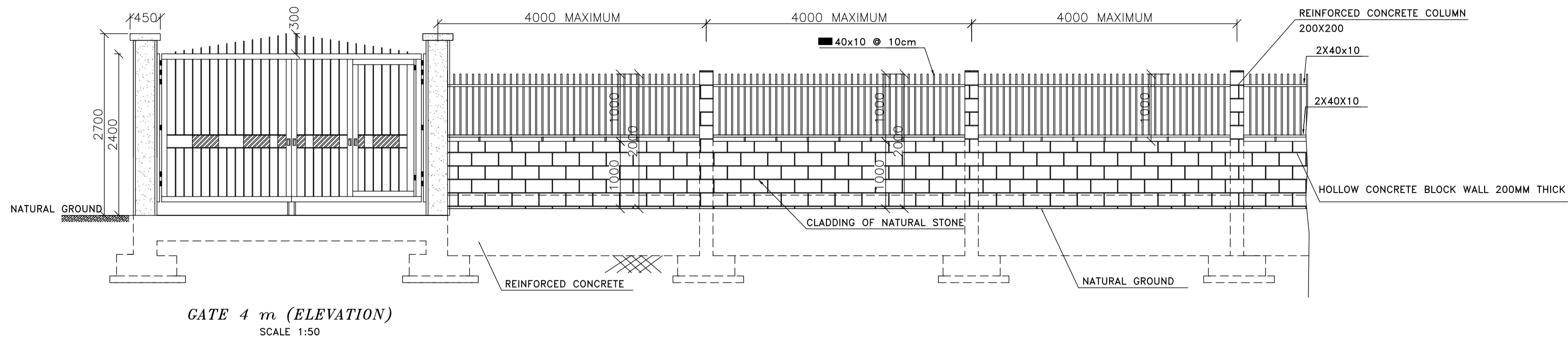
BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

WELL HEAD	HEAD WORK STRUCTURAL DETAILS
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DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-STDPS05	W. SEIFEDDINE	W. SEIFEDDINE	W. SEIFEDDINE

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	1:25	5/7	5/33



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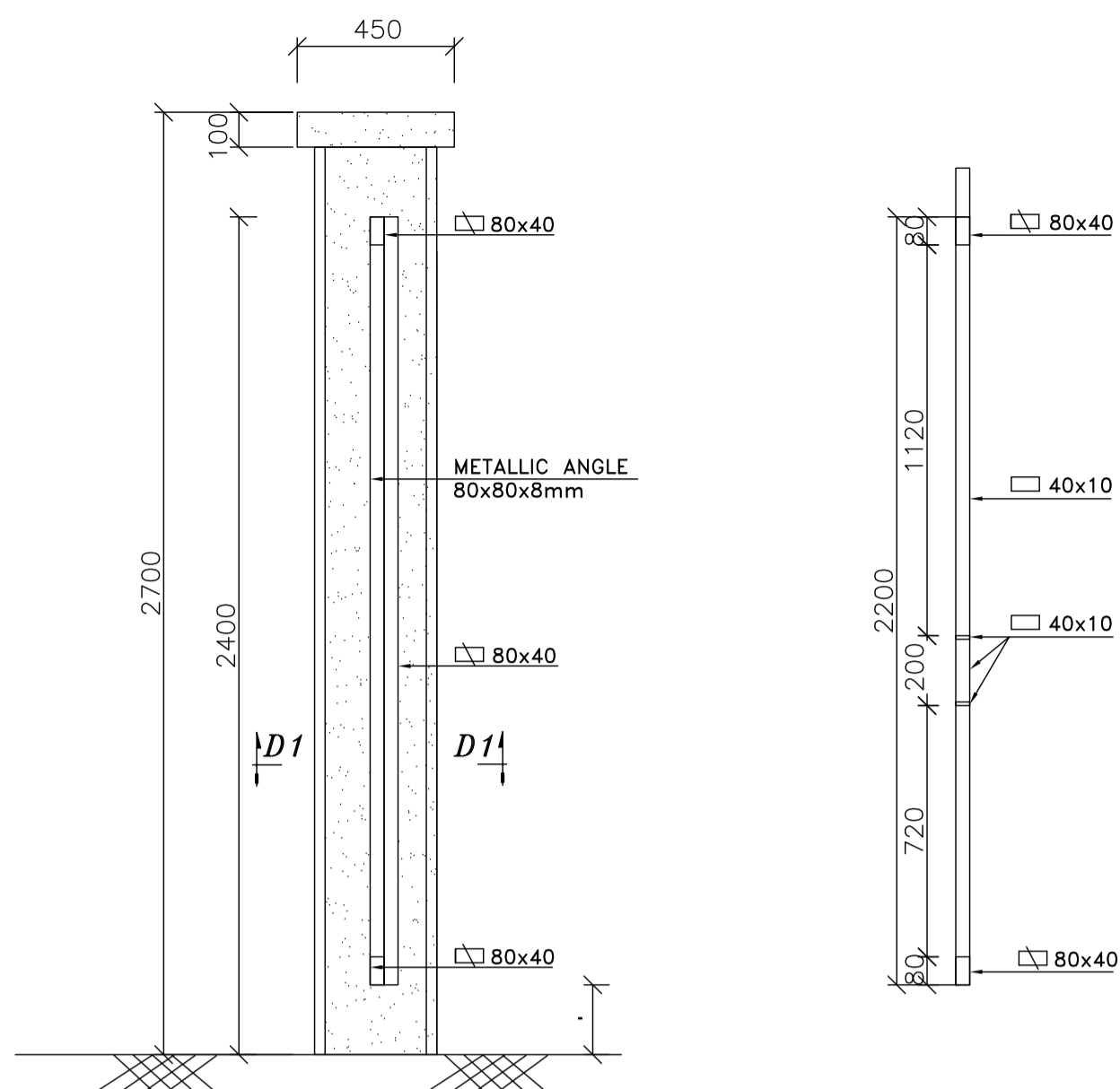
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

FENCE AND TYPICAL GATE 4m	ELEVATIONS SECTIONS AND DETAILS
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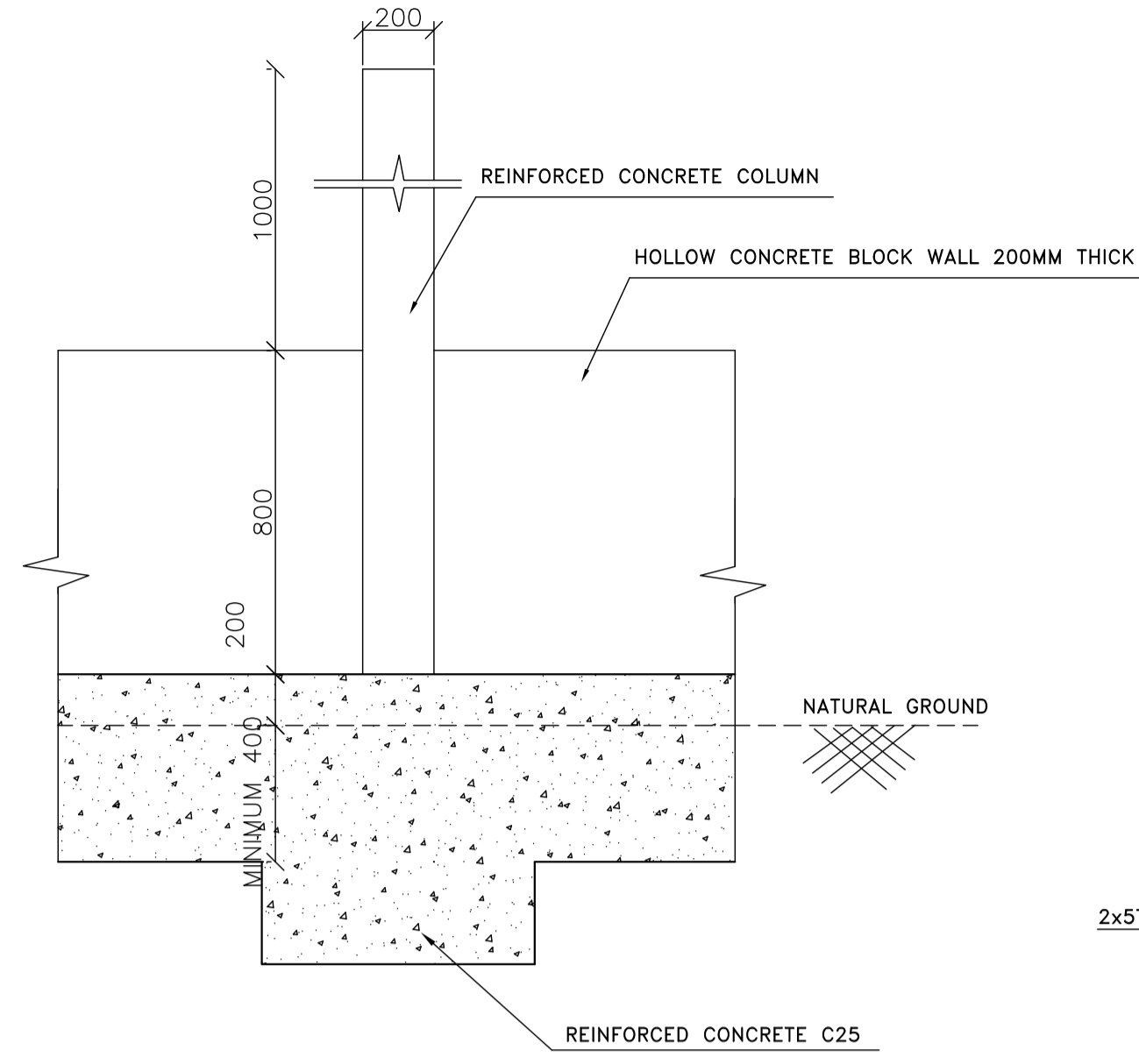
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562W-STDPS06	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	1:50 - 1:20	6/7	6/33

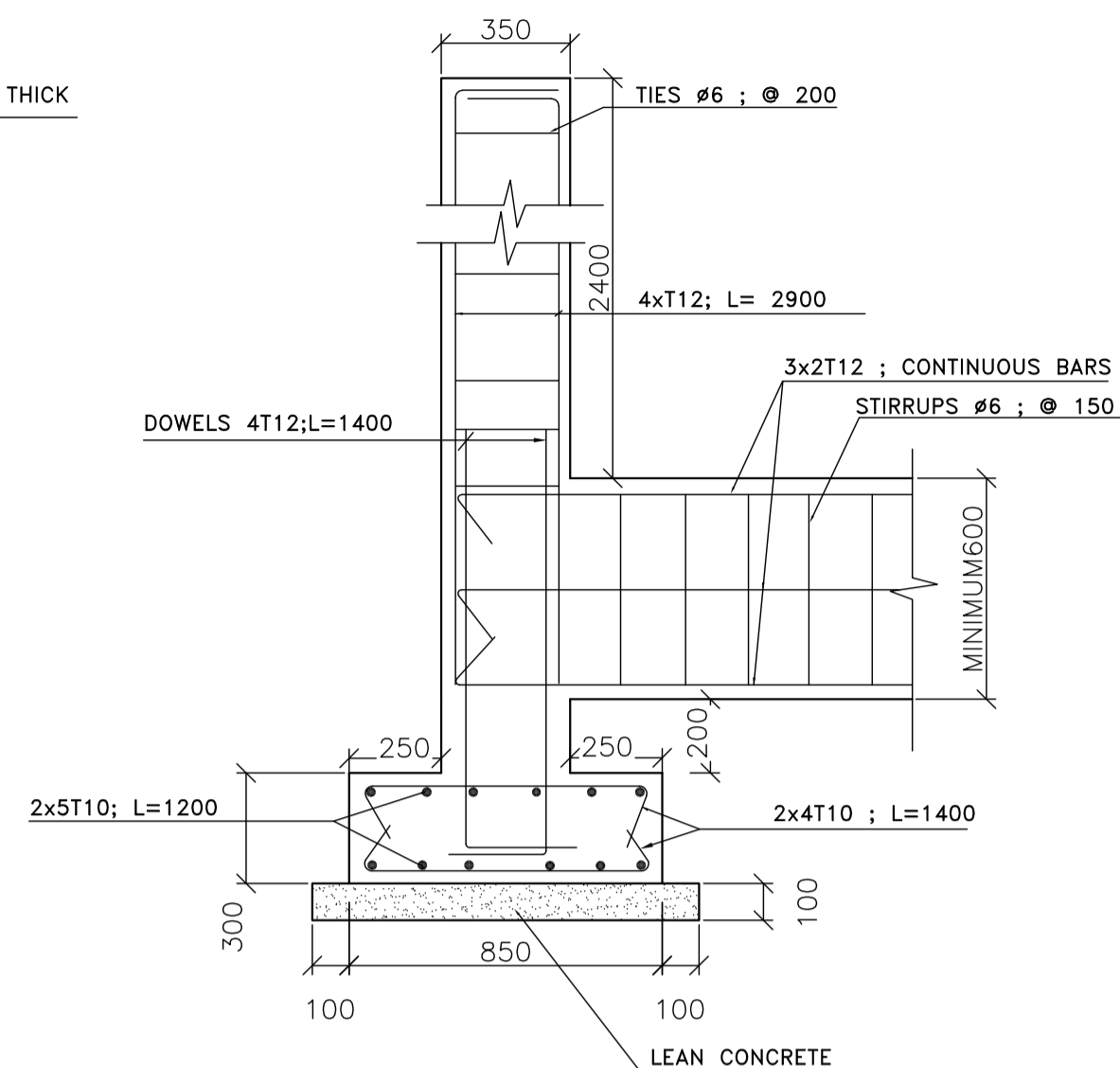


SECTION C-C
SCALE 1:20

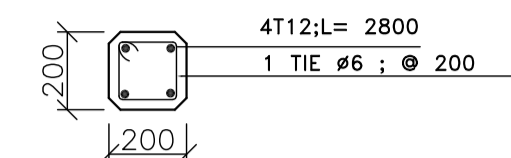
SECTION A-A
SCALE 1:20



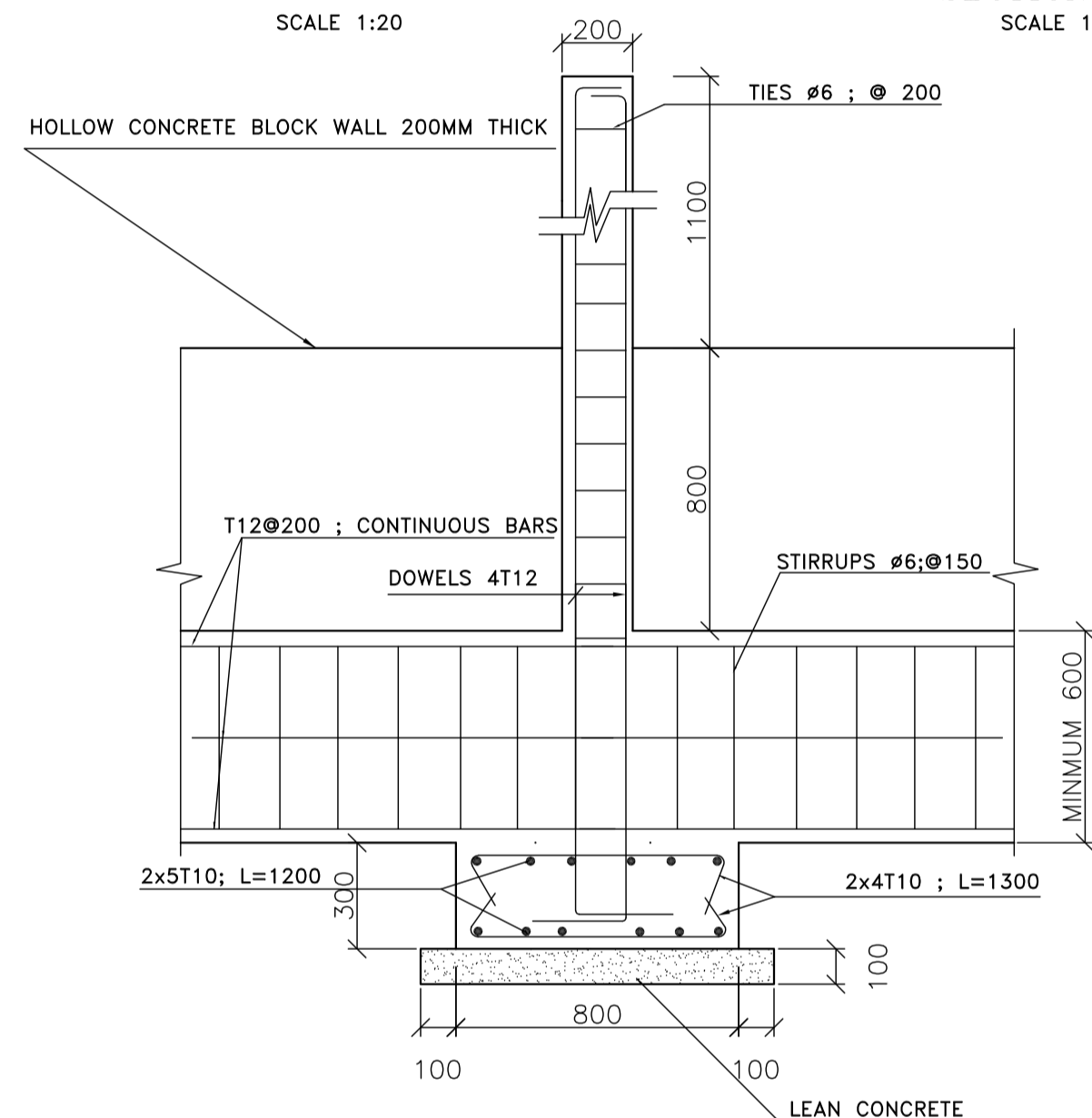
TYPICAL FENCE COLUMN
SCALE 1:20



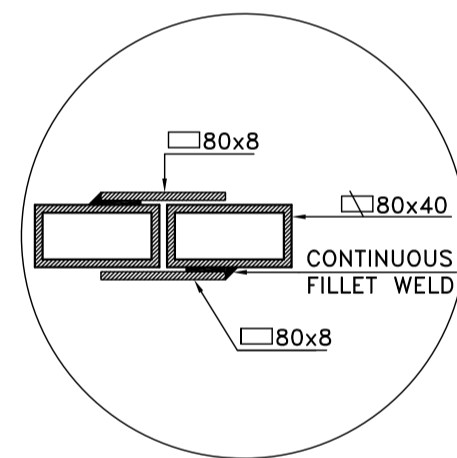
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SCALE 1:20



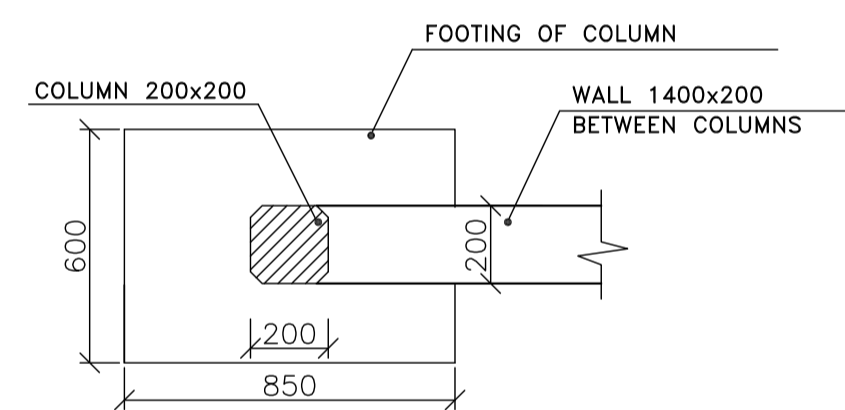
HORIZONTAL SECTION
OF COLUMN
SCALE 1:20



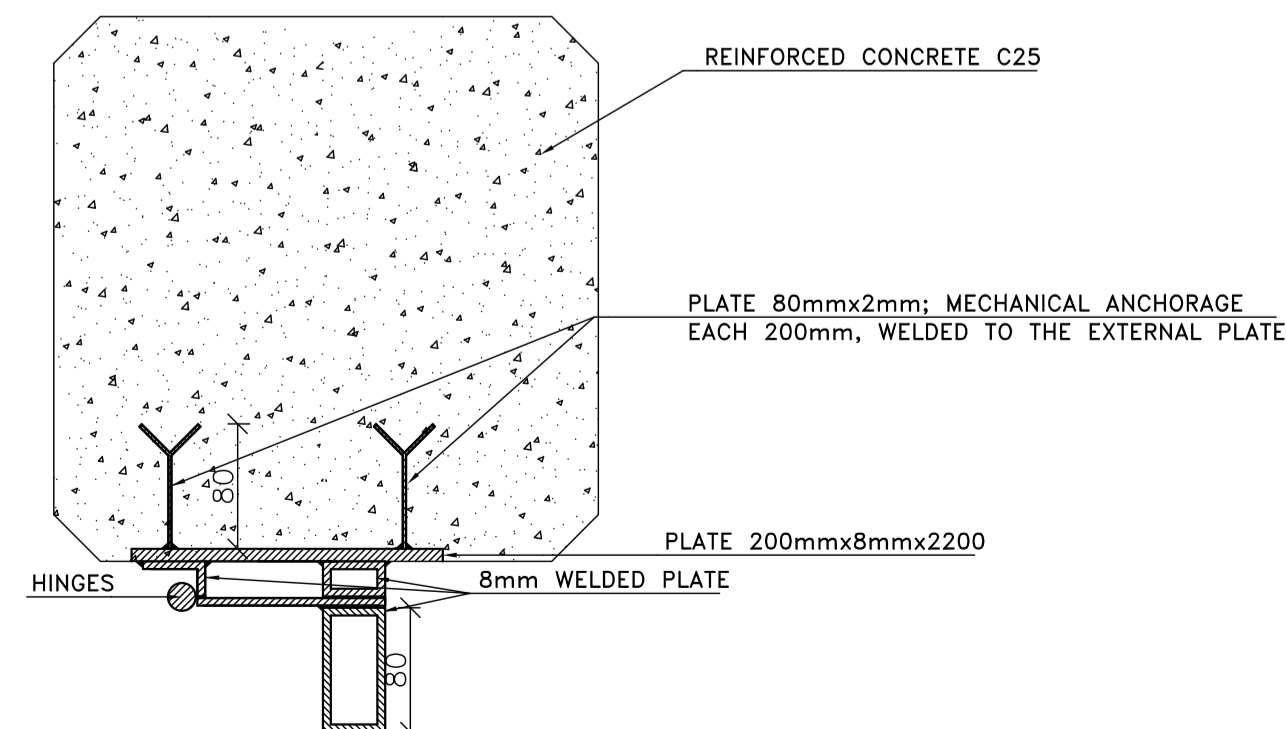
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SCALE 1:20



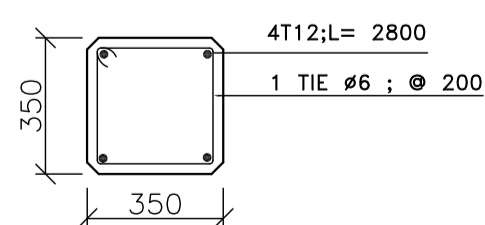
DETAIL A
SCALE 1:5



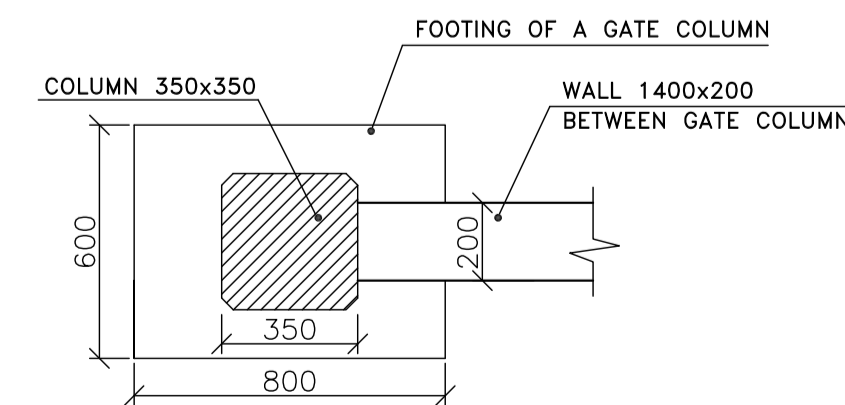
FOOTING
SCALE 1:20



SECTION D-D
SCALE 1:5



HORIZONTAL SECTION
OF GATE COLUMN
SCALE 1:20



FOOTING
SCALE 1:20

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

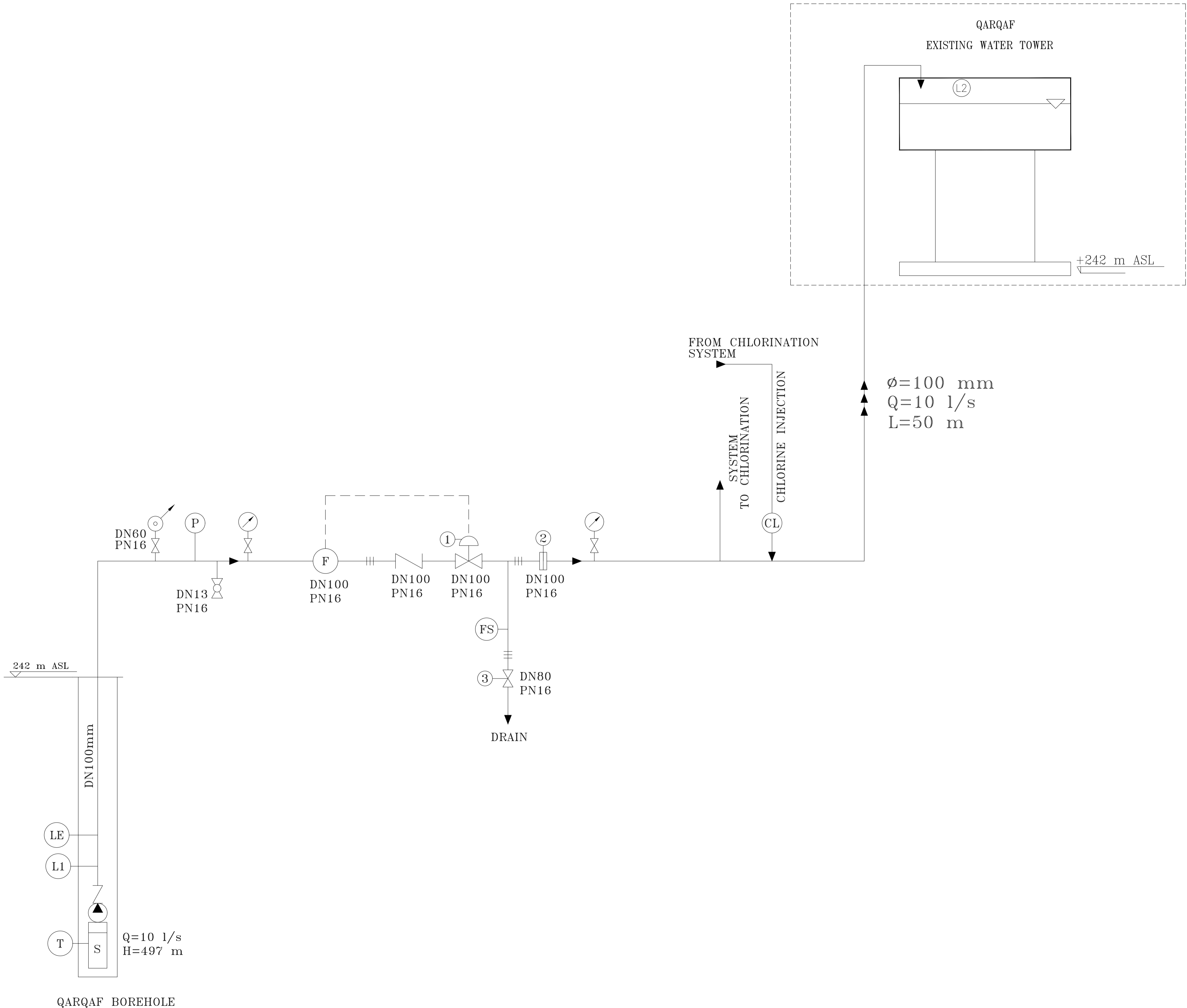
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
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P.O.BOX:70492 - ANELIAS FAX:(04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

FENCE AND
TYPICAL GATE 4m
ELEVATIONS
SECTIONS AND DETAILS

DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-STDPS07	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	1:2 - 1:5 - 1:20	7/7	7/33



- LEGEND:
- : SUBMERSIBLE PUMP
 - DN : NOMINAL DIAMETER
 - PN : NOMINAL PRESSURE
 - : PRESSURE MEASUREMENT
 - : FLOW SWITCH
 - : TEMPERATURE MEASUREMENT
 - : LEVEL MEASUREMENT
 - : FLOW MEASUREMENT
 - : GLYCERINE FILLED MANOMETER $\phi 100$ WITH 3 WAY VALVE.
 - : SURGE SUPPRESSION EQUIPMENT.
 - : PIPELINE
 - : DOUBLE AIR RELEASE VALVE WITH ISOLATING VALVE.
 - : ELECTRIC ACTUATOR
 - : GATE VALVE
 - : CHECK VALVE (ANTI SLAM TYPE)
 - : SAMPLING VALVE
 - : PERFORATED CHECK VALVE
 - : DEMOUNTABLE JOINT
 - : SURGE ANTICIPATION VALVE
 - : GLOBE VALVE
 - : BUTTERFLY VALVE
 - : PUMPING LINE
 - : GRAVITY LINE
 - : REGULATING VALVE
 - : FLEXIBLE JOINT
 - : CHLORINE INJECTION
 - : STRAINER
 - : RUBBER SPHERICAL FLEXIBLE JOINT.
 - : STAINLESS STEEL FLEXIBLE JOINT.
 - : PRESSURE REDUCING VALVE
 - : Y STRAINER

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY WATER
COUNCIL FOR DEVELOPMENT RECONSTRUCTION

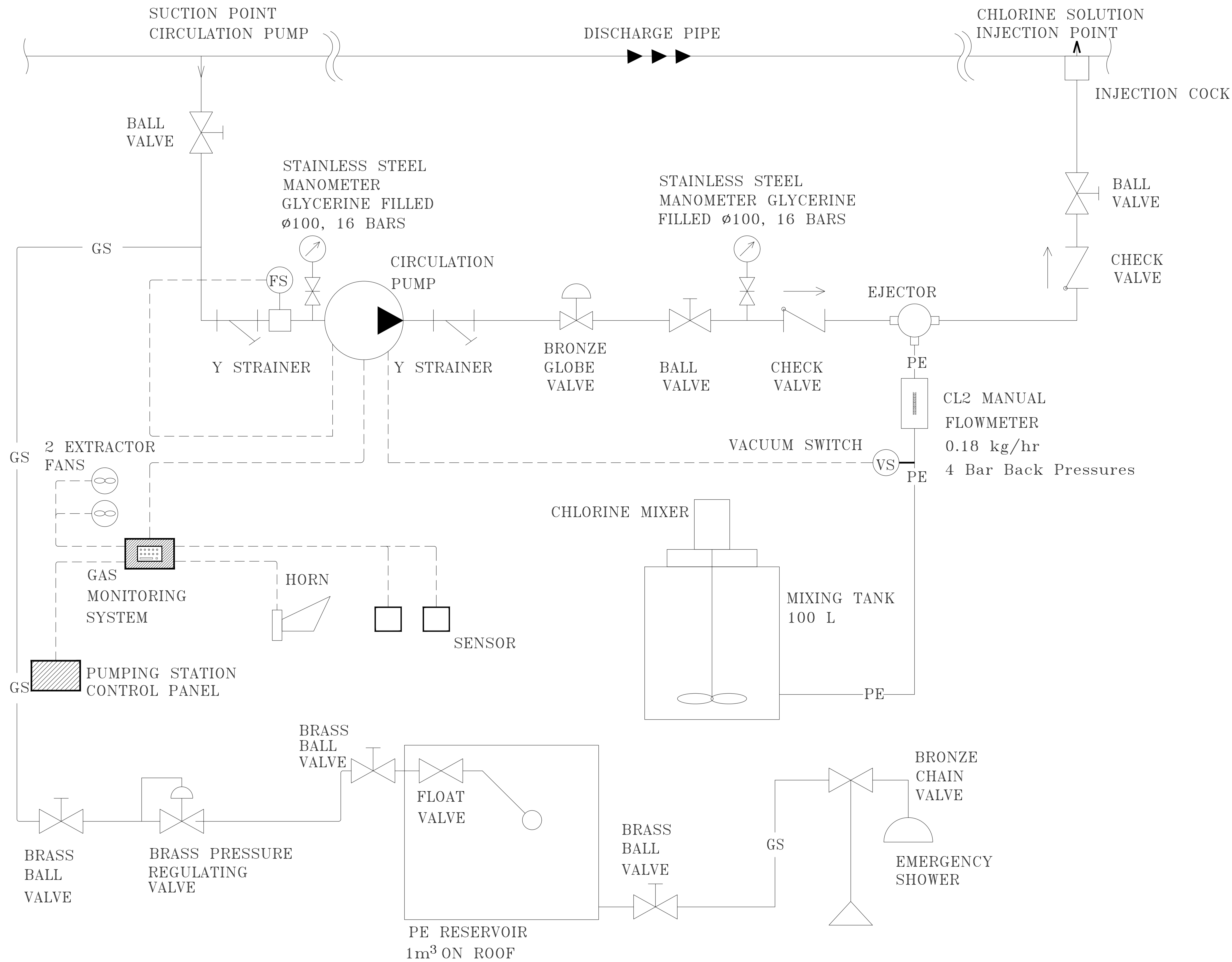
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB – HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 – ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF PUMPING STATION	WELL HEAD SCHEMATIC
------------------------	---------------------

DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-M01	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	1/7	8/33



- LEGEND:
- PE— : POLYETHYLENE TUBE
 - - - - : ELECTRIC CONNECTION
 - GS— : GALVANIZED STEEL PIPE
 - ⊗ : THREE WAY VALVE
 - FS : FLOW SWITCH

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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MINISTRY OF ENERGY WATER
COUNCIL FOR DEVELOPMENT RECONSTRUCTION

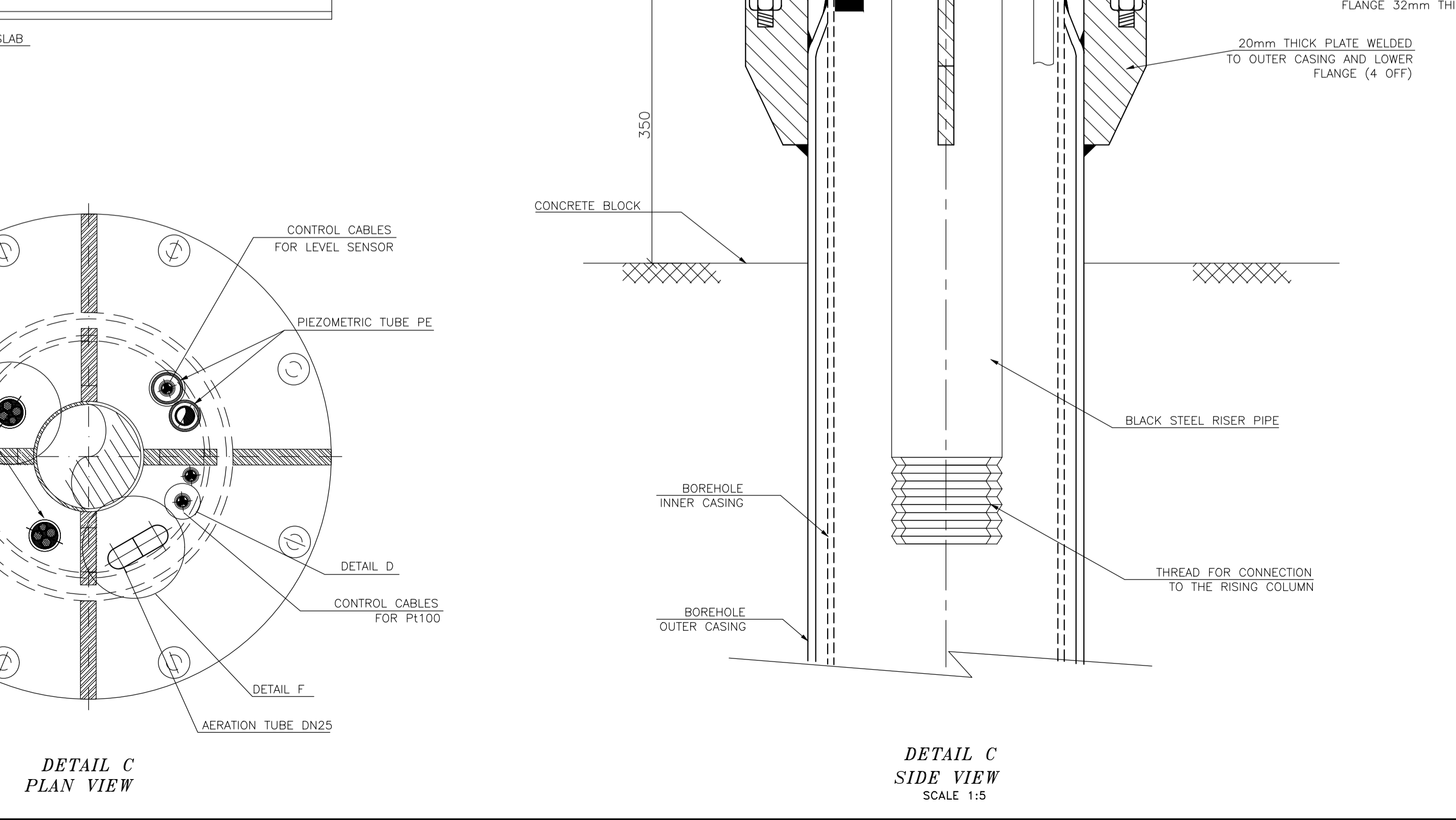
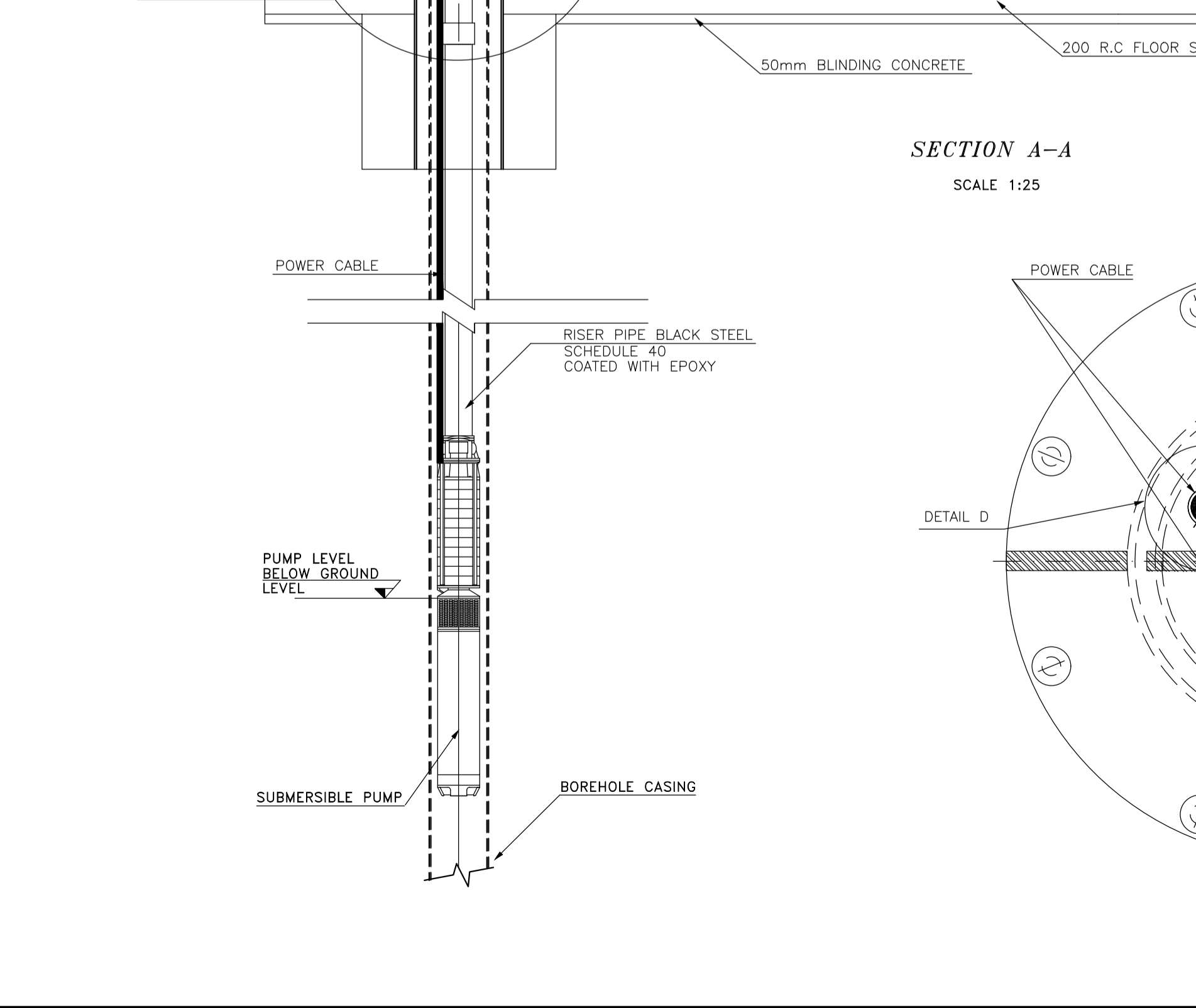
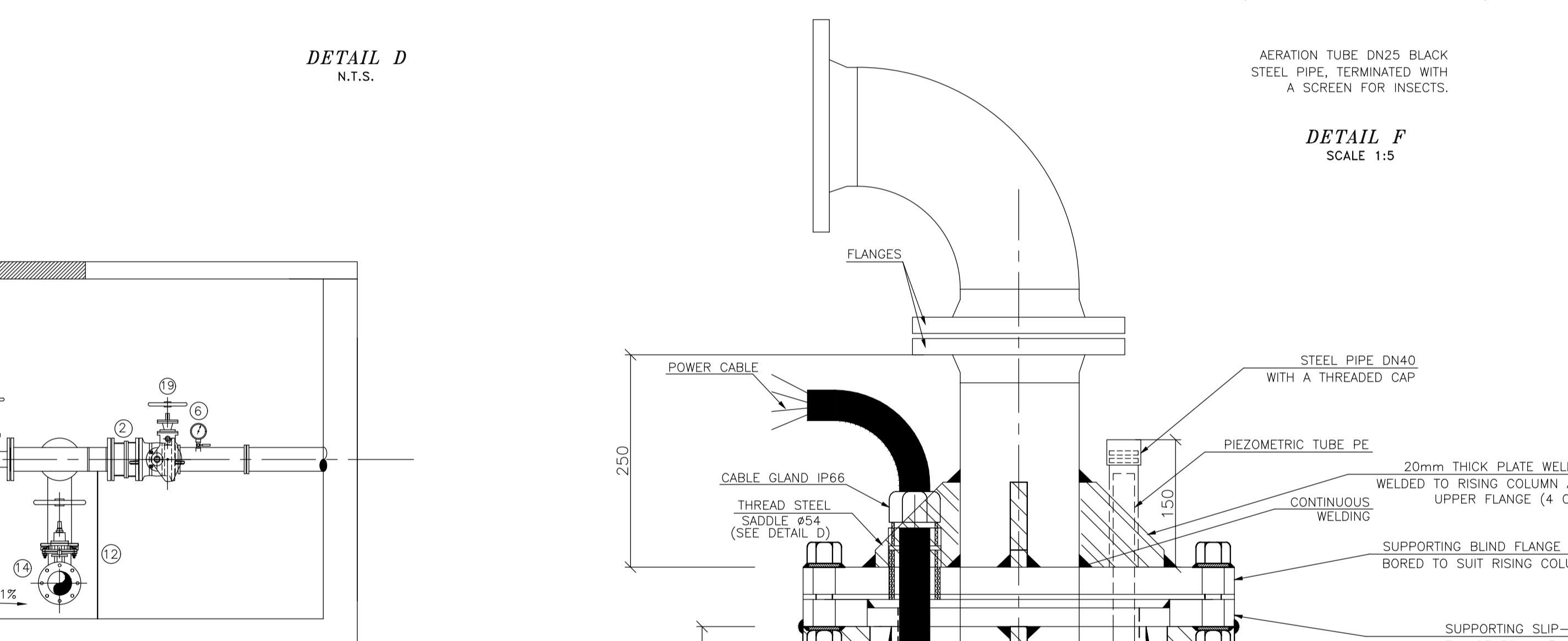
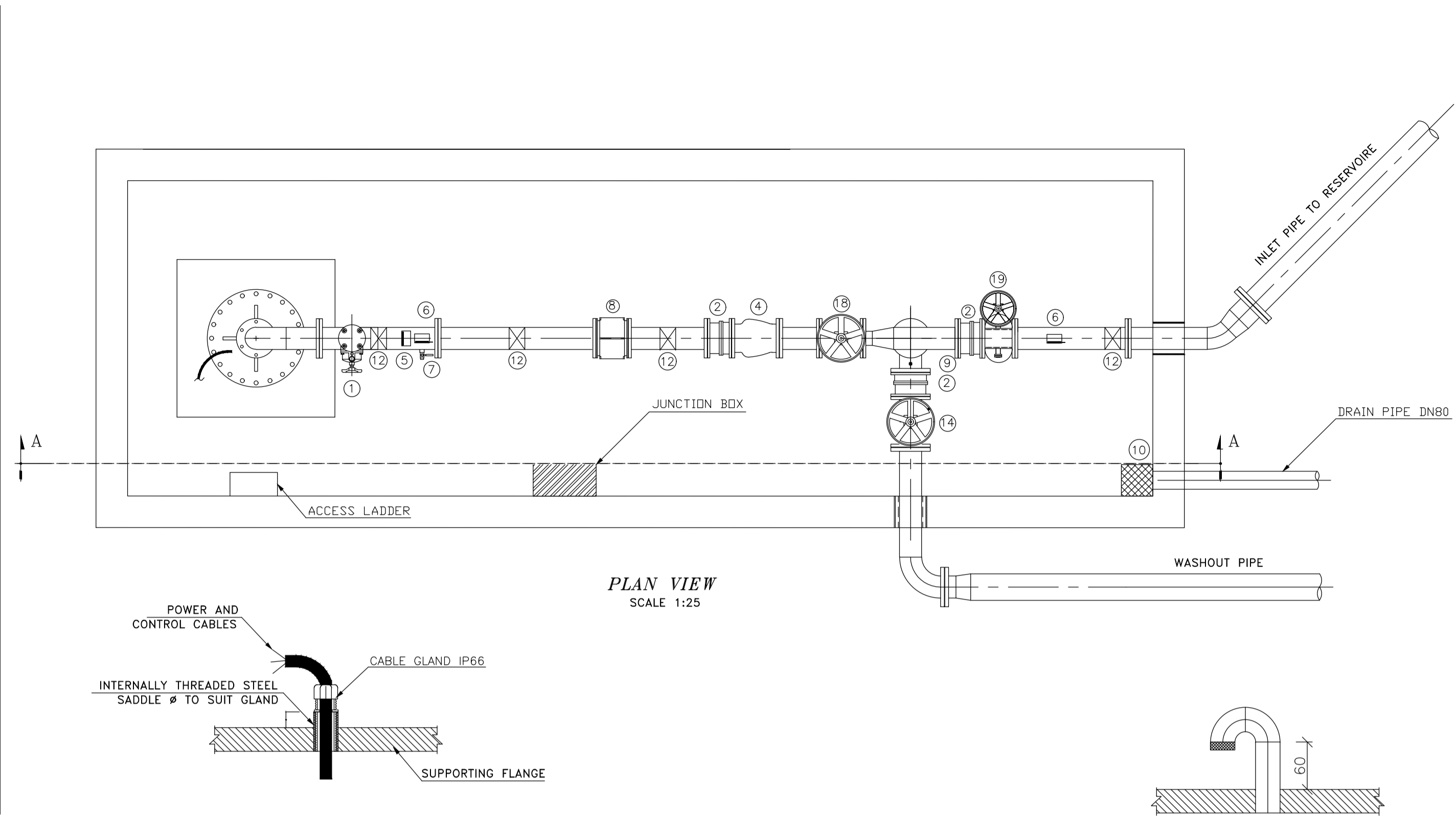
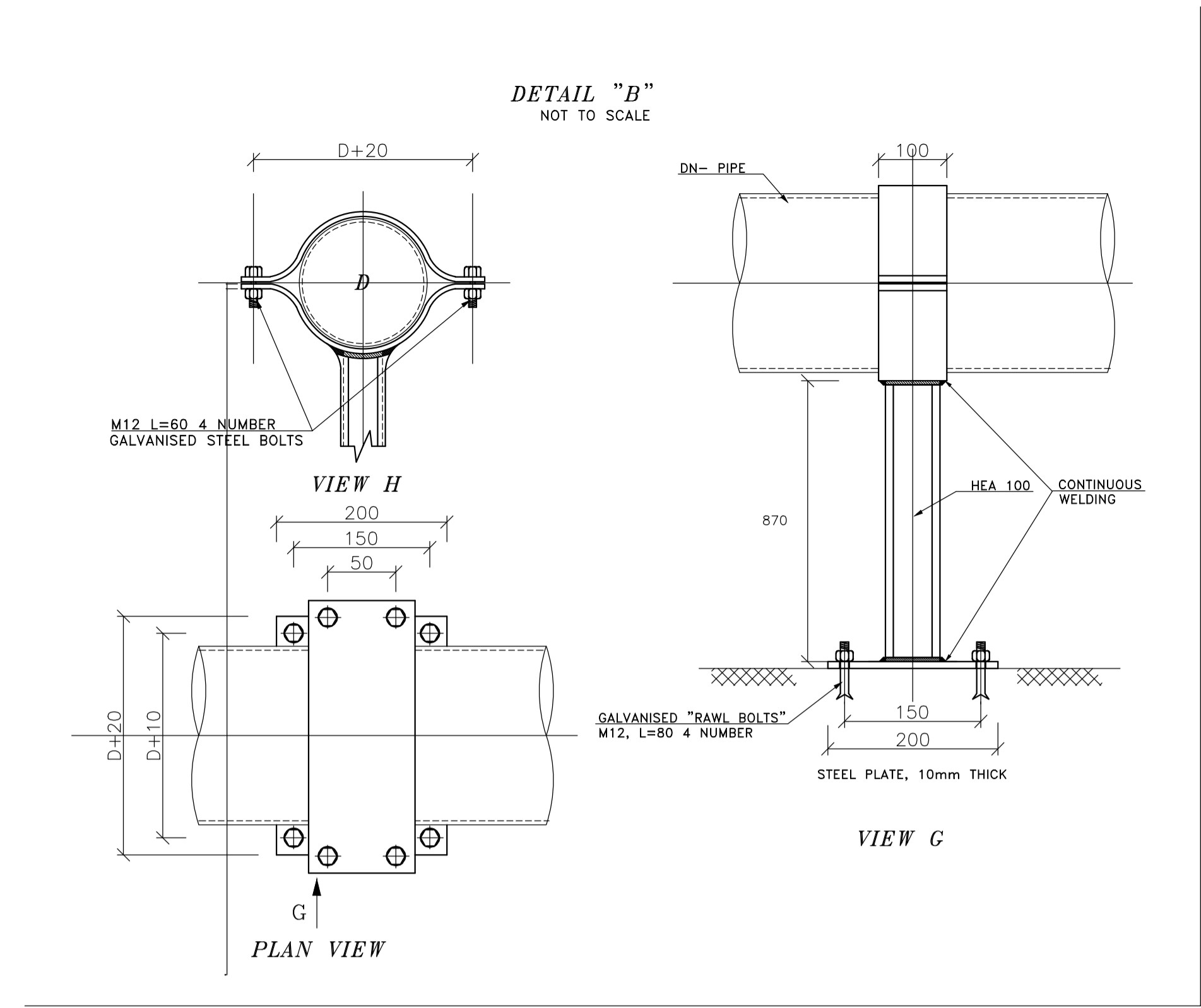
BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB – HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 – ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF PUMPING STATION	CHLORINATION SCHEMATIC
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DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-M02	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	2/7	9/33



LEGEND					
1	:	DOUBLE AIR RELEASE VALVE WITH ISOLATING VALVE			
2	:	DISMANTLING JOINT			
3	:	MOTORISED GATE VALVE			
4	:	NON RETURN VALVE (CHECK-VALVE)			
5	:	PIESORESISTIVE PRESSURE SENSOR			
6	:	MANOMETER WITH THREE WAY ISOLATING VALVE			
7	:	SAMPLING VALVE 1/2"			
8	:	ELECTROMAGNETIC FLOWMETER			
9	:	FLOW SWITCH			
10	:	DRAIN			
11	:	NIPPEL 1" FOR CHLORE			
12	:	PIPE SUPPORT			
13	:	LEVEL SENSOR			
14	:	MANUAL GATE VALVE			
15	:	SURGE ANTICIPATION VALVE			
16	:	REINFORCED PIPE SUPPORT			
17	:	SUCTION STRAINER			
18	:	MANUAL GLOBE VALVE			
19	:	MANUAL BUTTERFLY VALVE			

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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MINISTRY OF ENERGY WATER

COUNCIL FOR DEVELOPMENT RECONSTRUCTION

BD

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

JALL ED DIB – HAJAL Bldg
P.O.BOX:70492 – ANTELIAS

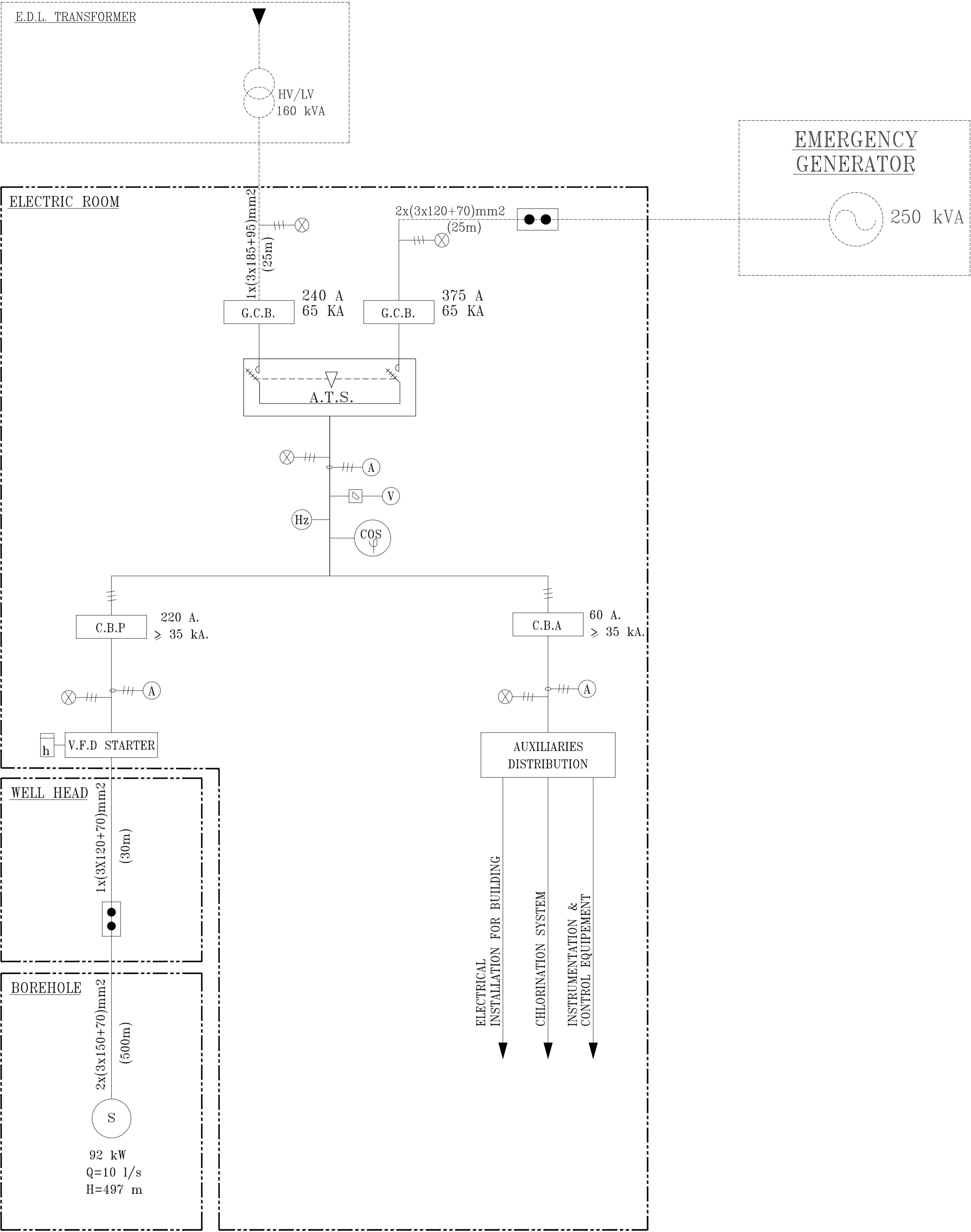
TEL:(04) 712157 / 712158
FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF PUMPING STATION	MECHANICAL DRAWING FOR WELL HEAD
------------------------	----------------------------------

DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-M03	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	3/7	10/33



LEGEND

- : POWER FACTOR MEASURMENT
- : INDICATING LAMP
- : SELECTOR SWITCH
- : FREQUENCY METER
- : VOLTMETER
- : AMPERMETER
- : HOURMETER
- : CIRCUIT BREAKER
- : JUNCTION BOX IP67
- : TRANSFORMER HV/LV
- : SUBMERSIBLE MOTOPUMPSET
- : SURFACE MOTOPUMPSET
- : AUTOMATIC TRANSFER SWITCH (A.T.S.)
- : EMERGENCY GENERATOR
- C.B.B** : GENERAL CIRCUIT BREAKER
- C.B.P** : CIRCUIT BREAKER FOR PUMPSET
- C.B.A** : CIRCUIT BREAKER FOR AUXILIARIES

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P.O.BOX:70492 – ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF PUMPING STATION

ELECTRICAL SCHEMATIC

DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-E01	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	4/7	11/33

- LEGEND:
- EXHAUST FAN
 - SIMPLE SWITCH
 - DOUBLE SWITCH
 - TRIPPLE SWITCH
 - DOUBLE DIRECTION SWITCH
 - DOUBLE SWITCH, DOUBLE DIRECTION
 - TRIPPLE SWITCH, DOUBLE DIRECTION
 - TRIPPLE DIRECTION SWITCH
 - SINGLE PHASE POWER OUTLET (1-PH P.O.)
 - 3-PHASE POWER OUTLET (3-PH P.O.)
 - 220 V_{AC} HANDLAMP OUTLET
 - TELEPHONE OUTLET
 - ANTENNA OUTLET
 - UPS OUTLET
 - INCANDESCENT LIGHTING FIXTURE
 - FLUORESCENT LIGHTING FIXTURE (2 LAMPS)
 - FLUORESCENT LIGHTING FIXTURE (1 LAMP)
 - HALOGEN LIGHTING FIXTURE
 - EMERGENCY LIGHTING FIXTURE
 - HIGH BAY REFLECTORS
 - EXTERNAL ROAD LIGHTING FIXTURE
 - EXTERNAL WALKWAY LIGHTING FIXTURE
 - ELECTRICAL PANEL BOARD-PRINCIPAL OR COMPLETE
 - ELECTRICAL PANEL BOARD-SECONDARY
 - FLOOR DRAIN (FD)
 - VOLTMETER
 - AMMETER
 - 4-POLE CIRCUIT BREAKER (4P-C.B.)
 - 3-POLE CIRCUIT BREAKER (3P-C.B.)
 - 2-POLE CIRCUIT BREAKER (2P-C.B.)
 - SELECTOR SWITCH
 - VENTILATION

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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COUNCIL FOR DEVELOPMENT RECONSTRUCTION

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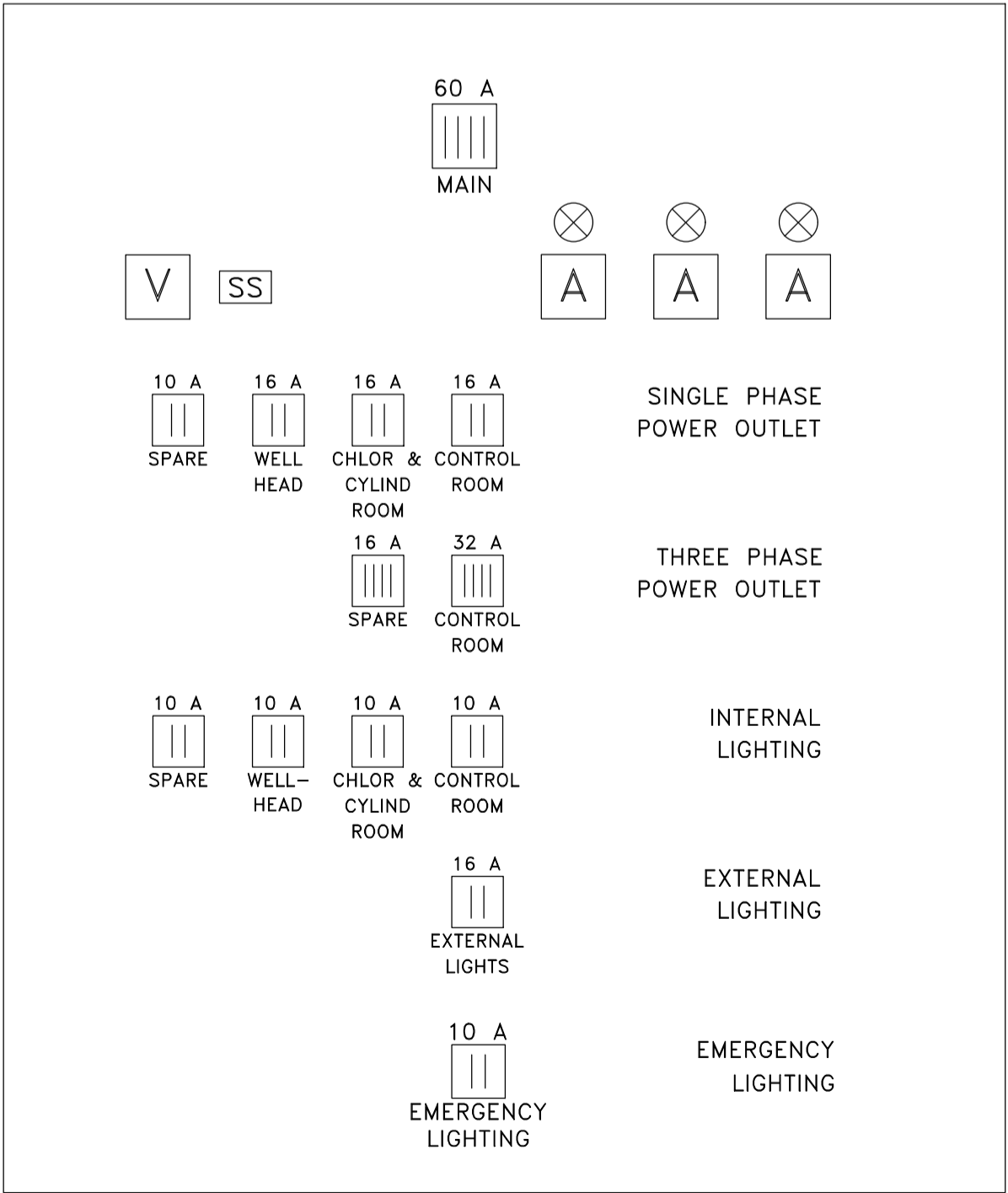
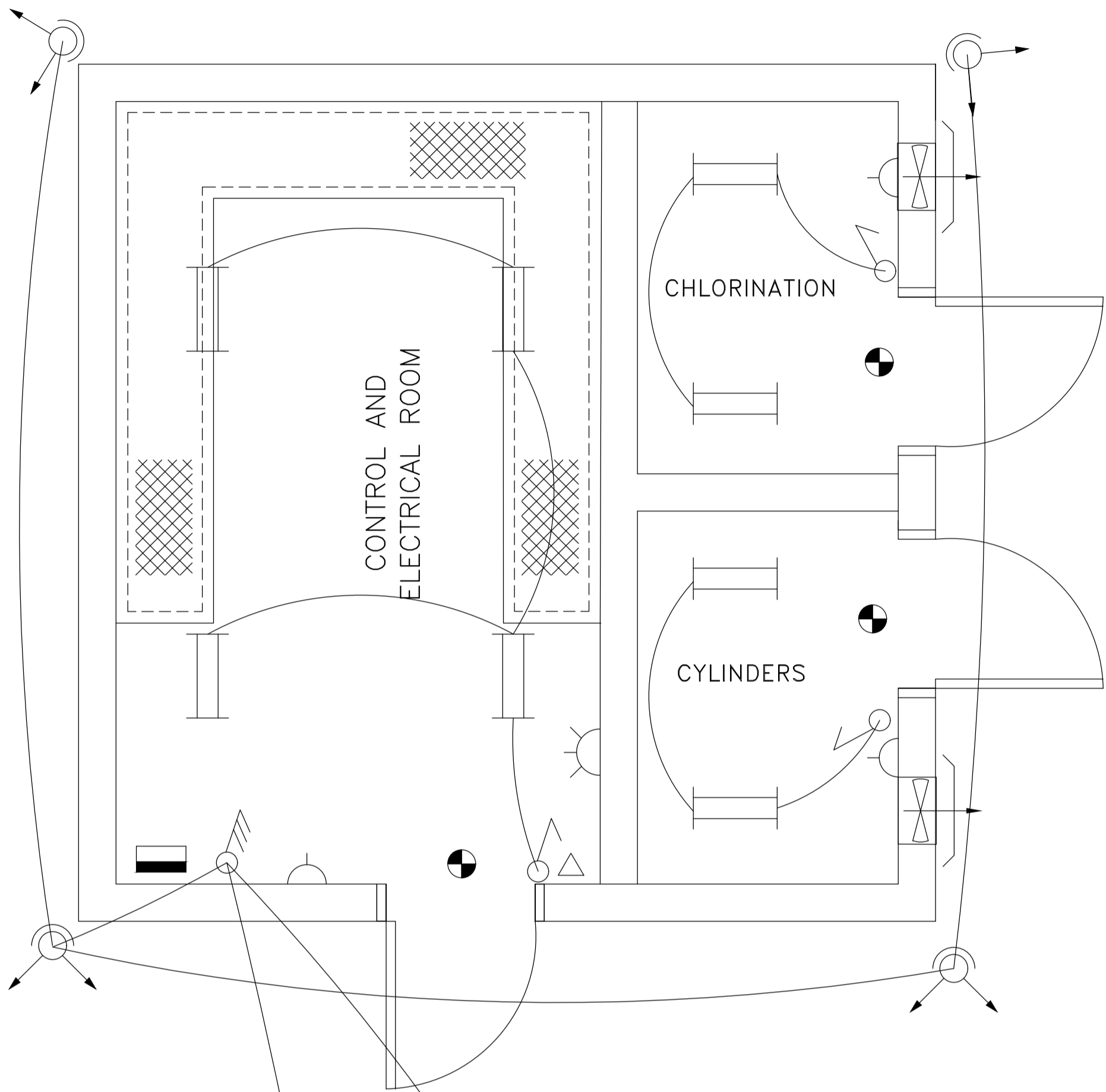
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P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

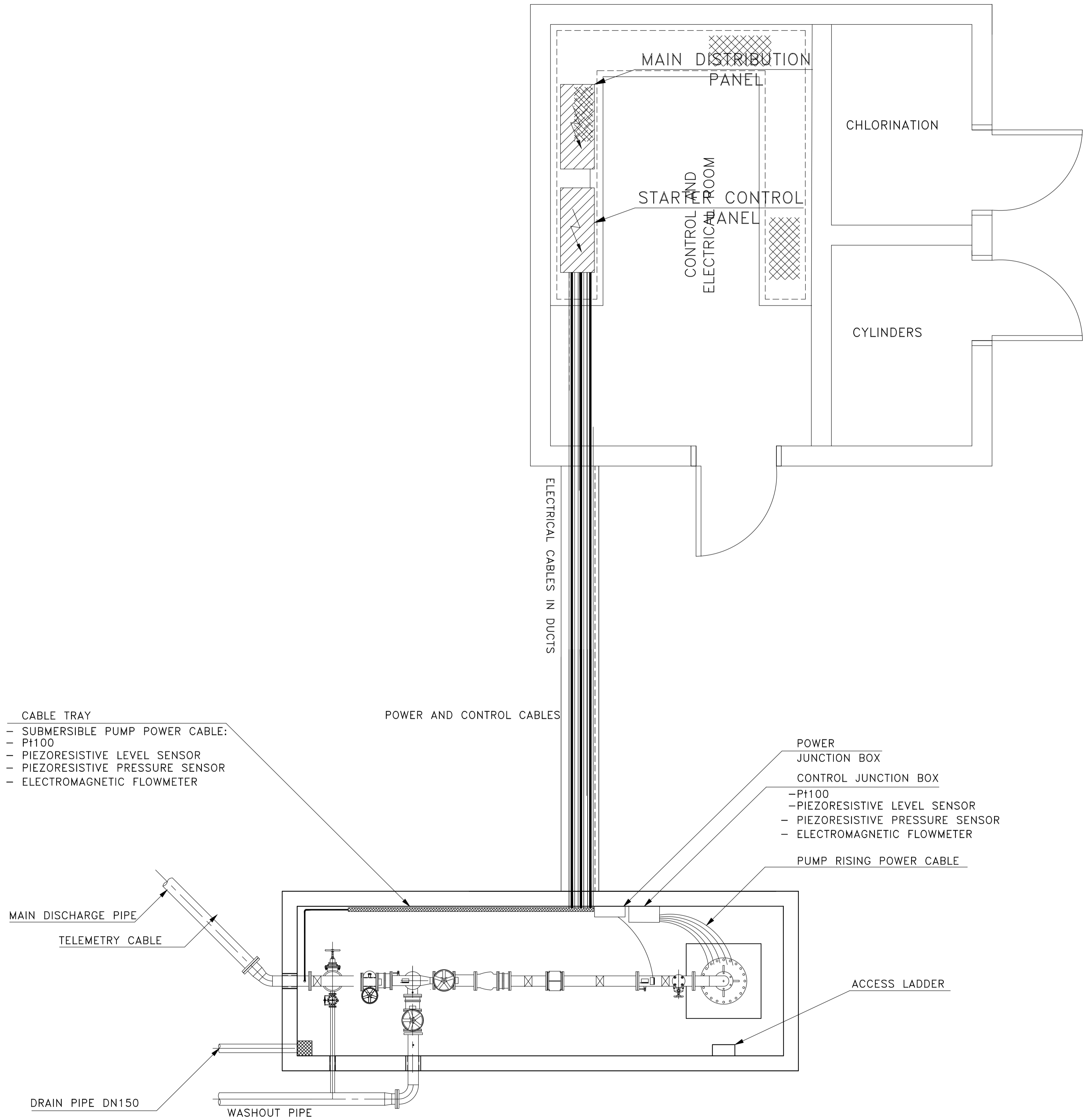
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF PUMPING STATION	DOMESTIC ELECTRICAL INSTALLATION SCHEMATIC
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DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-E02	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	5/7	12/33





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COUNCIL FOR DEVELOPMENT RECONSTRUCTION

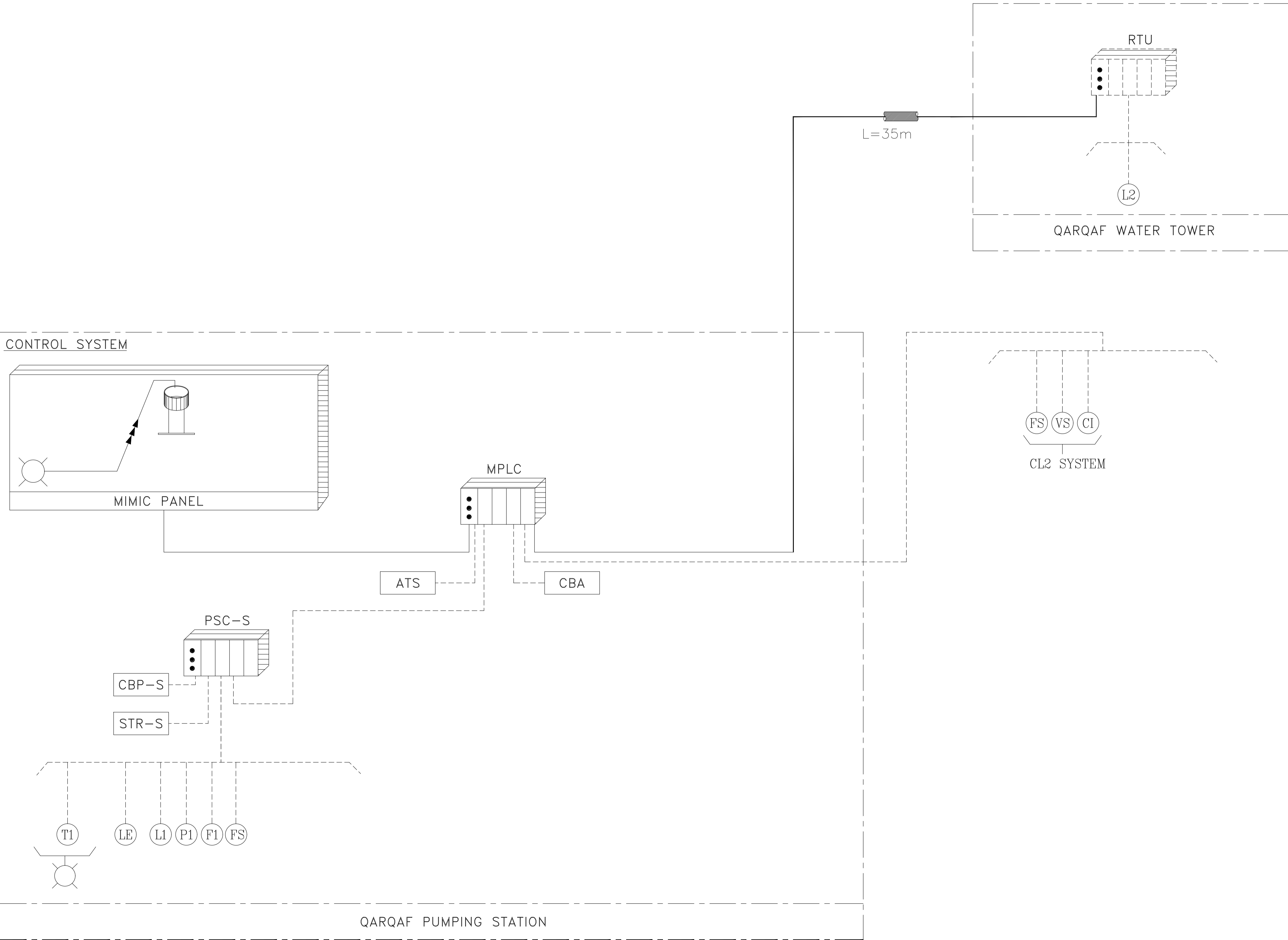
BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB – HAJAL Bldg TEL: (04) 712157 / 712158
P.O.BOX: 70492 – ANTELIAF FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

QARQAF PUMPING STATION	ELECTRICAL SCHEMATIC
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DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-E03	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	6/7	13/33



- LEGEND:
- : PROGRAMMABLE LOGICAL CONTROLLER (PLC)
 - MPLC : MAIN PLC
 - RTU : REMOTE TERMINAL UNIT
 - : DATA CABLES
 - : TELEMETRY CABLE IN CONDUIT
 - AWH : ANTI WATER HAMMER
 - FS : FLOW SWITCH
 - VS : VACUUM SWITCH
 - : RESERVOIR
 - : BOREHOLE MOTOPUMPSET
 - ATS : AUTOMATIC TRANSFER SWITCH
 - PSC : PUMPSET CONTROLLER
 - : FLOW MEASUREMENT
 - : LEVEL MEASUREMENT
 - : PRESSURE MEASUREMENT
 - : TEMPERATURE MEASUREMENT
 - : CHLORINE
 - STR : STARTER
 - CBP : CIRCUIT BREAKER FOR PUMPSET
 - CBA : CIRCUIT BREAKER FOR AUXILIARIES
 - GCB : GENERAL CIRCUIT BREAKER
 - : SURFACE MOTOPUMPSET
 - : ELECTRIC ACTUATOR
 - : ANTI WATER HAMMER

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MINISTRY OF ENERGY WATER
COUNCIL FOR DEVELOPMENT RECONSTRUCTION

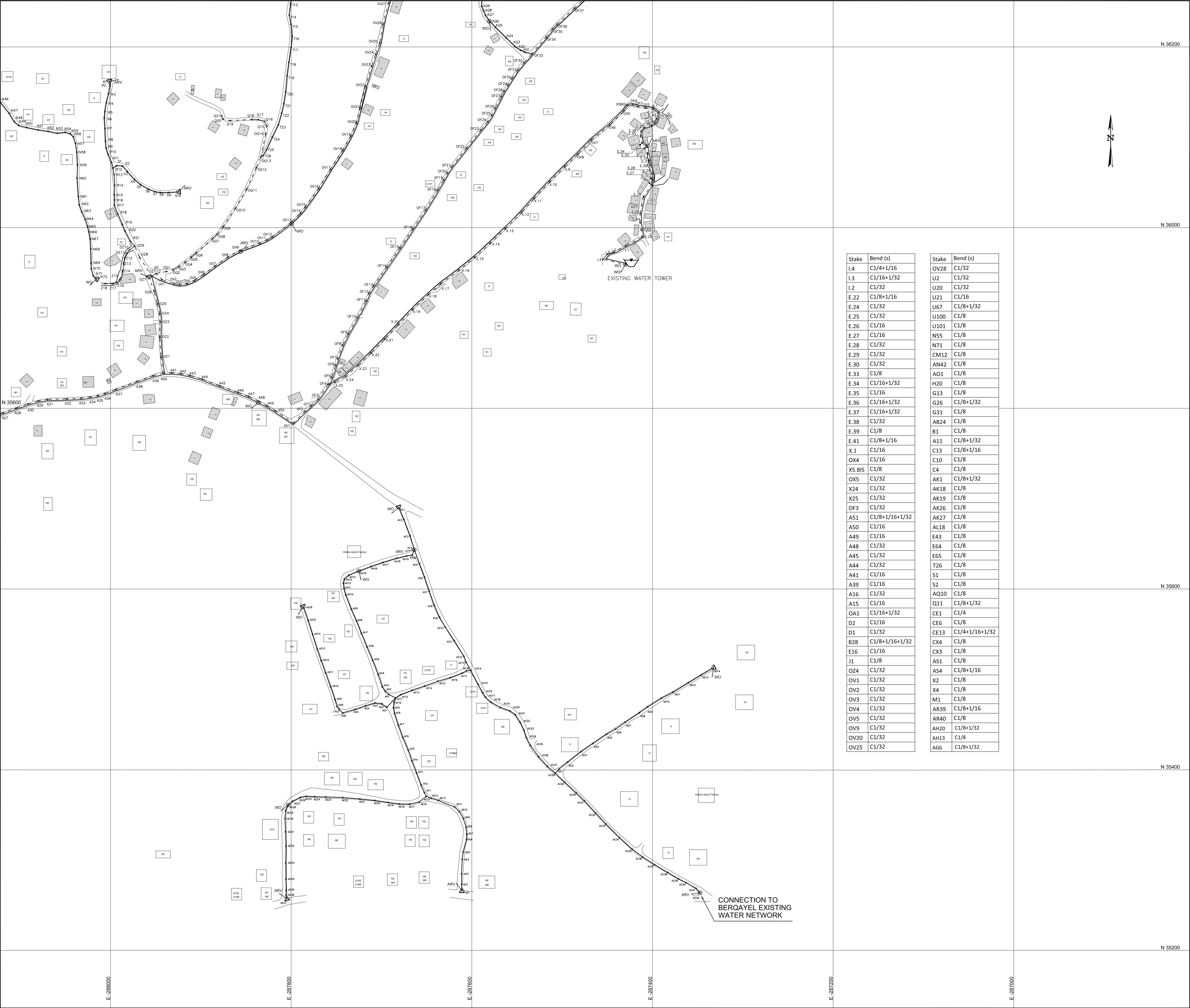
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB - HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)













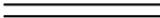





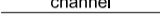

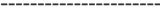













QARQAF PUMPING STATION CONTROL SCHEMATIC

DRAWING No:	DESIGNED BY	DRAWN BY	CHECKED BY
562W-101-I01	F.GHANEM	F.GHANEM	T.RMEITY

DATE	SCALE	SHEET No.	SEQ. No
MAY 2020	-	7/7	14/33



HYDRAULIC LEGEND		
PIPELINE		BEND 1/8
FLOW DIRECTION		ARV (AIR VALVE)
VALVE		W.O (WASHOUT)
TEE		FLANGED ADAPTER
REDUCER		END CAPS
PRESSURE REGULATING VALVE		EXISTING PIPE

TOPOGRAPHICAL LEGEND			
	HOUSES ALREADY CONNECTED TO THE EXISTING NETWORK		MANHOLE SEWER
	HOUSE OF "n" APARTMENTS		MANHOLE WATER
	"n" SHOPS		MANHOLE TELEPHONE
	UNDER CONSTRUCTION		MANHOLE NOT IDENTIFIED
	PAVED ROAD		LIGHTING POLE
	CONCRETE ROAD		TELEPHONE POLE
	TRACK		TRIANGULATION STATION
	REFERENCE LINE		ELECTRIC SUB STATION
	CHANNEL		ELECTRIC POLE/TELEGRAPH POLE
	TERRACE		STAKE NUMBER
	FENCE		STAKE POINT
	STREAM/RIVER		SPOT HEIGHT
	CULVERT/BRIDGE		PLOT No
	SPRING		BOUNDARY
	WELL		CIRCUMSCRIPTION BOUNDARY
	DECIDUOUS/PINE TREE		
	ROCKS		
	Down Hill		
	High Hill		

KEY PLAN		

NOTES		
- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.		
- HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND K=0.2mm FOR HDPE PIPES.		
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STD14.		
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 343STD05 AND DWG Nb 562STD08.		
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD11 AND DWG Nb 562STD12.		
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD13.		
- FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 343STD09 AND DWG Nb 562STD10.		
- PIPE MATERIAL: DUCTILE IRON CLASS C HDPE PE100 PN16		
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED		
- PIPE SHOULD BE LAID IN PARALLEL TO EXISTING PIPE BETWEEN STAKES: RES-OF4, OF4-F63, OF4-OA1, A40-OZ7-2, OZ7-2-OV28, OA9-Y16.		
- SPECIAL CARE SHOULD BE TAKEN DURING THE EXECUTION TO KEEP EXISTING PIPES IN GOOD CONDITION.		

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd
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REPUBLIC OF LEBANON		
MINISTRY OF ENERGY AND WATER		
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BUREAU TECHNIQUE POUR LE DEVELOPEMENT		
JALL ED DIB - HAJAL Bldg	TEL:(04) 712157 / 712158	
P.O.BOX:70492 - ANTELIA	FAX: (04) 712159	

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)		
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DISTRIBUTION NETWORK	PLAN
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-DS-01-PL01	J. DACCACHE	R. MAKHOUL	T. ACHKAR

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	1:2000	1/5	15/33



HYDRAULIC LEGEND	
PIPELINE	
FLOW DIRECTION	
VALVE	
TEE	
REDUCER	
PRESSURE REGULATING VALVE	
BEND 1/8	
ARV (AIR VALVE)	
W.O (WASHOUT)	
FLANGED ADAPTER	
END CAPS	
EXISTING PIPE	

TOPOGRAPHICAL LEGEND	
	HOUSES ALREADY CONNECTED TO THE NETWORK
	HOUSE OF "n°" APARTMENTS
	"1st" SHOPS
	UNDER CONSTRUCTION
	PAVED ROAD
	CONCRETE ROAD
	TRACK
	REFERENCE LINE
	CHANNEL
	TERRACE
	FENCE
	STREAM/RIVER
	CULVERT/BRIDGE
	SPRING
	WELL
	DECIDUOUS/PINE TREE
	ROCKS
	BOUNDARY
	CIRCUMSCRIPTION BOUNDARY
	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
	CIRCUMSCRIPTION BOUNDARY

KEY PLAN	

NOTES	
- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.	
- HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND K=0.2mm FOR HDPE PIPES.	
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STDPI4.	
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 343STDPO5 AND DWG Nb 562STDPO8.	
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STDPI1 AND DWG Nb 562STDPI2.	
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STDPI3.	
- FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 343STDPO9 AND DWG Nb 562STDPI0.	
- PIPE MATERIAL: DUCTILE IRON CLASS C HDPE PE100 PN16	
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED	
- PIPE SHOULD BE LAID IN PARALLEL TO EXISTING PIPE BETWEEN STAKES: RES-OF4, OF4-F63, OF4-OA1, A40-OZ7-2, OZ7-2-OV28, OA9-Y16.	
- SPECIAL CARE SHOULD BE TAKEN DURING THE EXECUTION TO KEEP EXISTING PIPES IN GOOD CONDITION.	

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON	
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






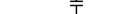

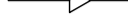
BUREAU TECHNIQUE POUR LE DEVELOPEMENT	
JALL ED DIB - HAJAL Bldg P.O.BOX:70492 - ANELIAS	TEL:(04) 712157 / 712158 FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)	
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







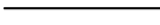

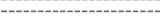



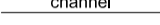

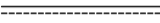





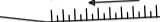








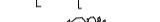
DISTRIBUTION NETWORK	PLAN
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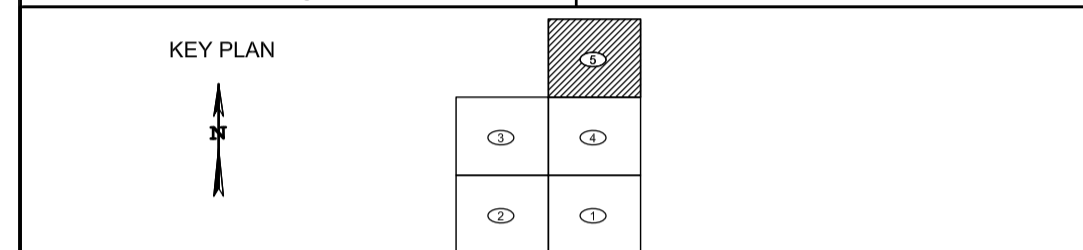
DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-DS-01-PL02	J. DACCACHE	R. MAKHOUL	T. ACHKAR

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	1:2000	2/5	16/33

HYDRAULIC LEGEND		
PIPELINE		BEND 1/8 
FLOW DIRECTION		ARV (AIR VALVE) 
VALVE		W.O (WASHOUT) 
TEE		FLANGED ADAPTER 
REDUCER		END CAPS 
PRESSURE REGULATING VALVE		EXISTING PIPE

TOPOGRAPHICAL LEGEND

	HOUSES ALREADY CONNECTED TO THE NETWORK		MANHOLE SEWER
	HOUSE OF "n" APARTMENTS		MANHOLE WATER
	"n" SHOPS		MANHOLE TELEPHONE
	UNDER CONSTRUCTION		MANHOLE NOT IDENTIFIED
	PAVED ROAD		LIGHTING POLE
	CONCRETE ROAD		TELEPHONE POLE
	TRACK		TRIANGULATION STATION
	REFERENCE LINE		ELECTRIC SUB STATION
	CHANNEL		ELECTRIC POLE/TELEGRAPH POLE
	TERRACE		STAKE NUMBER
	FENCE		STAKE POINT
	STREAM/RIVER		SPOT HEIGHT
	CULVERT/BRIDGE		PLOT No
	SPRING		BOUNDARY
	WELL		CIRCUMSCRIPTION BOUNDARY
	DECIDUOUS/PINE TREE		
	ROCKS		
	Downhill		
	Uphill		

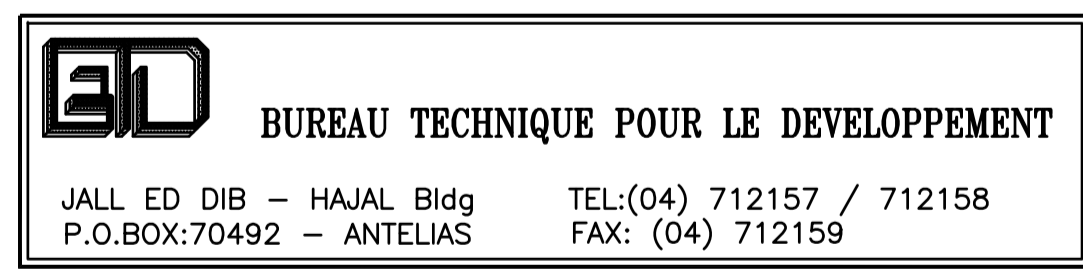


NOTES

- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.
- HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS $K=0.4\text{mm}$ FOR DUCTILE IRON PIPES AND $K=0.2\text{mm}$ FOR HDPE PIPES.
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STD14.
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 343STD05 AND DWG Nb 562STD06.
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD11 AND DWG Nb 562STD12.
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD13.
- FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 343STD09 AND DWG Nb 562STD10.
- PIPE MATERIAL: DUCTILE IRON CLASS C
HDPE PE100 PN16
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
- PIPE SHOULD BE LAID IN PARALLEL TO EXISTING PIPE BETWEEN STAKES: RES-OF4, OF4-F63, OF4-0A1, A40-0Z7-2, 0Z7-2-0V28, 0A9-Y16.
- SPECIAL CARE SHOULD BE TAKEN DURING THE EXECUTION TO KEEP EXISTING PIPES IN GOOD CONDITION.

<i>Rev.</i>	<i>Date</i>	<i>Dsgn</i>	<i>Drwn</i>	<i>Chk'd</i>	<i>Appr'd</i>

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

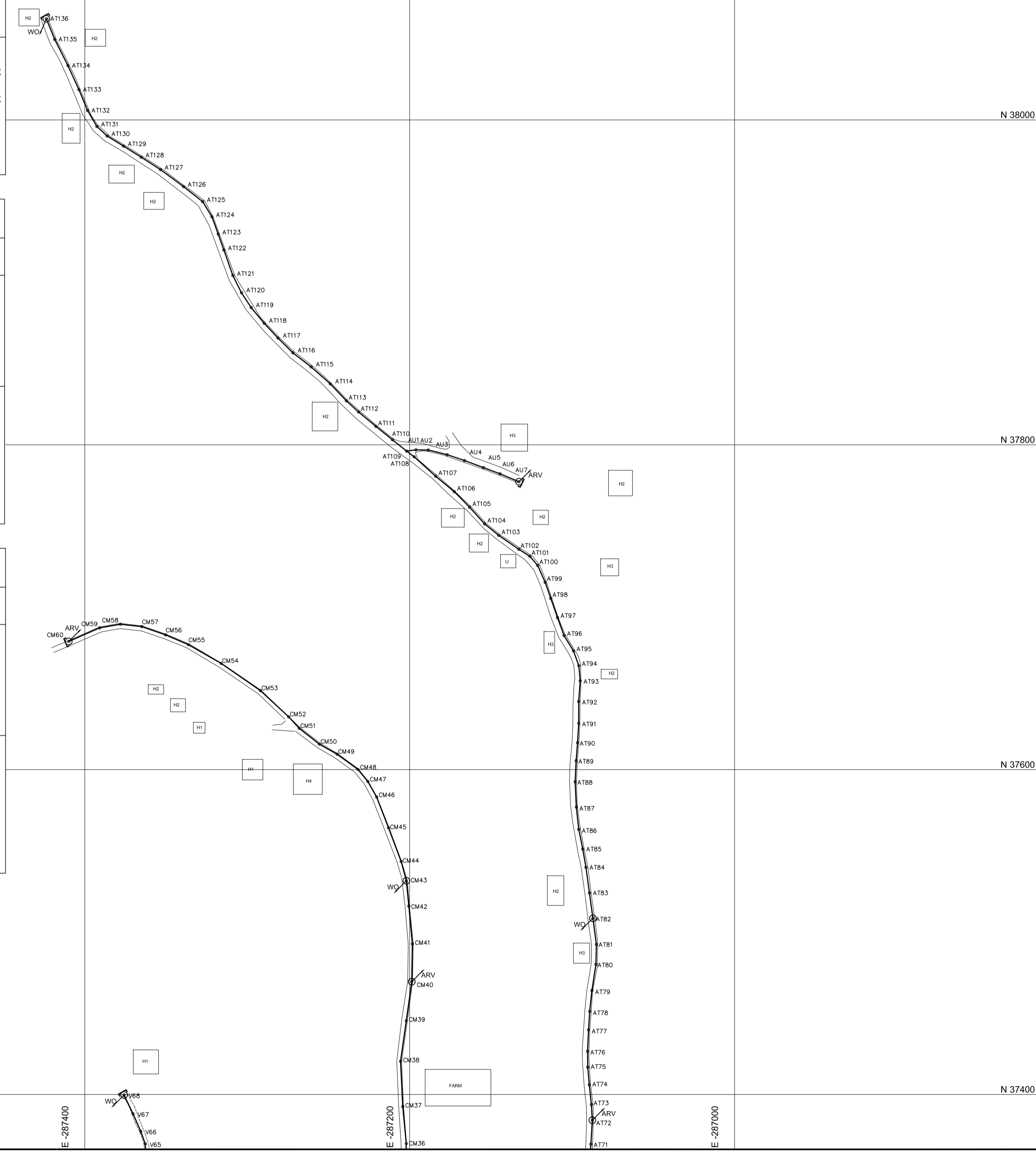


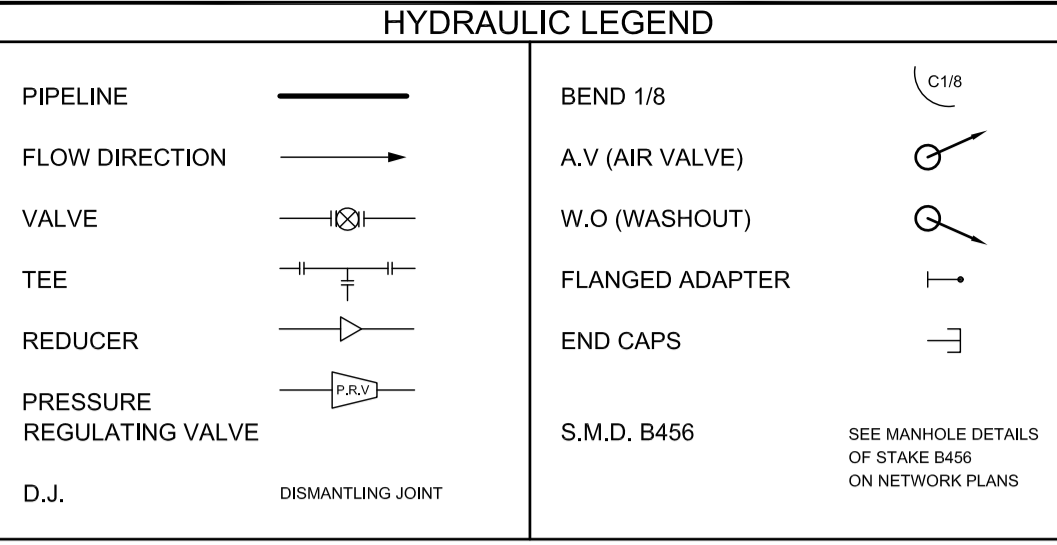
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

DISTRIBUTION NETWORK	PLAN
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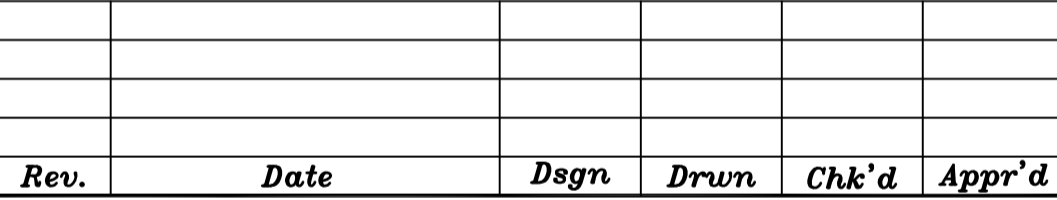
<i>DRAWING No.</i>	<i>DESIGNED BY</i>	<i>DRAWN BY</i>	<i>CHECKED BY</i>
562W-DS-01-PL05	J. DACCACHE	R. MAKHOUL	T. ACHKAR

<i>DATE</i>	<i>SCALE</i>	<i>SHEET No.</i>	<i>SEQ No.</i>
MAY 2020	1:2000	5/5	19/33





- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.
- HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS $K=0.4\text{mm}$ FOR DUCTILE IRON PIPES AND $K=0.2\text{mm}$ FOR HDPE PIPES.
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STDPI4.
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 562STDPI05 AND DWG Nb 562STDPI06.
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STDPI11 AND DWG Nb 562STDPI12.
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STDPI13.
- FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 562STDPI09 AND DWG Nb 562STDPI10.
- PIPE MATERIAL: DUCTILE IRON CLASS C
HDPE PE100 PN16
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS
- FOR LOCATIONS OF TRENCHES WITH MULTIPLE PIPES, REFER TO NOTES ON NETWORK PLANS



REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

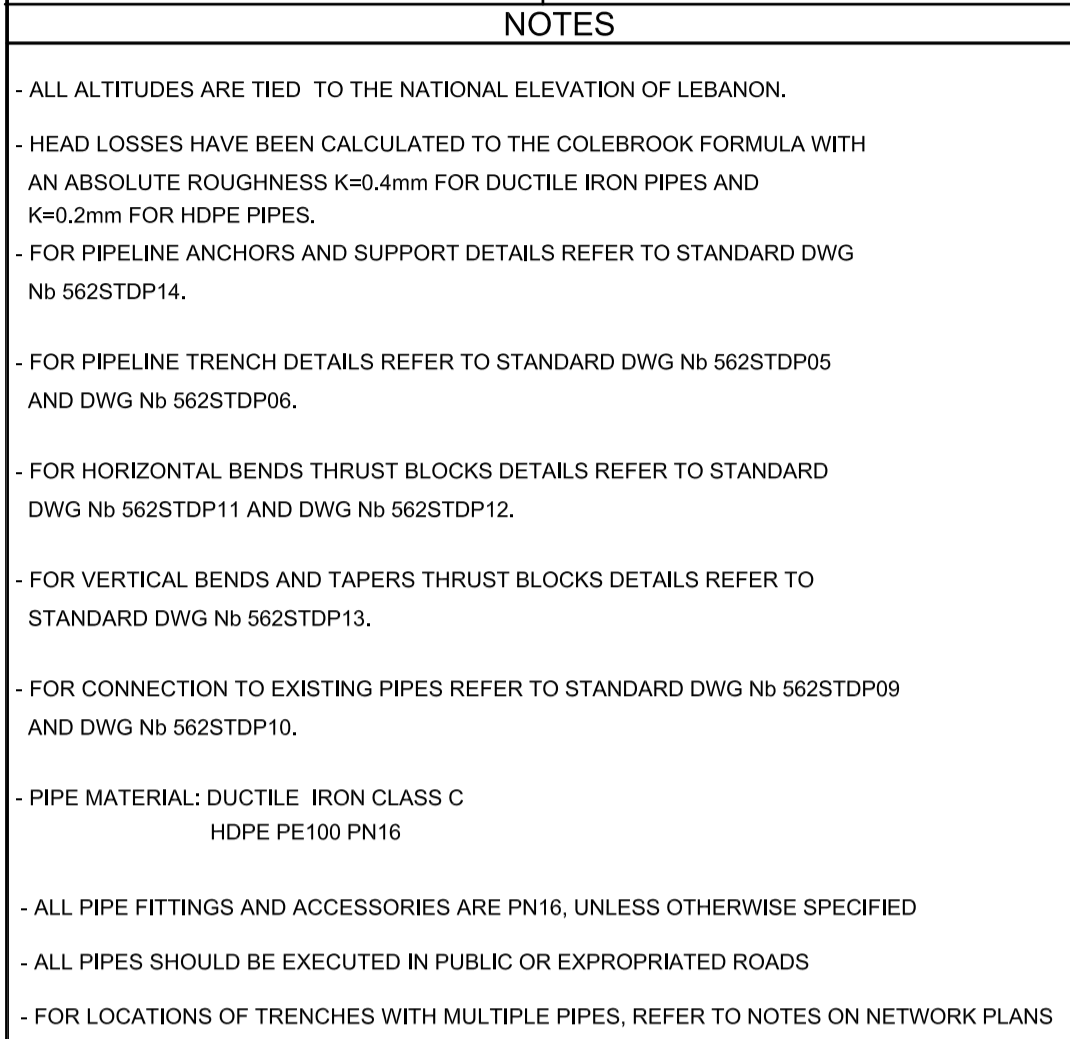
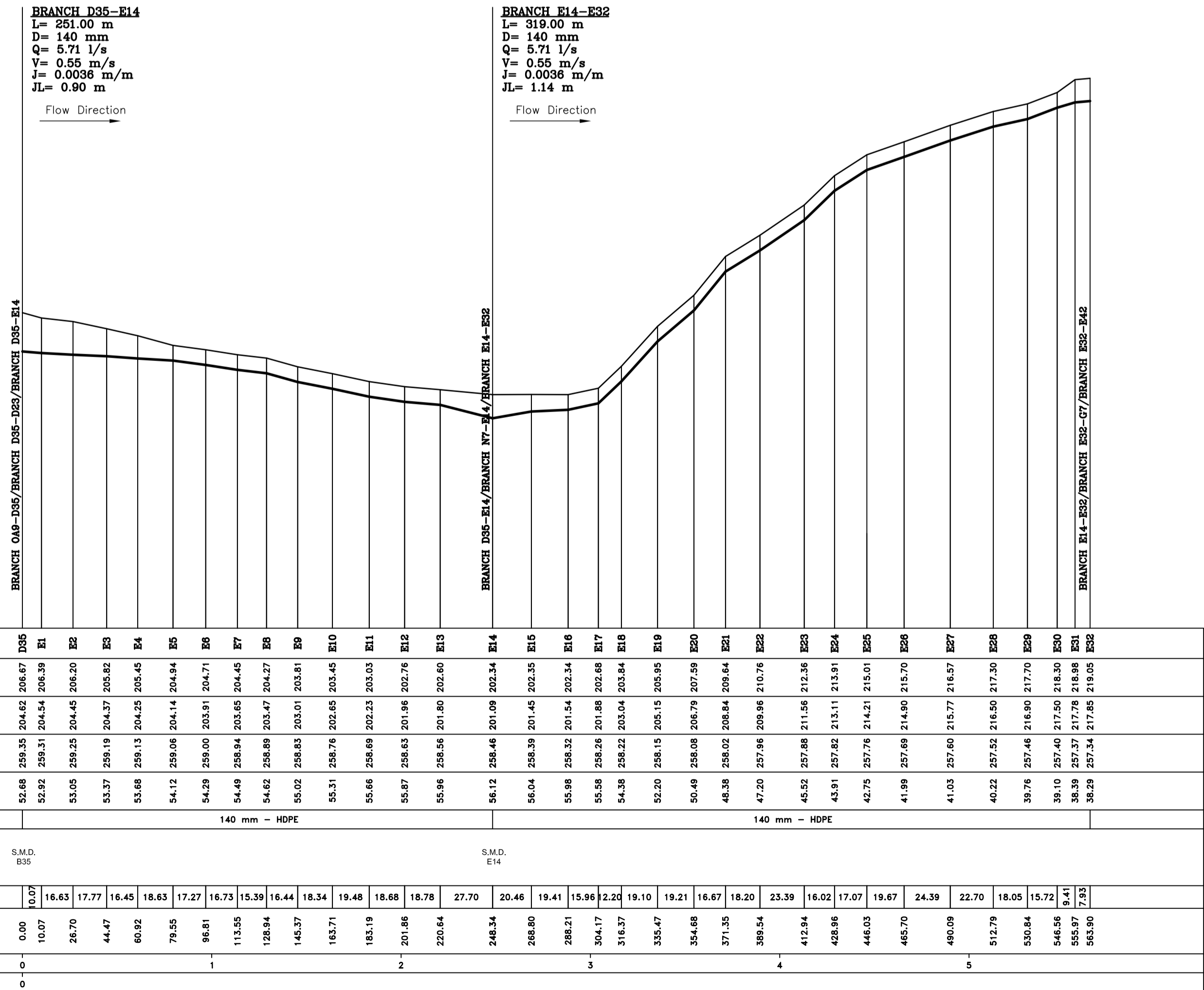
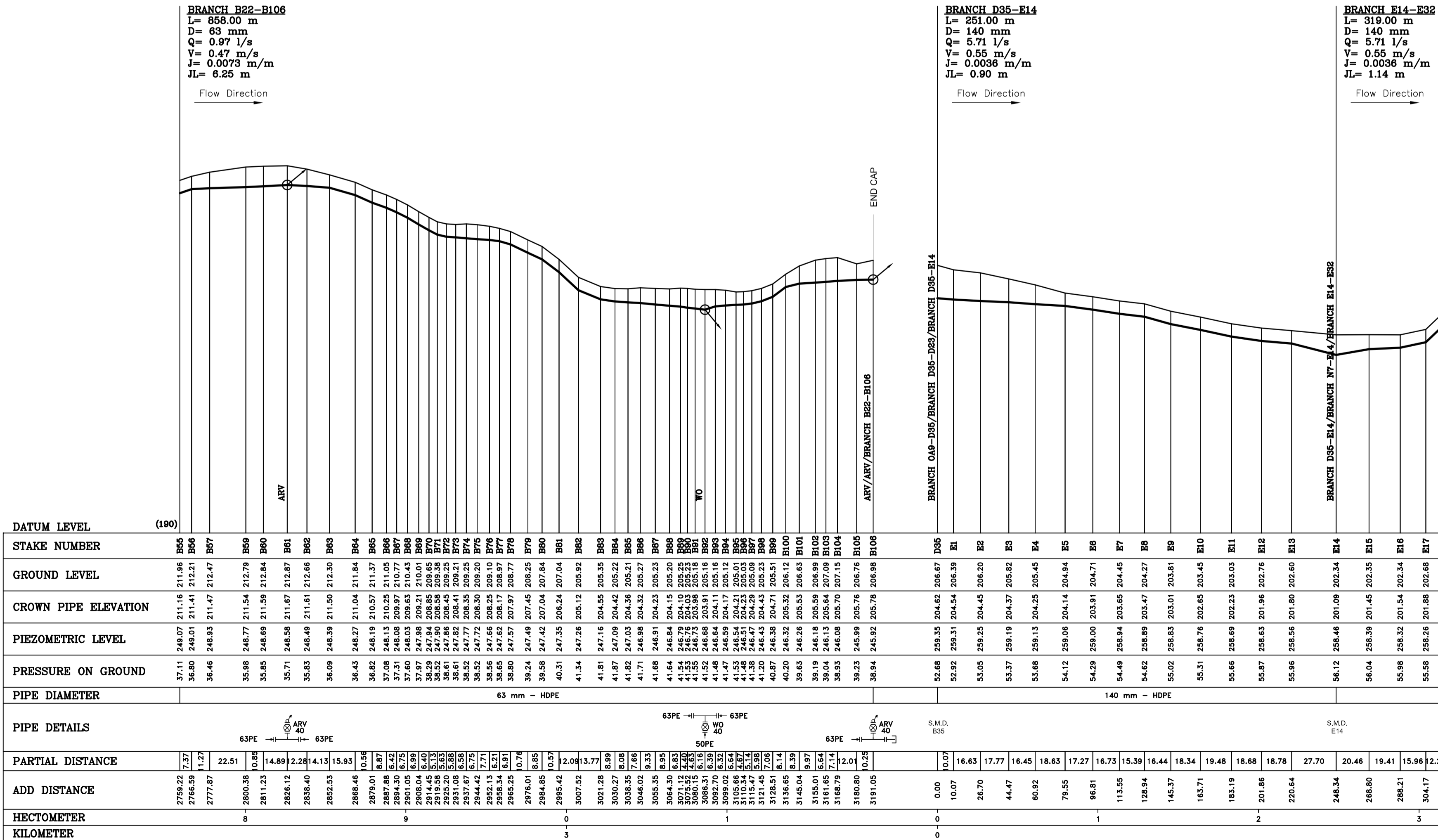
JALL ED DIB - HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)


DISTRIBUTION NETWORK	PROFILE
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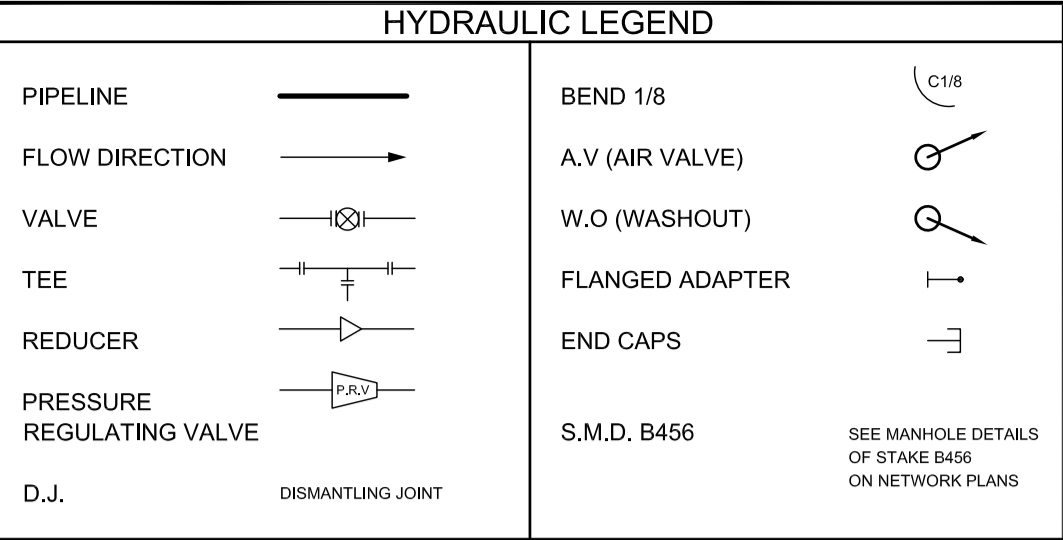
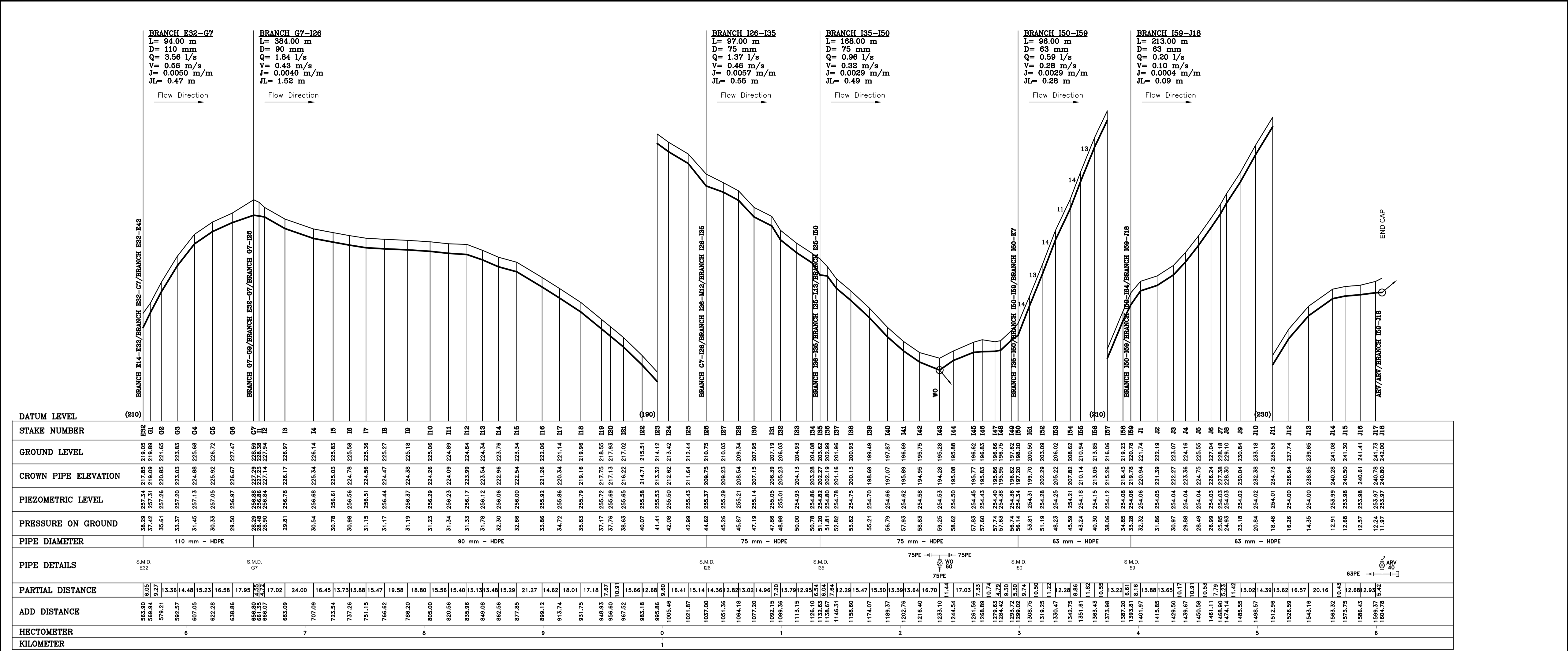
DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-DS-01-PR01	J. DACCACHE	R. MAKHOUL	T. ACHKAR

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	H = 1/2000 V = 1/200	1/13	20/33

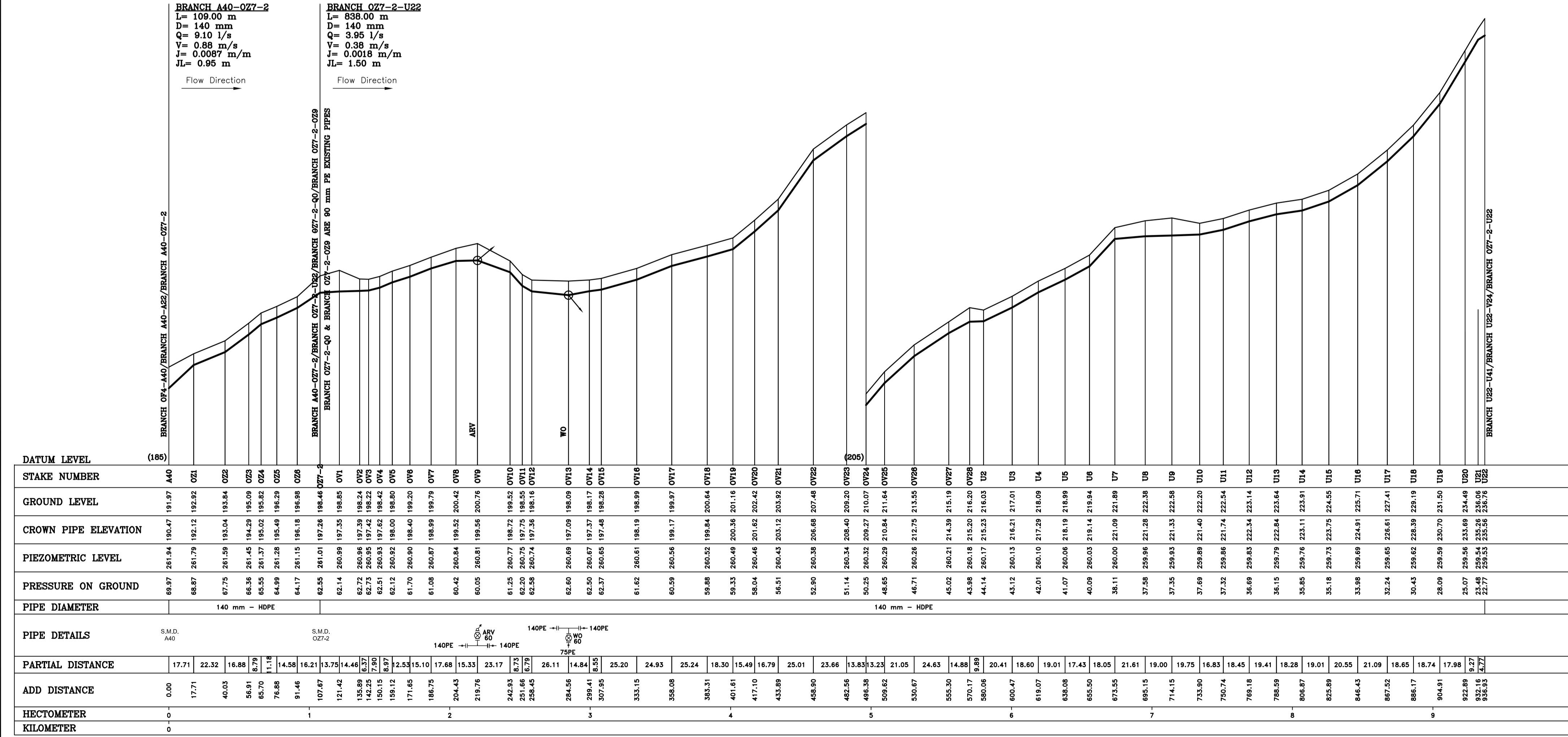


<i>Rev.</i>	<i>Date</i>	<i>Dsgn</i>	<i>Drwn</i>	<i>Chk'd</i>	<i>Appr'd</i>

<h1 style="margin: 0;">REPUBLIC OF LEBANON</h1> <h2 style="margin: 0;">MINISTRY OF ENERGY AND WATER</h2> <h3 style="margin: 0;">COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION</h3>			
<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> BUREAU TECHNIQUE POUR LE DEVELOPPEMENT </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> JALL ED DIB – HAJAL Bldg P.O.BOX:70492 – ANTELIAS </div> <div style="width: 45%; text-align: right;"> TEL: (04) 712157 / 712158 FAX: (04) 712159 </div> </div>			
<h2 style="margin: 0;">UPGRADING OF WATER SUPPLY IN THE VILLAGES</h2> <h3 style="margin: 0;">OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)</h3>			
<h2 style="margin: 0;">DISTRIBUTION NETWORK</h2>		<h2 style="margin: 0;">PROFILE</h2>	
<i>DRAWING No.</i>	<i>DESIGNED BY</i>	<i>DRAWN BY</i>	<i>CHECKED BY</i>
562W-DS-01-PR02	J. DACCACHE	R. MAKHOUL	T. ACHKAR
<i>DATE</i>	<i>SCALE</i>	<i>SHEET No.</i>	<i>SEQ No.</i>
MAY 2020	H = 1/2000 V = 1/200	2/13	21/33



- NOTES
- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.
 - HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND K=0.2mm FOR HDPE PIPES.
 - FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STD14.
 - FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 562STD05 AND DWG Nb 562STD06.
 - FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD11 AND DWG Nb 562STD12.
 - FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD13.
 - FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 562STD09 AND DWG Nb 562STD10.
 - PIPE MATERIAL: DUCTILE IRON CLASS C HDPE PE100 PN16
 - ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
 - ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS
 - FOR LOCATIONS OF TRENCHES WITH MULTIPLE PIPES, REFER TO NOTES ON NETWORK PLANS



Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

MINISTRY OF ENERGY AND WATER

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

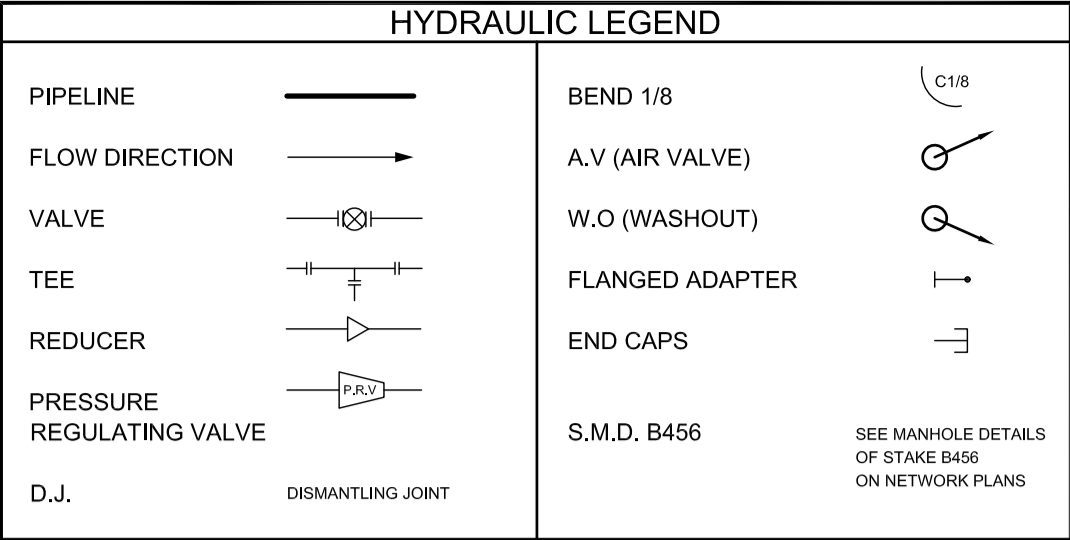
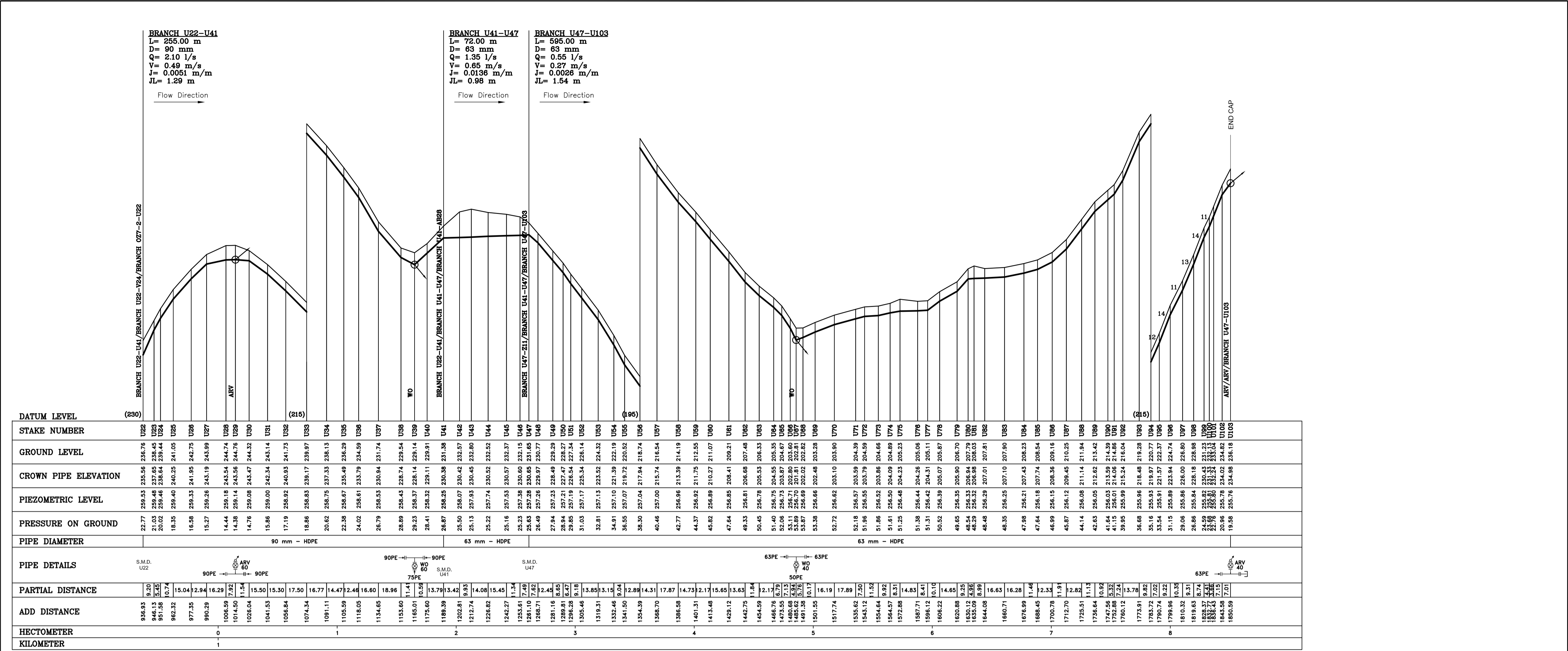
BUREAU TECHNIQUE POUR LE DEVELOPEMENT

JALL ED DIB - HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

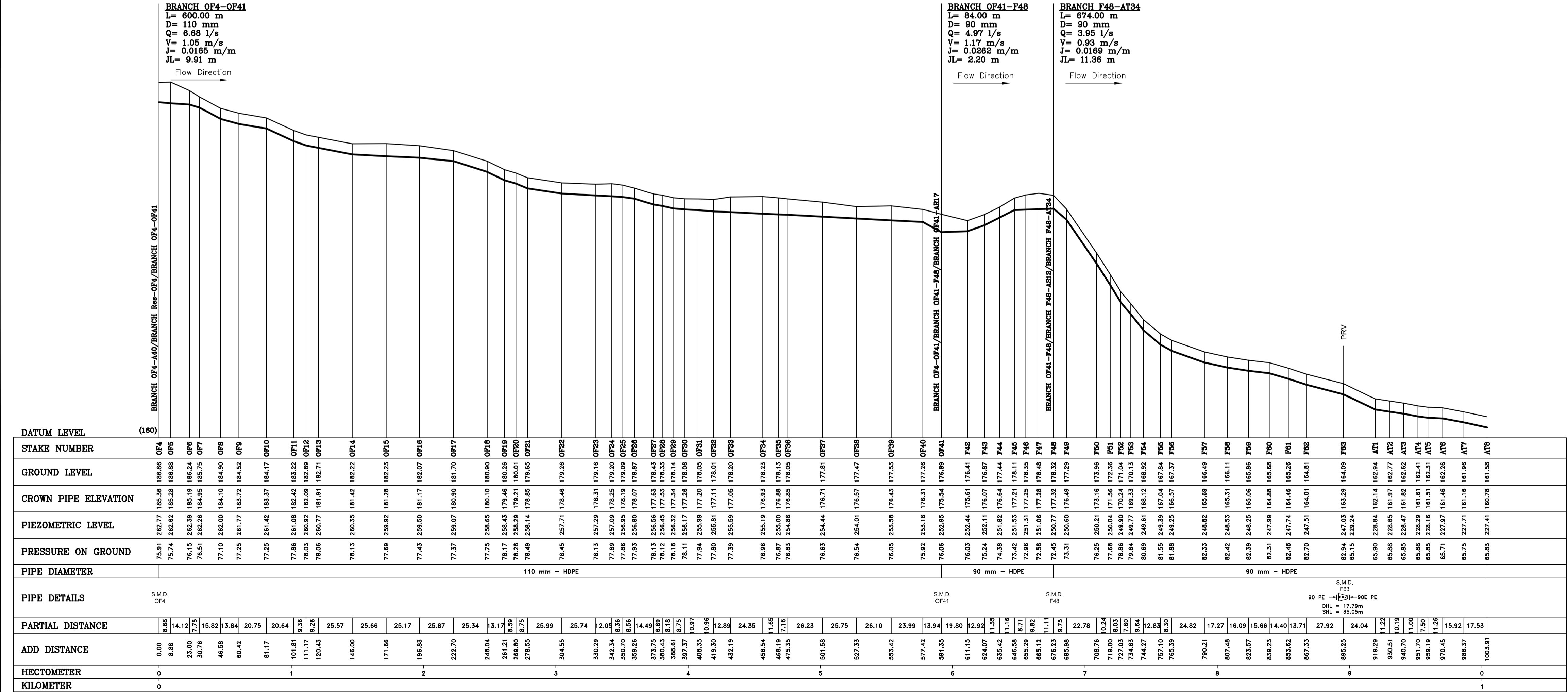
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

DISTRIBUTION NETWORK	PROFILE

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562W-DS-01-PR03	J. DACCACHE	R. MAKHOUL	T. ACHKAR
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	H = 1/2000 V = 1/200	3/13	22/33



- NOTES
- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.
 - HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND K=0.2mm FOR HDPE PIPES.
 - FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STDP14.
 - FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 562STDP05 AND DWG Nb 562STDP06.
 - FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STDP11 AND DWG Nb 562STDP12.
 - FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STDP13.
 - FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 562STDP09 AND DWG Nb 562STDP10.
 - PIPE MATERIAL: DUCTILE IRON CLASS C HDPE PE100 PN16
 - ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
 - ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS
 - FOR LOCATIONS OF TRENCHES WITH MULTIPLE PIPES, REFER TO NOTES ON NETWORK PLANS



REPUBLIC OF LEBANON

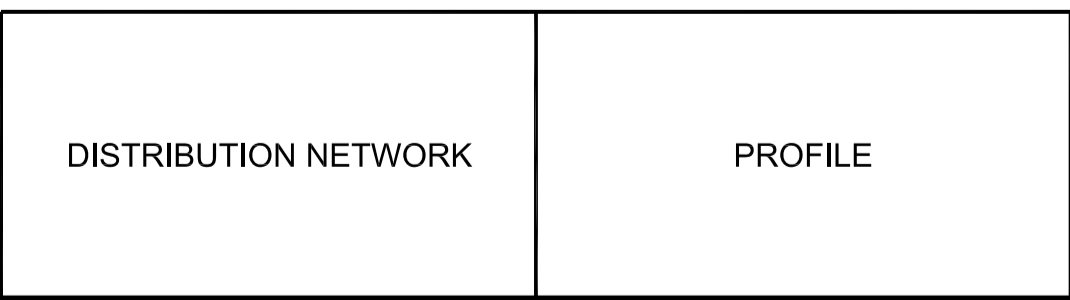
MINISTRY OF ENERGY AND WATER

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BUREAU TECHNIQUE POUR LE DEVELOPEMENT

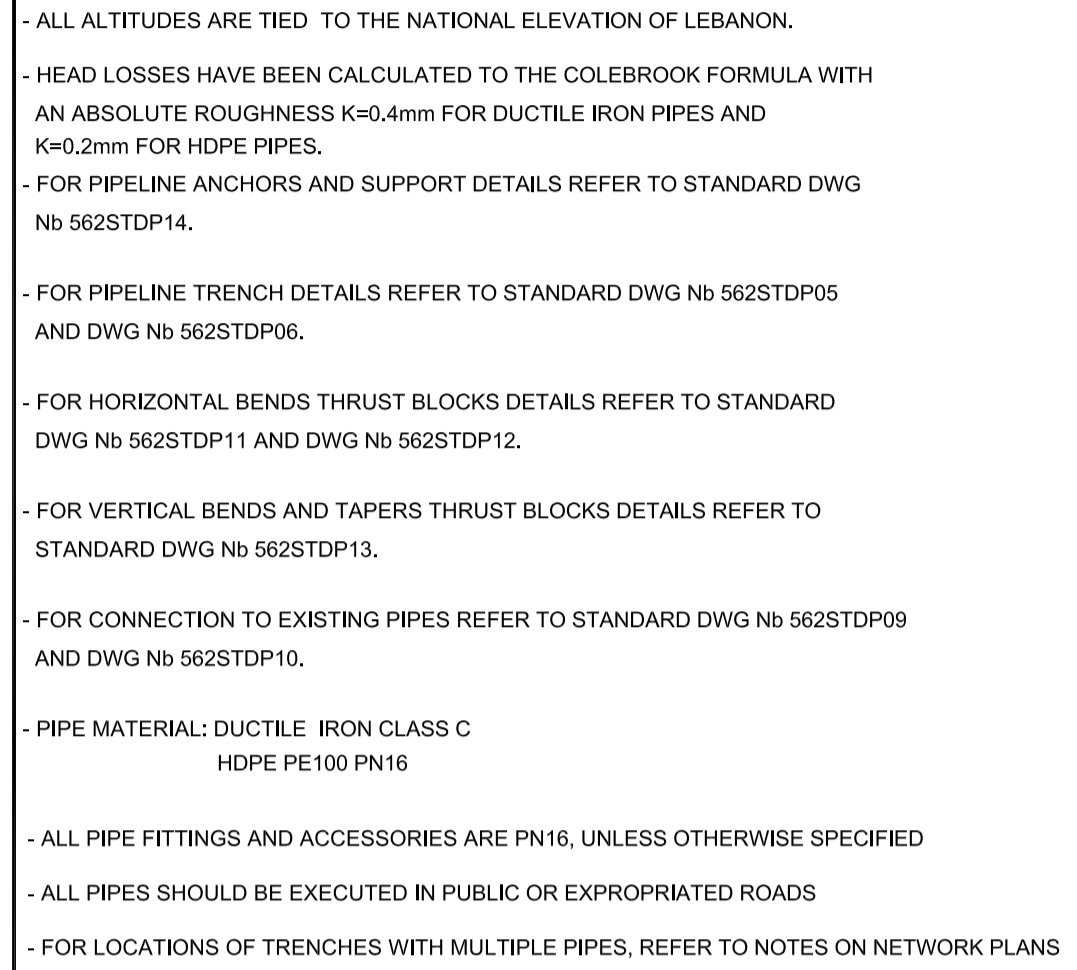
JALL ED DIB - HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

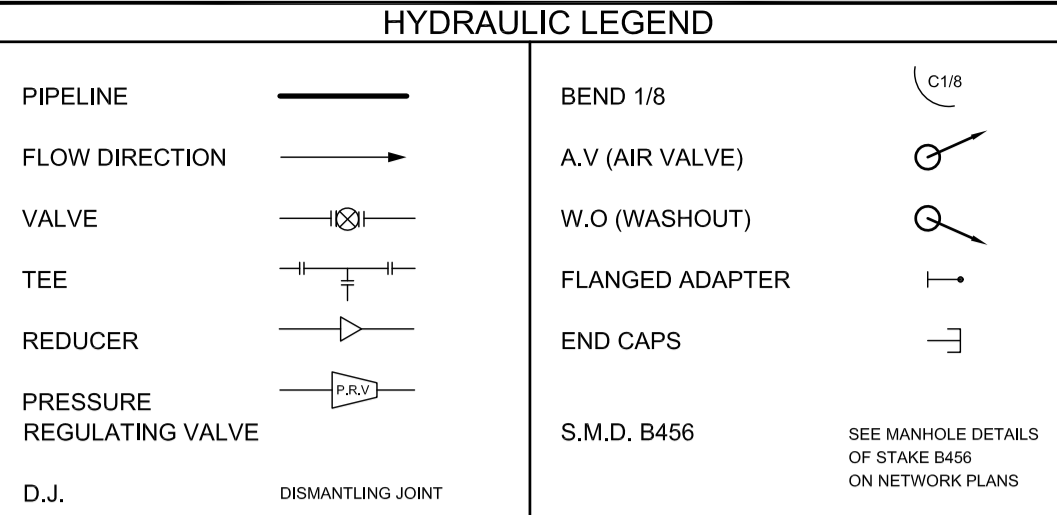


DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-DS-01-PR04	J. DACCACHE	R. MAKHOUL	T. ACHKAR

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	H = 1/2000 V = 1/200	4/13	23/33

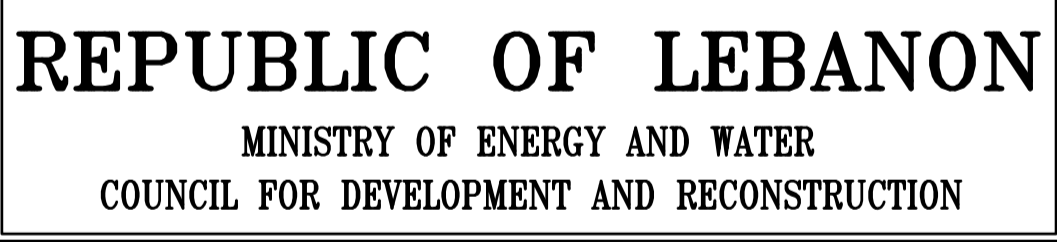


<i>Rev.</i>	<i>Date</i>	<i>Dsgn</i>	<i>Drwn</i>	<i>Chk'd</i>	<i>Appr'd</i>



- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.
- HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS $K=0.4\text{mm}$ FOR DUCTILE IRON PIPES AND $K=0.2\text{mm}$ FOR HDPE PIPES.
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STD14.
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 562STD105 AND DWG Nb 562STD106.
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD11 AND DWG Nb 562STD12.
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD13.
- FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 562STD109 AND DWG Nb 562STD110.
- PIPE MATERIAL: DUCTILE IRON CLASS C
HDPE PE100 PN16
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS
- FOR LOCATIONS OF TRENCHES WITH MULTIPLE PIPES, REFER TO NOTES ON NETWORK PLANS

- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS
- FOR LOCATIONS OF TRENCHES WITH MULTIPLE PIPES, REFER TO NOTES ON NETWORK PLANS

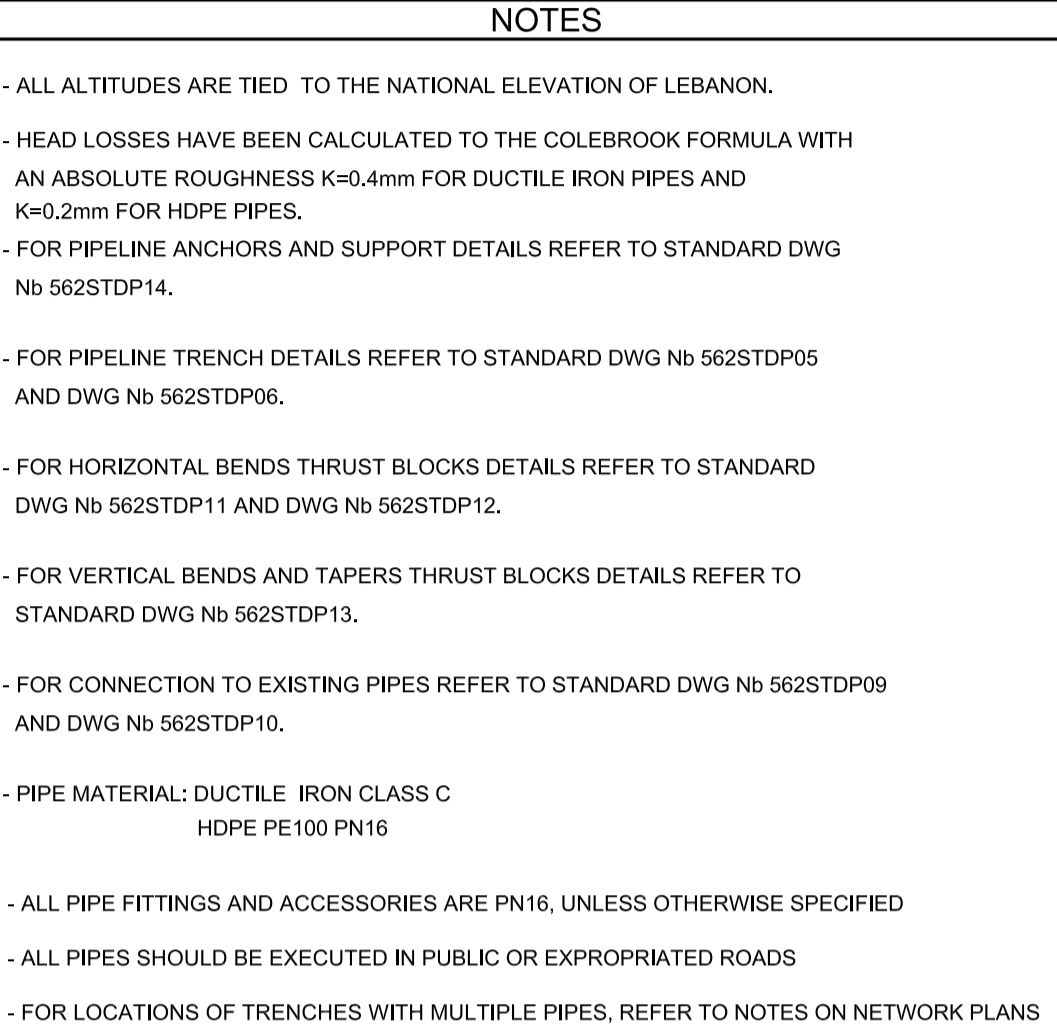
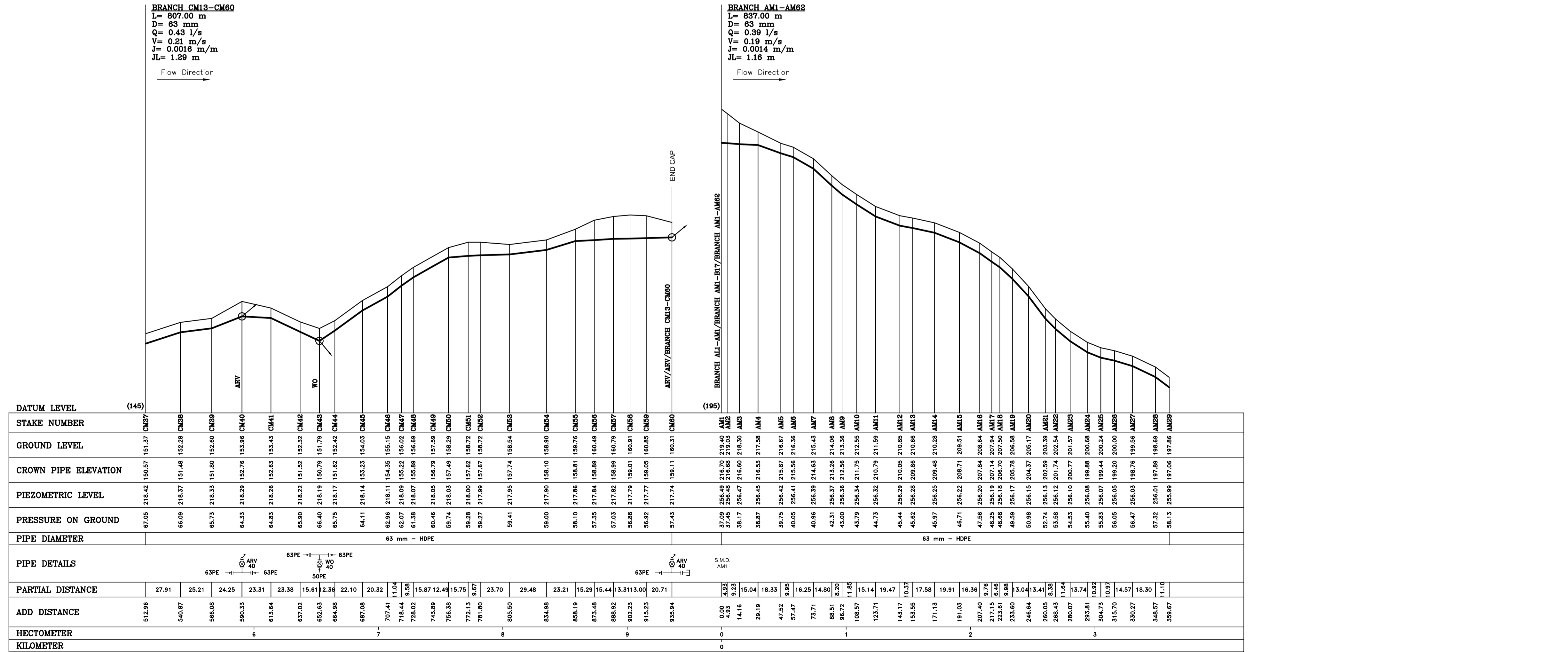


UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

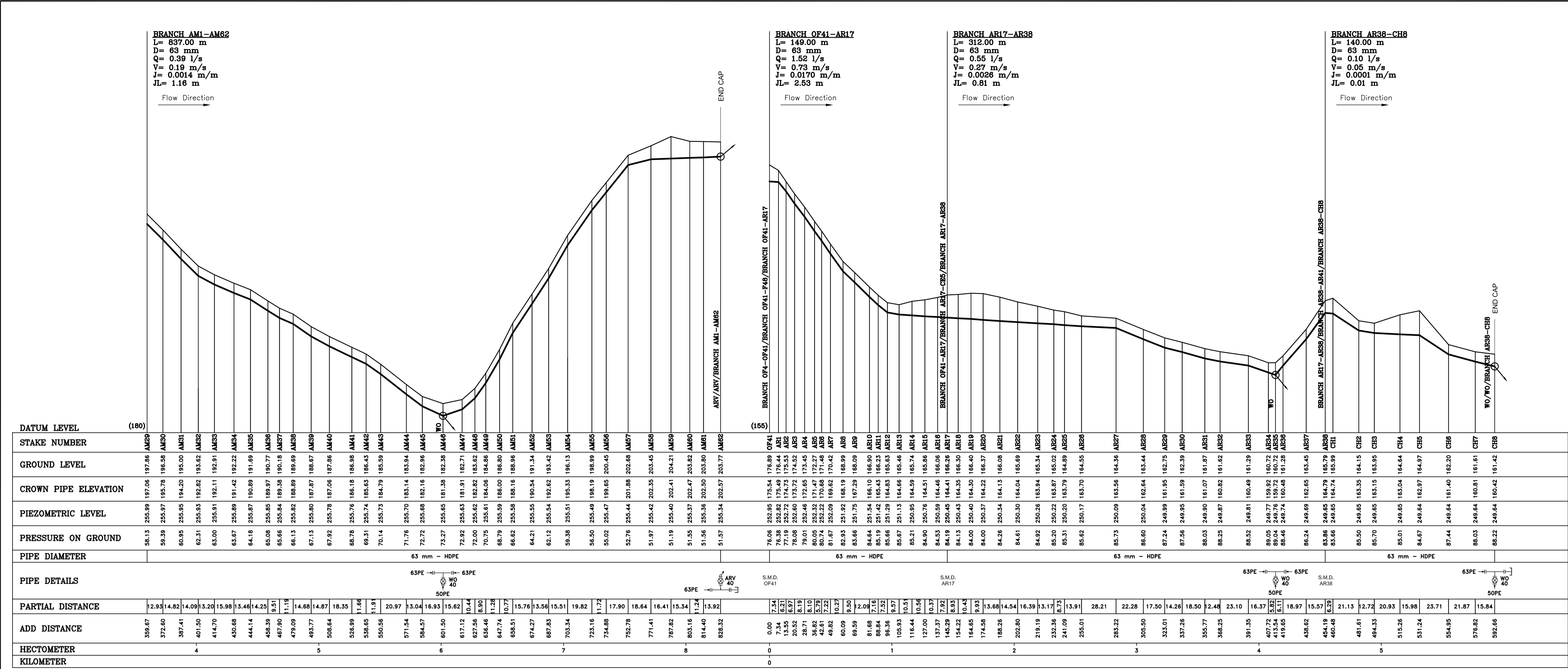
DISTRIBUTION NETWORK	PROFILE
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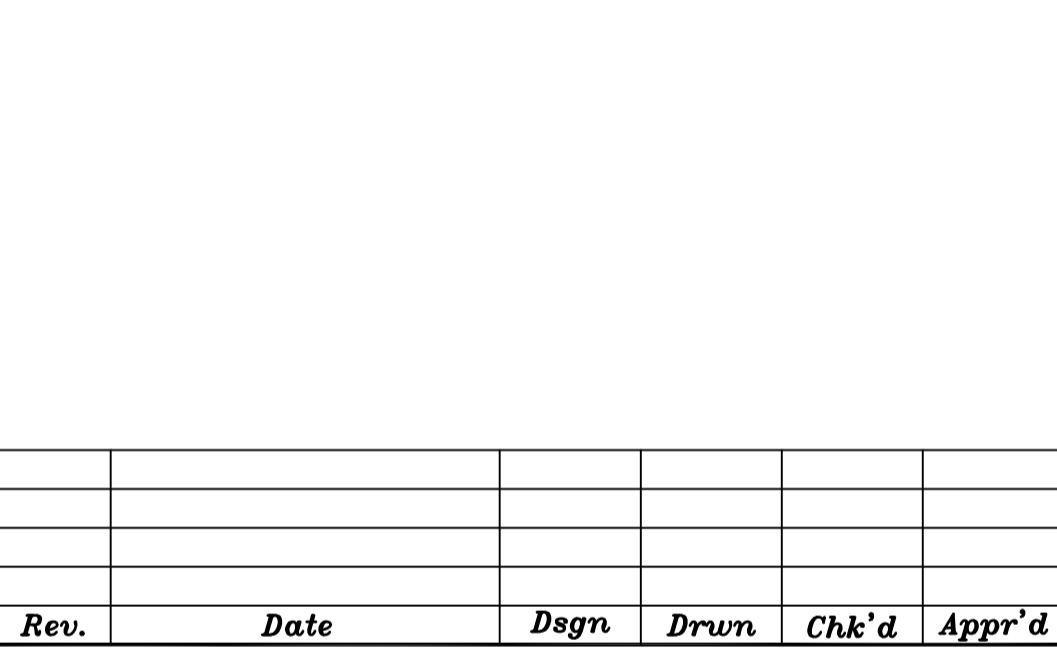
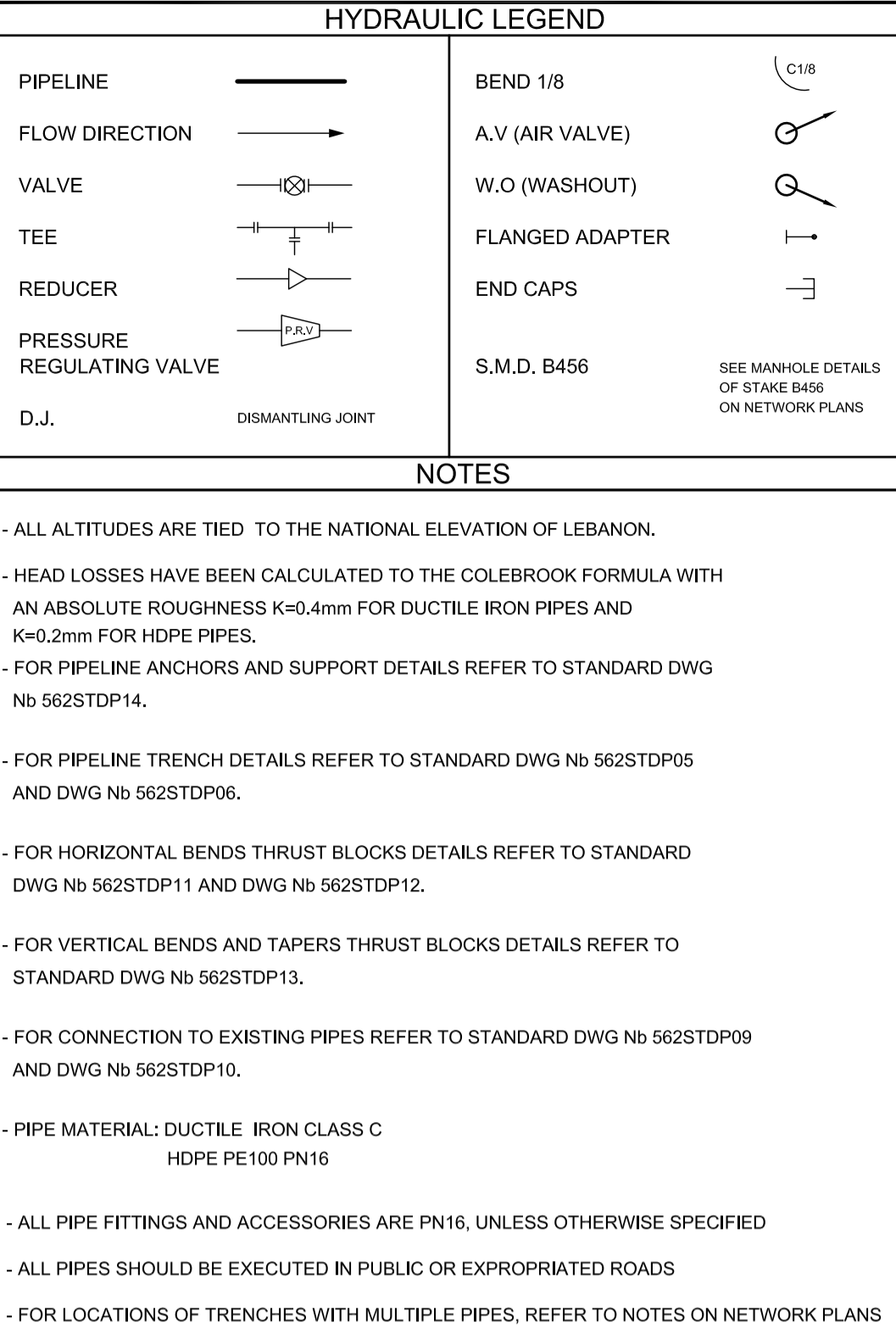
DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-DS-01-PR06	J. DACCACHE	R. MAKHOUL	T. ACHKAR

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	H = 1/2000 V = 1/200	6/13	25/33



<h1 style="margin: 0;">REPUBLIC OF LEBANON</h1> <h2 style="margin: 0;">MINISTRY OF ENERGY AND WATER</h2> <h3 style="margin: 0;">COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION</h3>			
<div style="display: flex; align-items: center; justify-content: center;"> <div> <h2 style="margin: 0;">BUREAU TECHNIQUE POUR LE DEVELOPPEMENT</h2> </div> </div>			
JALL ED DIB – HAJAL Bldg P.O.BOX:70492 – ANTELIAS		TEL:(04) 712157 / 712158 FAX: (04) 712159	
<h3 style="margin: 0;">UPGRADING OF WATER SUPPLY IN THE VILLAGES</h3> <h3 style="margin: 0;">OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)</h3>			
DISTRIBUTION NETWORK		PROFILE	
<i>DRAWING No.</i>	<i>DESIGNED BY</i>	<i>DRAWN BY</i>	<i>CHECKED BY</i>
562W-DS-01-PR07	J. DACCACHE	R. MAKHOUL	T. ACHKAR
<i>DATE</i>	<i>SCALE</i>	<i>SHEET No.</i>	<i>SEQ No.</i>
MAY 2020	H = 1/2000 V = 1/200	7/13	26/33





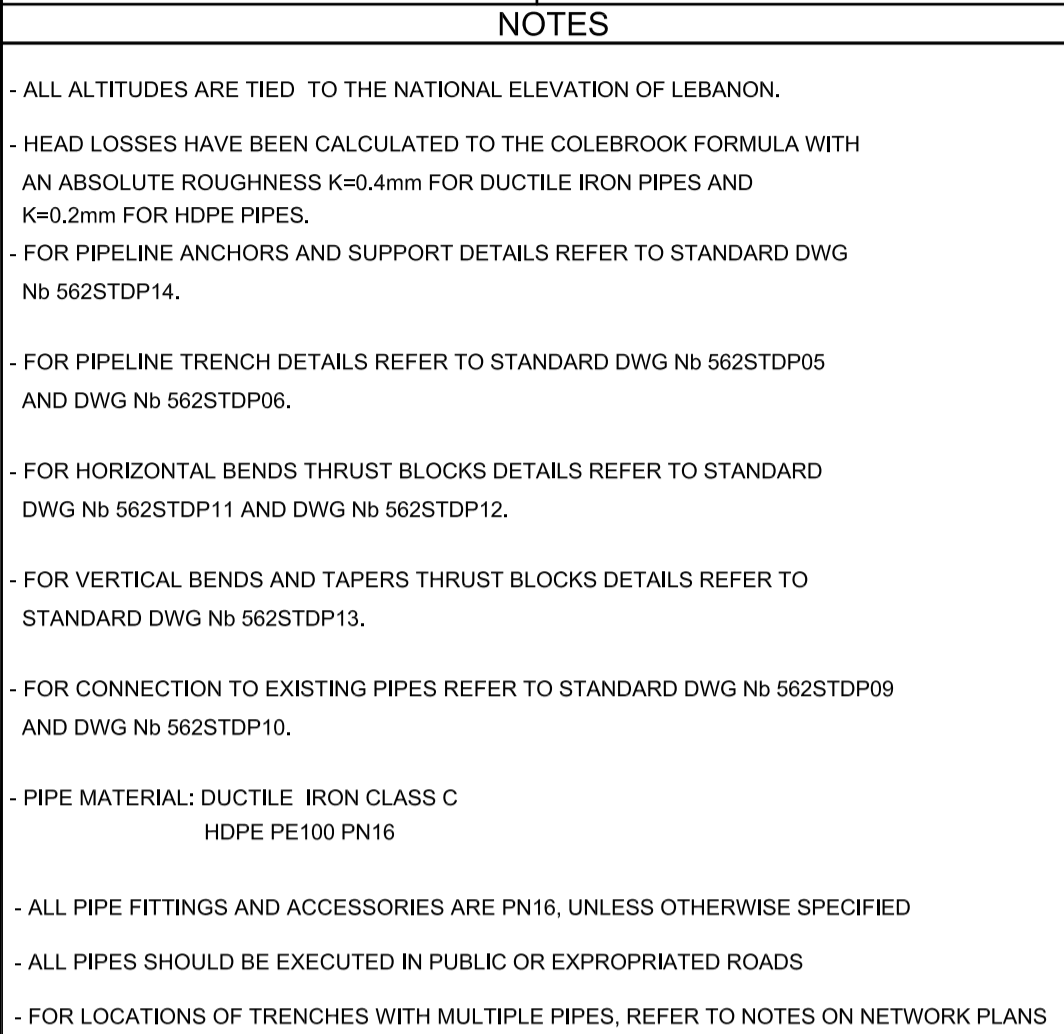
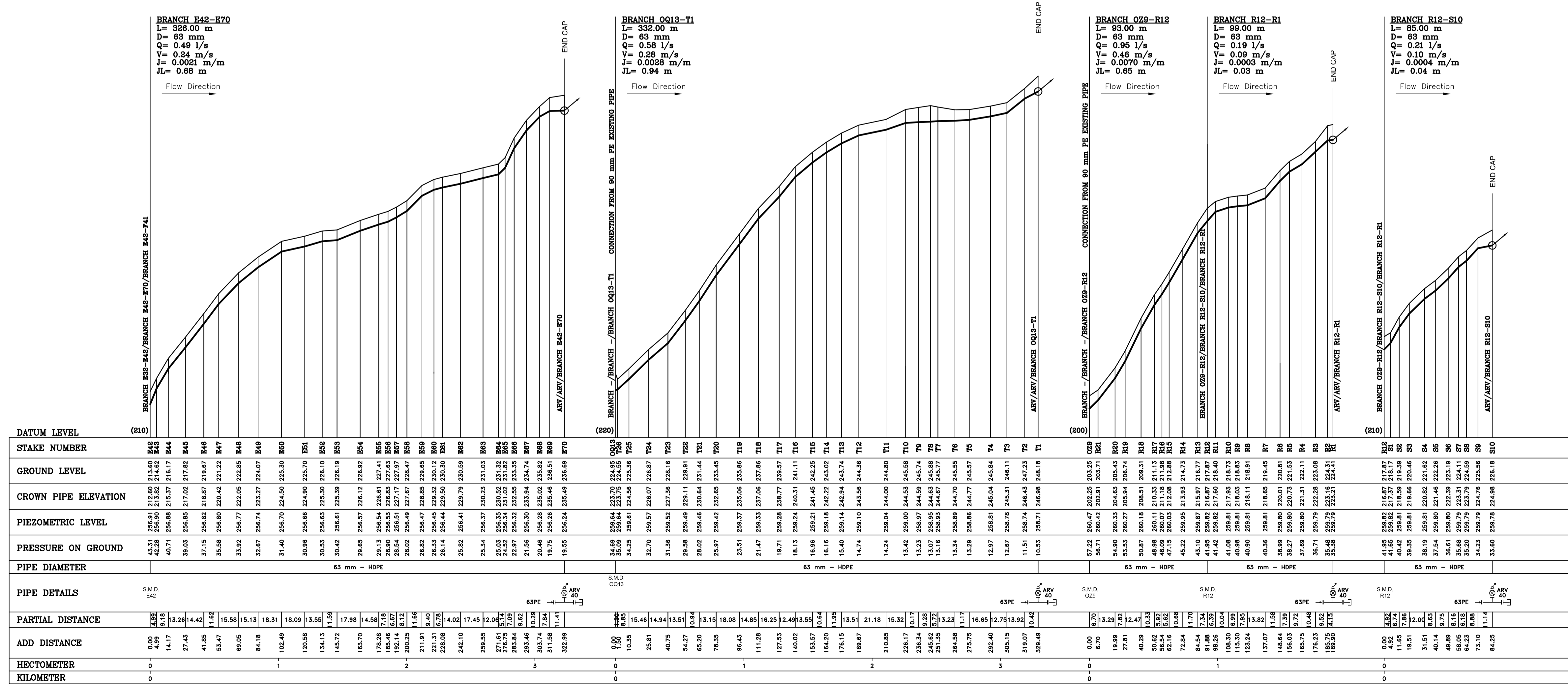
ED BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

JALL ED DIB – HAJAL Bldg TEL: (04) 712157 / 712158
P.O.BOX: 70492 – ANTELIAH FAX: (04) 712159

DISTRIBUTION NETWORK	PROFILE
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562W-DS-01-PR09	J. DACCACHE	R. MAKHOUL	T. ACHKAR
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MAY 2020	H = 1/2000 V = 1/200	9/13	28/33
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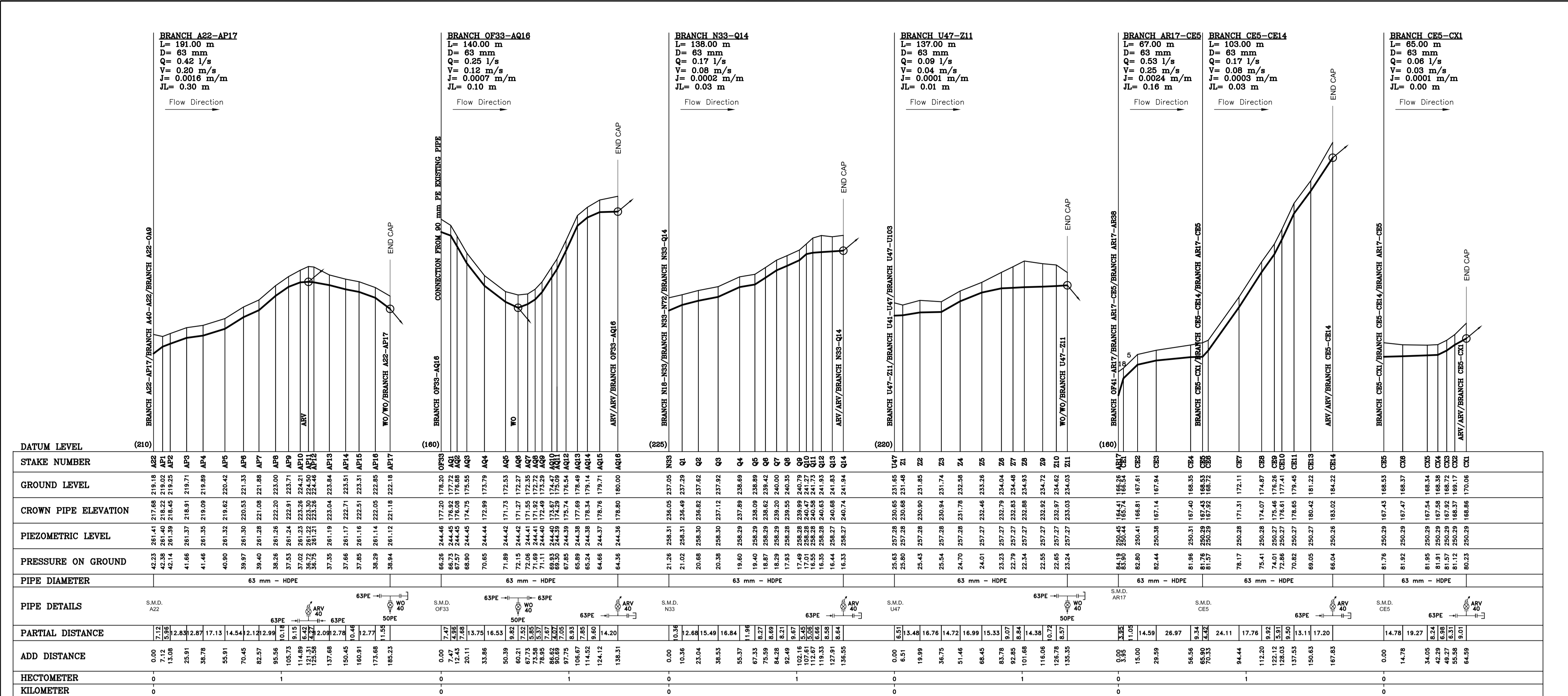


REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

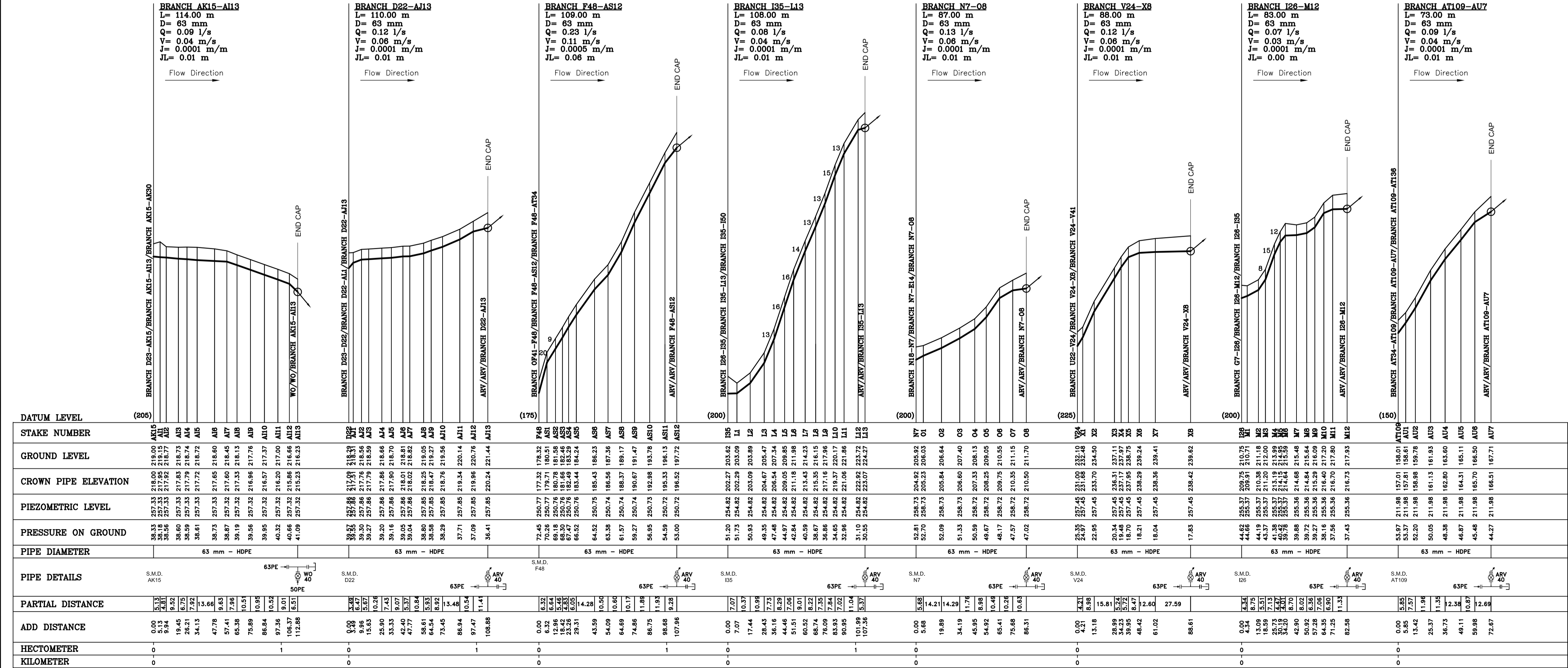
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562W-DS-01-PR10	J. DACCACHE	R. MAKHOUL	T. ACHKAR

<i>DATE</i>	<i>SCALE</i>	<i>SHEET No.</i>	<i>SEQ No.</i>
MAY 2020	H = 1/2000 V = 1/200	10/13	29/33



HYDRAULIC LEGEND		
PIPELINE		BEND 1/8
FLOW DIRECTION		A.V (AIR VALVE)
VALVE		W.O (WASHOUT)
TEE		FLANGED ADAPTER
REDUCER		END CAPS
PRESSURE REGULATING VALVE		S.M.D. B456
D.J.		SEE MANHOLE DETAILS OF STAKE B456 ON NETWORK PLANS
DISMANTLING JOINT		

- NOTES
- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.
 - HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND K=0.2mm FOR HDPE PIPES.
 - FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG N° 562STDPI4.
 - FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG N° 562STDPI5 AND DWG N° 562STDPI6.
 - FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG N° 562STDPI11 AND DWG N° 562STDPI2.
 - FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG N° 562STDPI3.
 - FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG N° 562STDPI9 AND DWG N° 562STDPI10.
 - PIPE MATERIAL: DUCTILE IRON CLASS C
HDPE PE100 PN16
 - ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED
 - ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS
 - FOR LOCATIONS OF TRENCHES WITH MULTIPLE PIPES, REFER TO NOTES ON NETWORK PLANS



REPUBLIC OF LEBANON

MINISTRY OF ENERGY AND WATER

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ED BUREAU TECHNIQUE POUR LE DEVELOPEMENT

JALL ED DIB - HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

DISTRIBUTION NETWORK	PROFILE

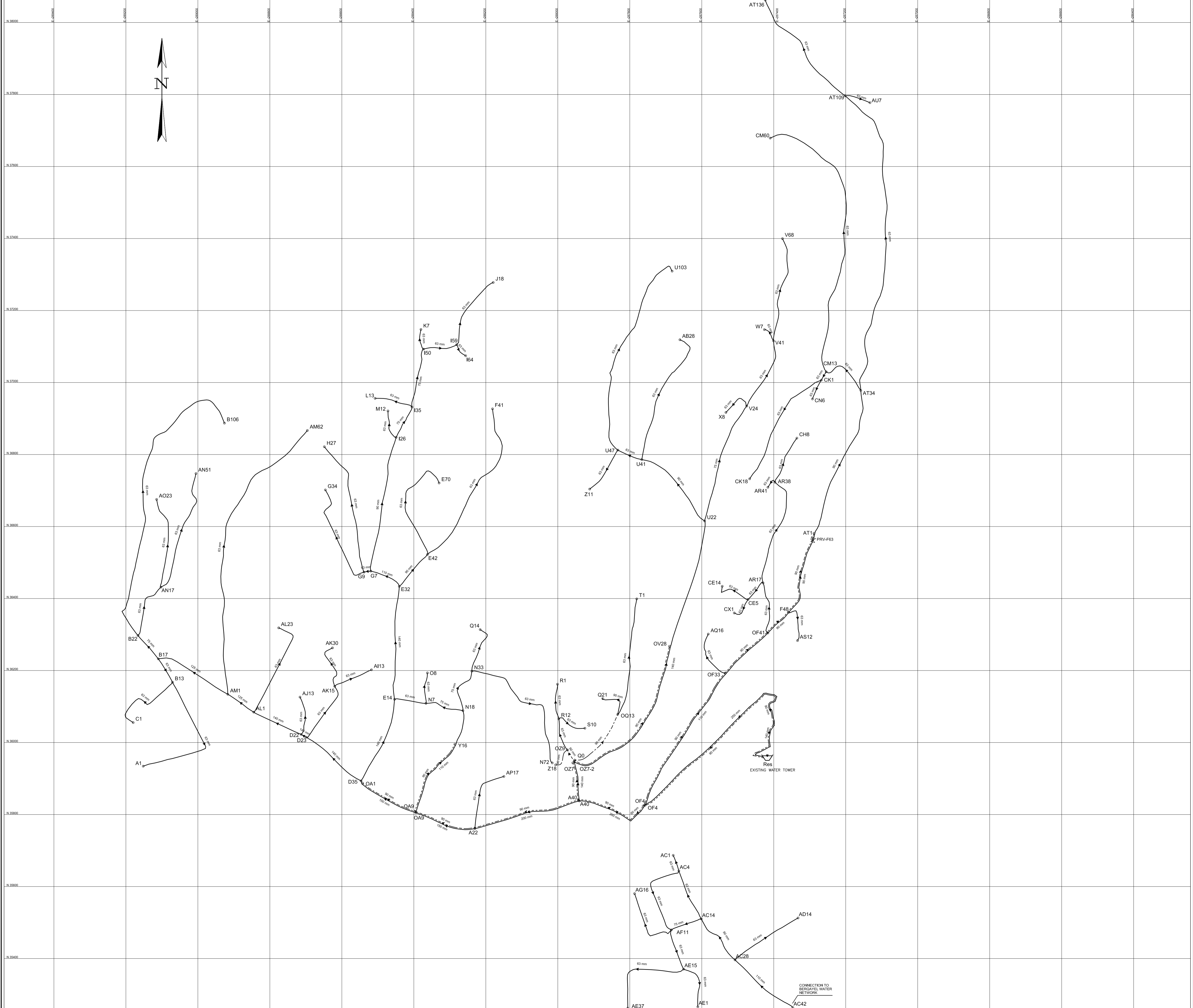
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562W-DS-01-PR11	J. DACCACHE	R. MAKHOUL	T. ACHKAR







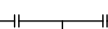





DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	H = 1/2000 V = 1/200	11/13	30/33



















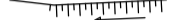

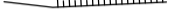










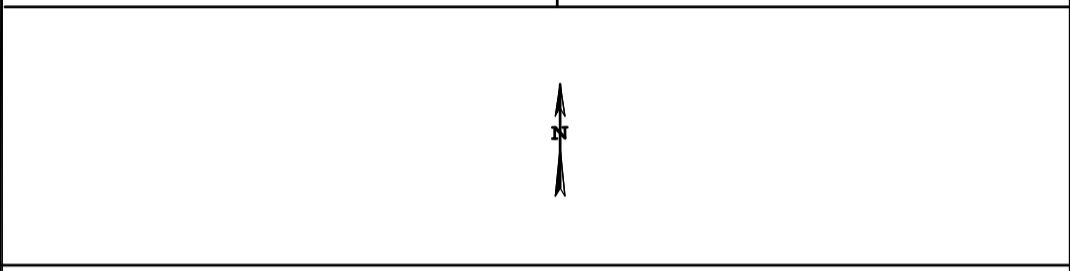
<i>DRAWING No.</i>	<i>DESIGNED BY</i>	<i>DRAWN BY</i>	<i>CHECKED BY</i>
562W-DS-01-PR12	J. DACCACHE	R. MAKHOUL	T. ACHKAR

<i>DATE</i>	<i>SCALE</i>	<i>SHEET No.</i>	<i>SEQ No.</i>
MAY 2020	H = 1/2000 V = 1/200	12/13	31/33



HYDRAULIC LEGEND			
PIPELINE		BEND 1/8	
FLOW DIRECTION		ARV (AIR VALVE)	
VALVE		W.O (WASHOUT)	
TEE		FLANGED ADAPTER	
REDUCER		END CAPS	
PRESSURE REGULATING VALVE		EXISTING PIPE	

TOPOGRAPHICAL LEGEND			
	BUILDING & BUILDING CODE REFER TO NETWORK PLANS		MANHOLE SEWER
	PAVED ROAD		MANHOLE WATER
	CONCRETE ROAD		MANHOLE NOT IDENTIFIED
	TRACK		LIGHTING POLE
	REFERENCE LINE		TELEPHONE POLE
	CHANNEL		TRIANGULATION STATION
	TERRACE		ELECTRIC SUB STATION
	FENCE		ELECTRIC POLE/TELEGRAPH POLE
	STREAM/RIVER		STAKE NUMBER
	CULVERT/BRIDGE		SPOT HEIGHT
	SPRING		PLOT No
	WELL		BOUNDARY
	DECIDUOUS/PINE TREE		CIRCUMSCRIPTION BOUNDARY
	ROCKS		
	DownHill		
	HighHill		



NOTES					
- ALL ALTITUDES ARE TIED TO THE NATIONAL ELEVATION OF LEBANON.					
- HEAD LOSSES HAVE BEEN CALCULATED TO THE COLEBROOK FORMULA WITH AN ABSOLUTE ROUGHNESS K=0.4mm FOR DUCTILE IRON PIPES AND K=0.2mm FOR HDPE PIPES.					
- FOR PIPELINE ANCHORS AND SUPPORT DETAILS REFER TO STANDARD DWG Nb 562STD14.					
- FOR PIPELINE TRENCH DETAILS REFER TO STANDARD DWG Nb 343STD05 AND DWG Nb 562STD08.					
- FOR HORIZONTAL BENDS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD11 AND DWG Nb 562STD12.					
- FOR VERTICAL BENDS AND TAPERS THRUST BLOCKS DETAILS REFER TO STANDARD DWG Nb 562STD13.					
- FOR CONNECTION TO EXISTING PIPES REFER TO STANDARD DWG Nb 343STD09 AND DWG Nb 562STD10.					
- PIPE MATERIAL: DUCTILE IRON CLASS C HDPE PE100 PN16					
- ALL PIPE FITTINGS AND ACCESSORIES ARE PN16, UNLESS OTHERWISE SPECIFIED					
- ALL PIPES SHOULD BE EXECUTED IN PUBLIC OR EXPROPRIATED ROADS					
Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

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

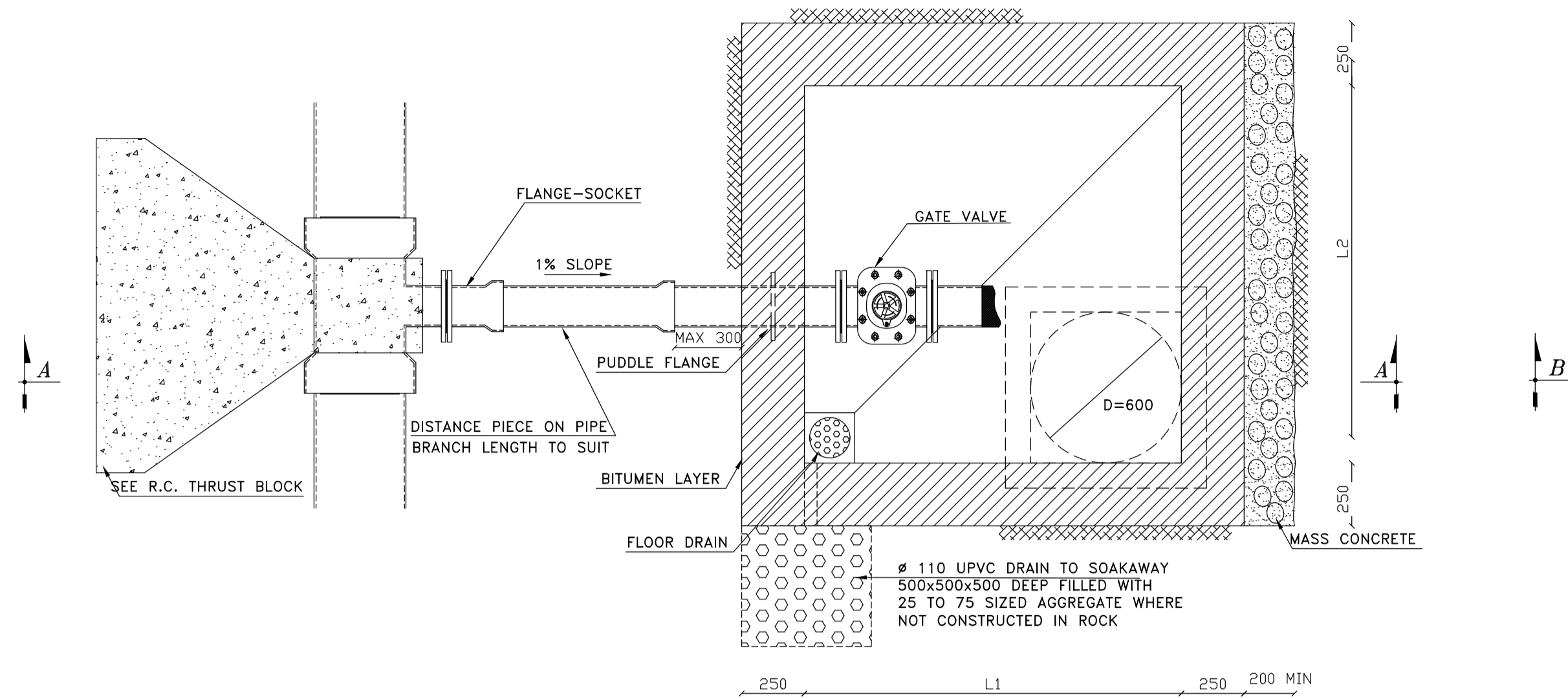
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

DISTRIBUTION NETWORK	SCHEMATIC PLAN
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562W-DS-01-SC01	J. DACCACHE	R. MAKHOUL	T. ACHKAR

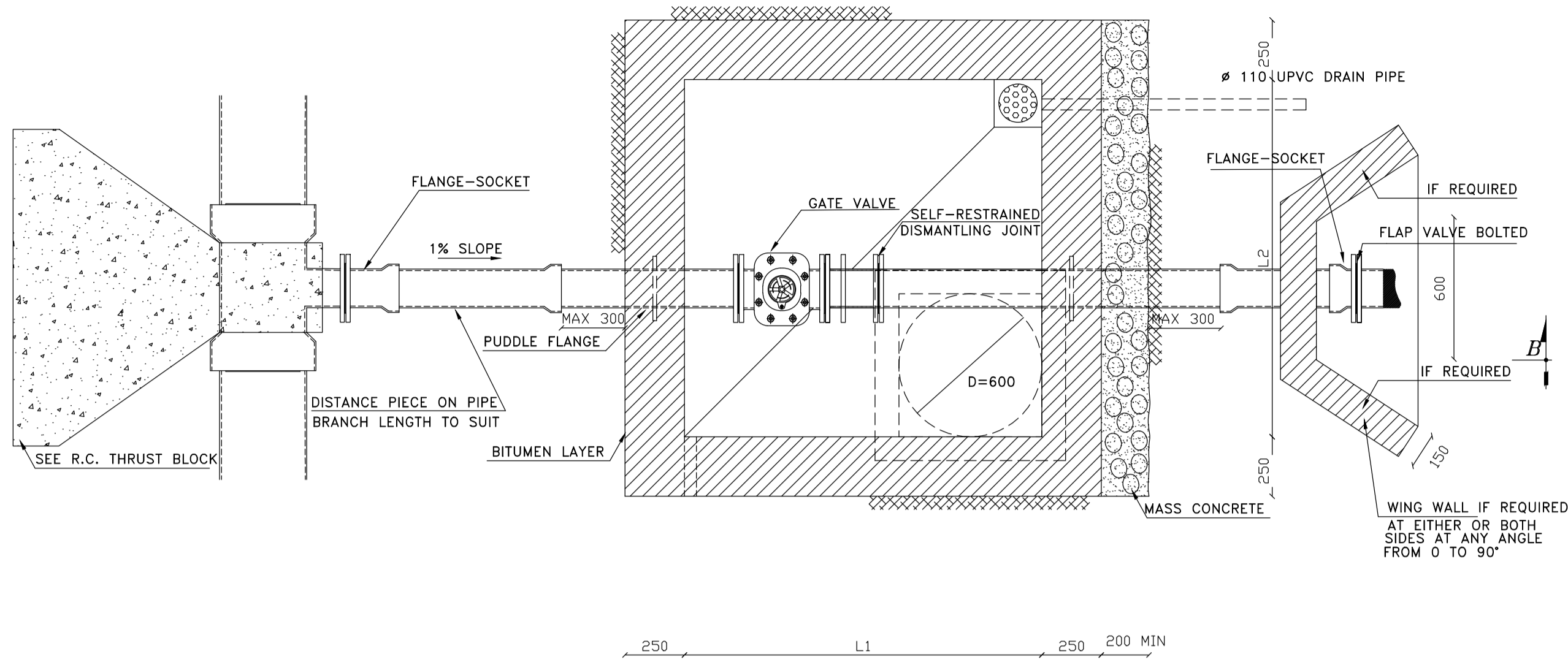
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	1:5000	1/1	33/33

TYPICAL WASHOUT CHAMBER DETAIL
TYPE I

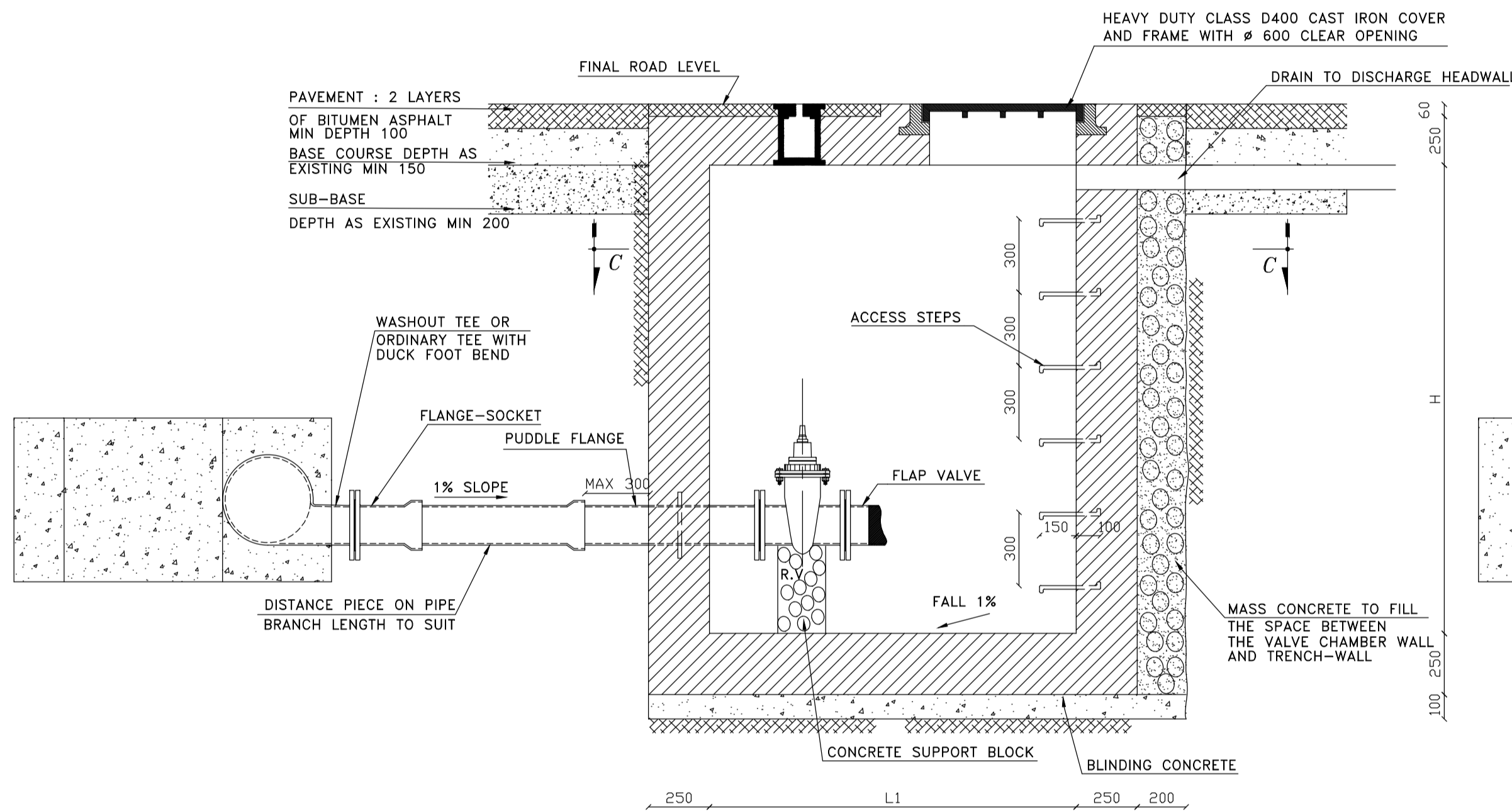


SECTION C-C

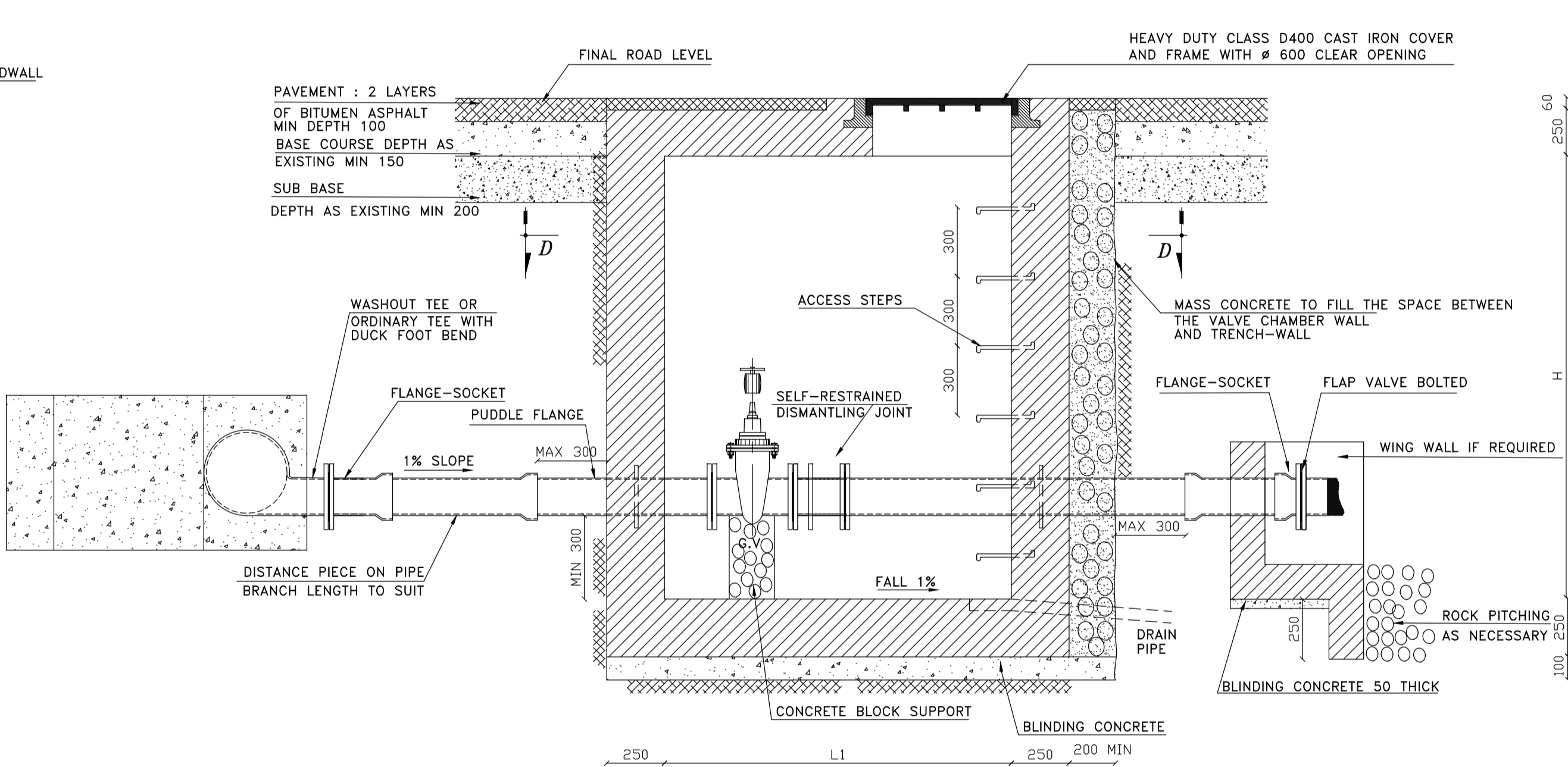
TYPICAL WASHOUT CHAMBER DETAIL
TYPE II



SECTION D-D

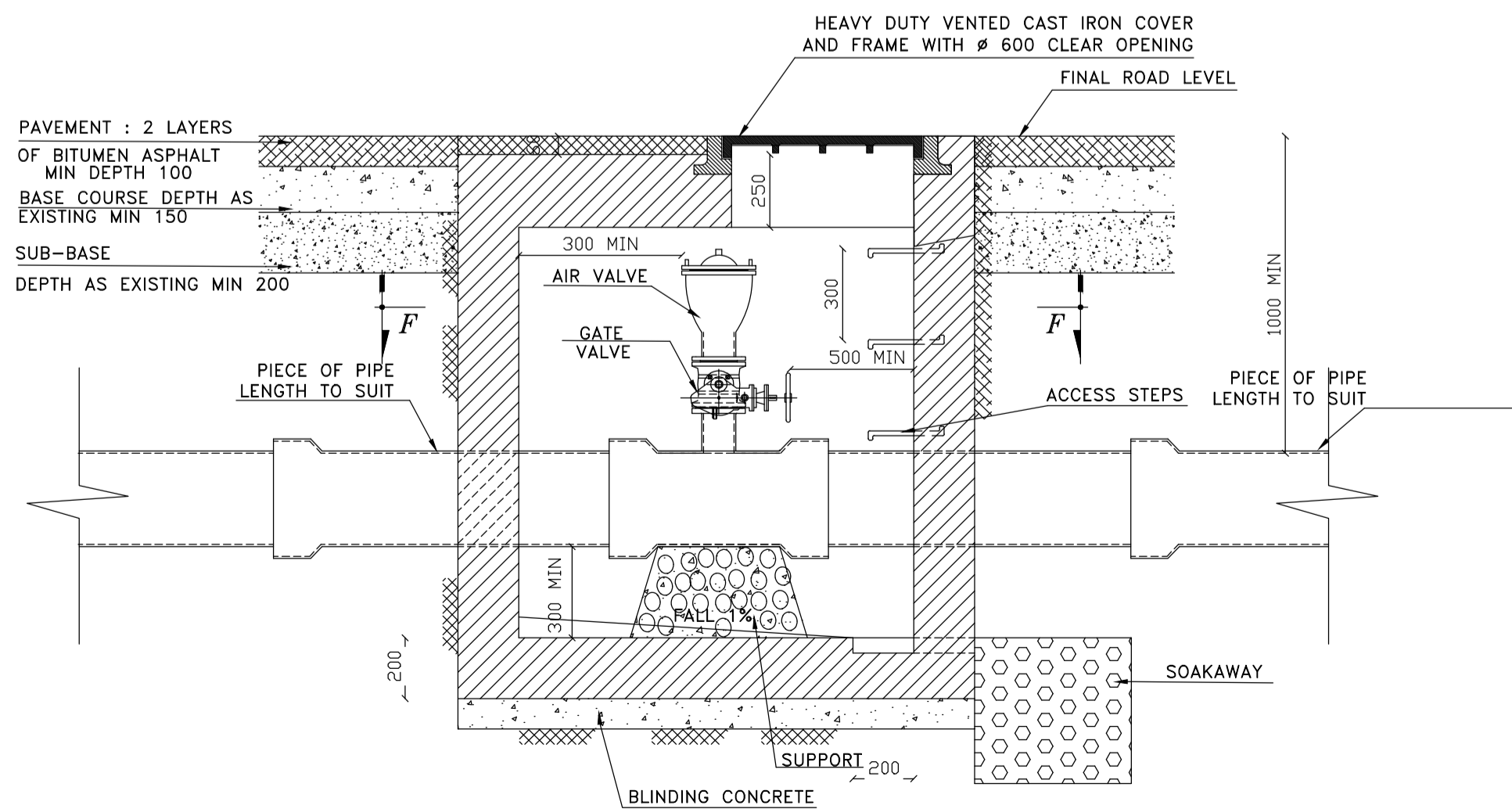


SECTION A-A

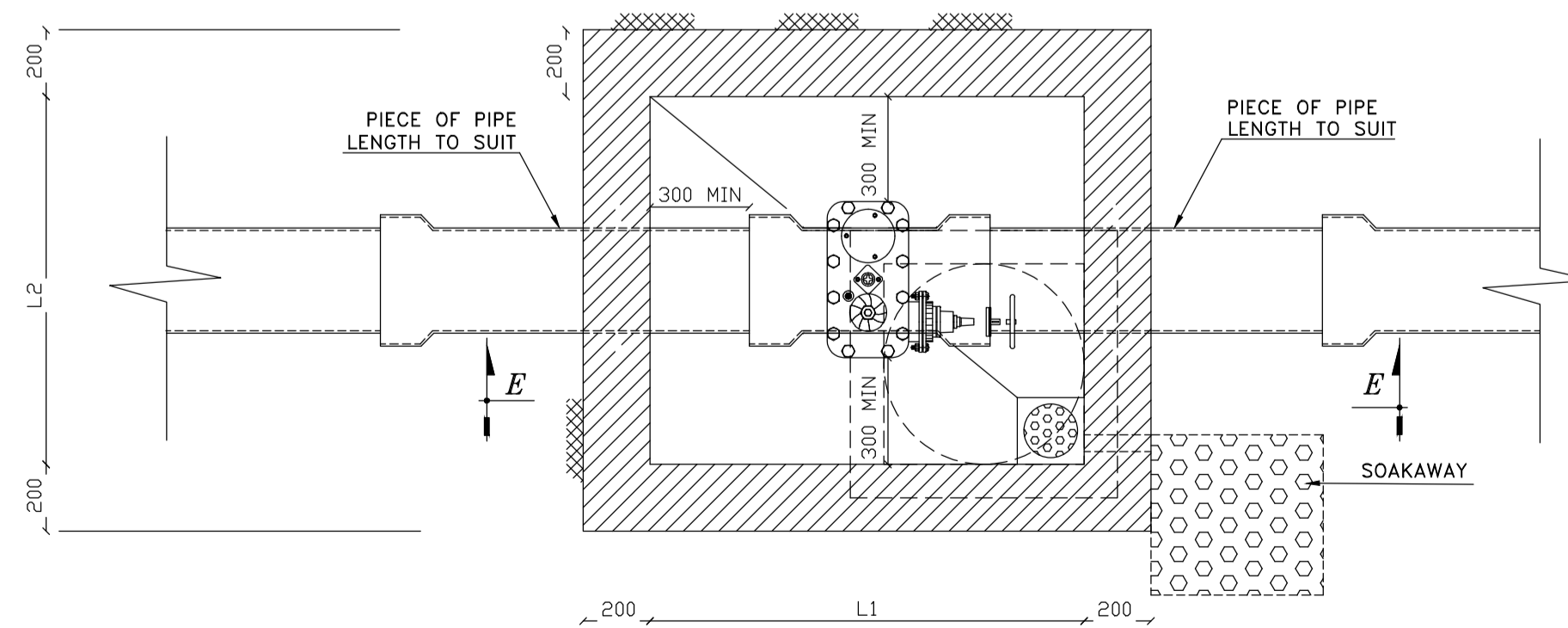


SECTION B-B

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: F_y=400 MPa.
MILD STEEL BARS: SYMBOL Ø YIELD STRESS: F_y=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
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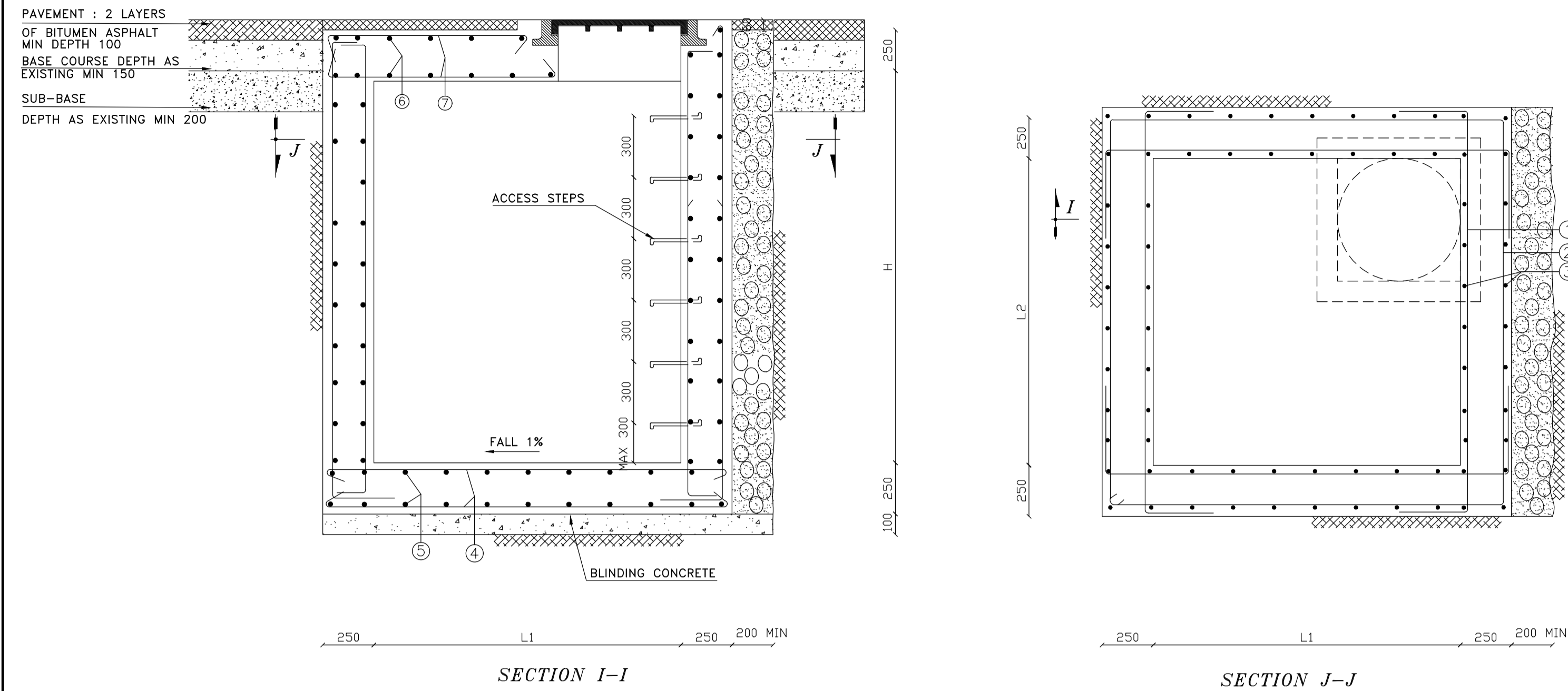
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND DISTRIBUTION SYSTEMS	WASHOUT AND AIR VALVE CHAMBER DETAILS
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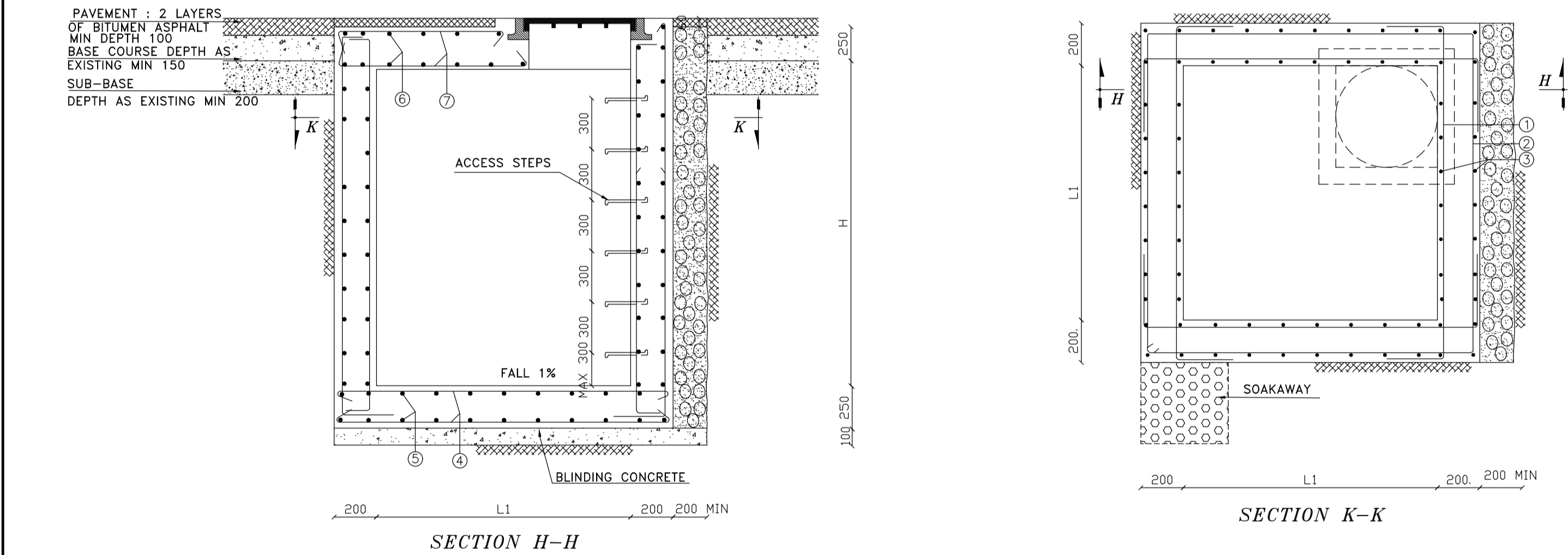
DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD01	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	1/23	01

TYPICAL REINFORCEMENT DETAIL FOR WASHOUT CHAMBER
NOT TO SCALE



TYPICAL REINFORCEMENT DETAIL FOR AIR VALVE CHAMBER
NOT TO SCALE



TYPICAL SINGLE OR DOUBLE AIR VALVE CHAMBER
REINFORCEMENT STEEL TABLE

PIPE DIAMETER	REINFORCEMENT						
D mm	1 mm	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm
80-150	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
200-250	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
300-400	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
450-600	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
700-800	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
900-1000	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200

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		H
		L1	L2	L1	L2	
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 mm	1 mm	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm
80-150	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
250	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
300-350	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200

TABLE 2 OF 2

PIPE DIAMETER	REINFORCEMENT						
D mm	1 mm	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm
400-450	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
500	T14 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
600<D<900	T14 Ø200	T14 Ø200	T14 Ø200	T14 Ø200	T14 Ø200	T14 Ø200	T14 Ø200

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 ≤ D ≤ 600	150	1500	1500	1650

REINFORCEMENT STEEL TABLE

PIPE DIAMETER	REINFORCEMENT						
D mm	1 mm	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm
80-125	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
150	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
200	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
250	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200
300 ≤ D ≤ 600	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T14 Ø200	T14 Ø200

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 2x5ø.
(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
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

**BUREAU TECHNIQUE POUR LE DEVELOPPEMENT**

JALL ED DIB - HAJAL Bldg
P.O.BOX:70492 - ANTELIAS

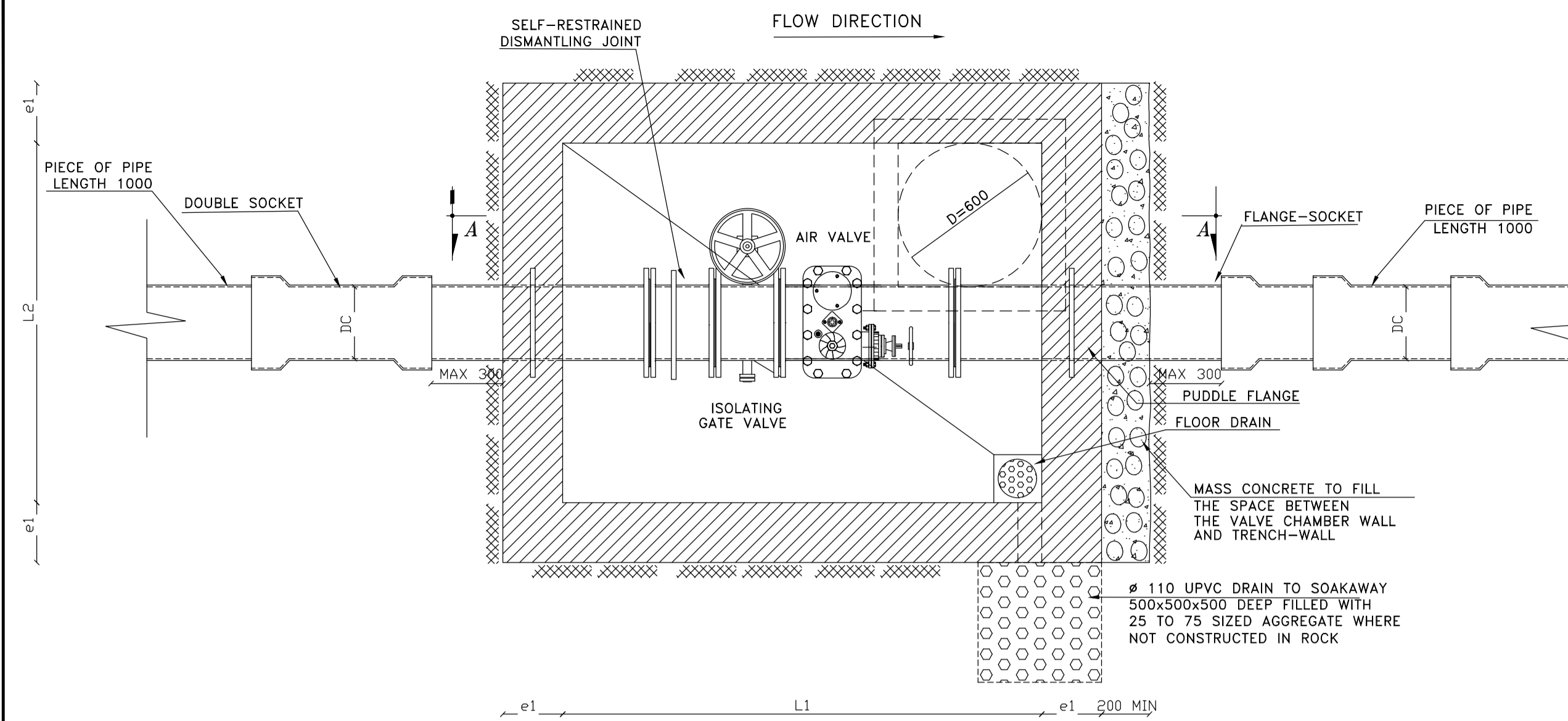
PHONE:(04) 712157/712158 (03) 291016
FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

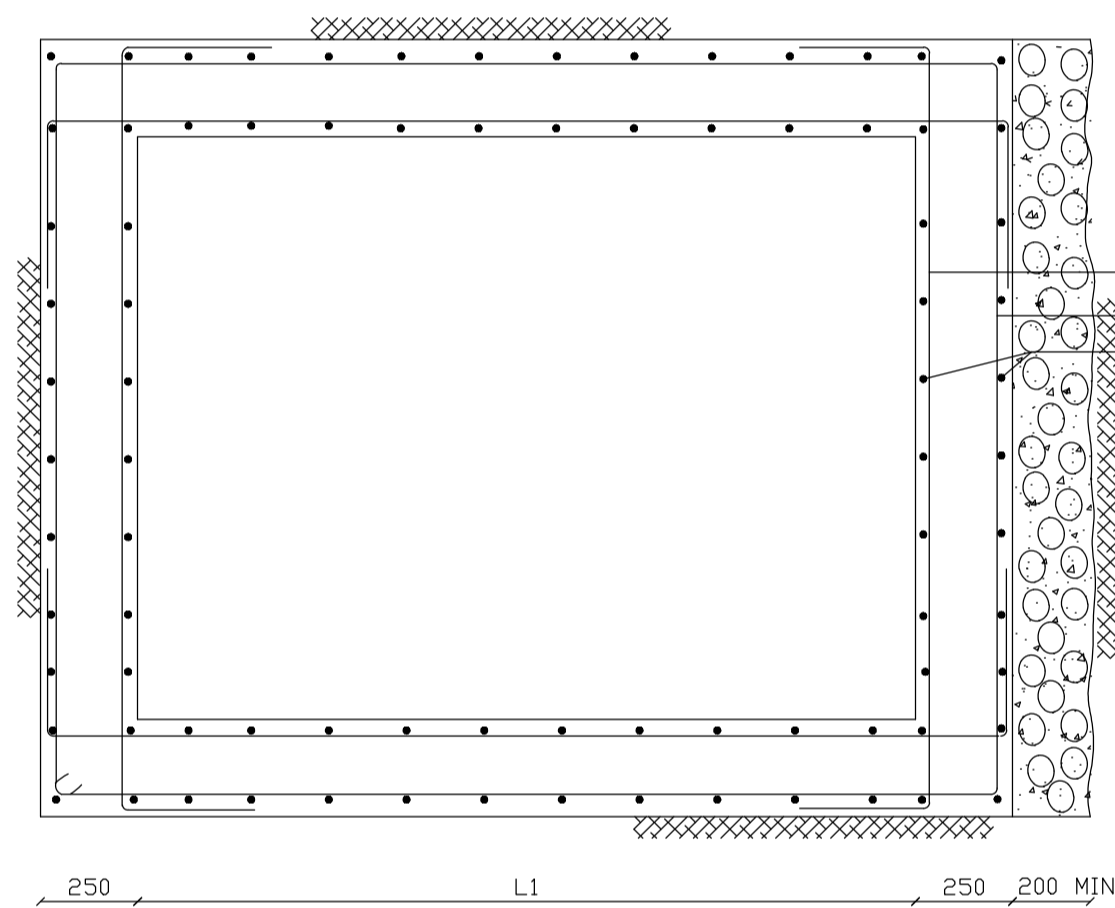
TRANSMISSION AND DISTRIBUTION SYSTEMS	WASHOUT AND AIR VALVE CHAMBER DETAILS
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562STDPO2	BTD	BTD	BTD

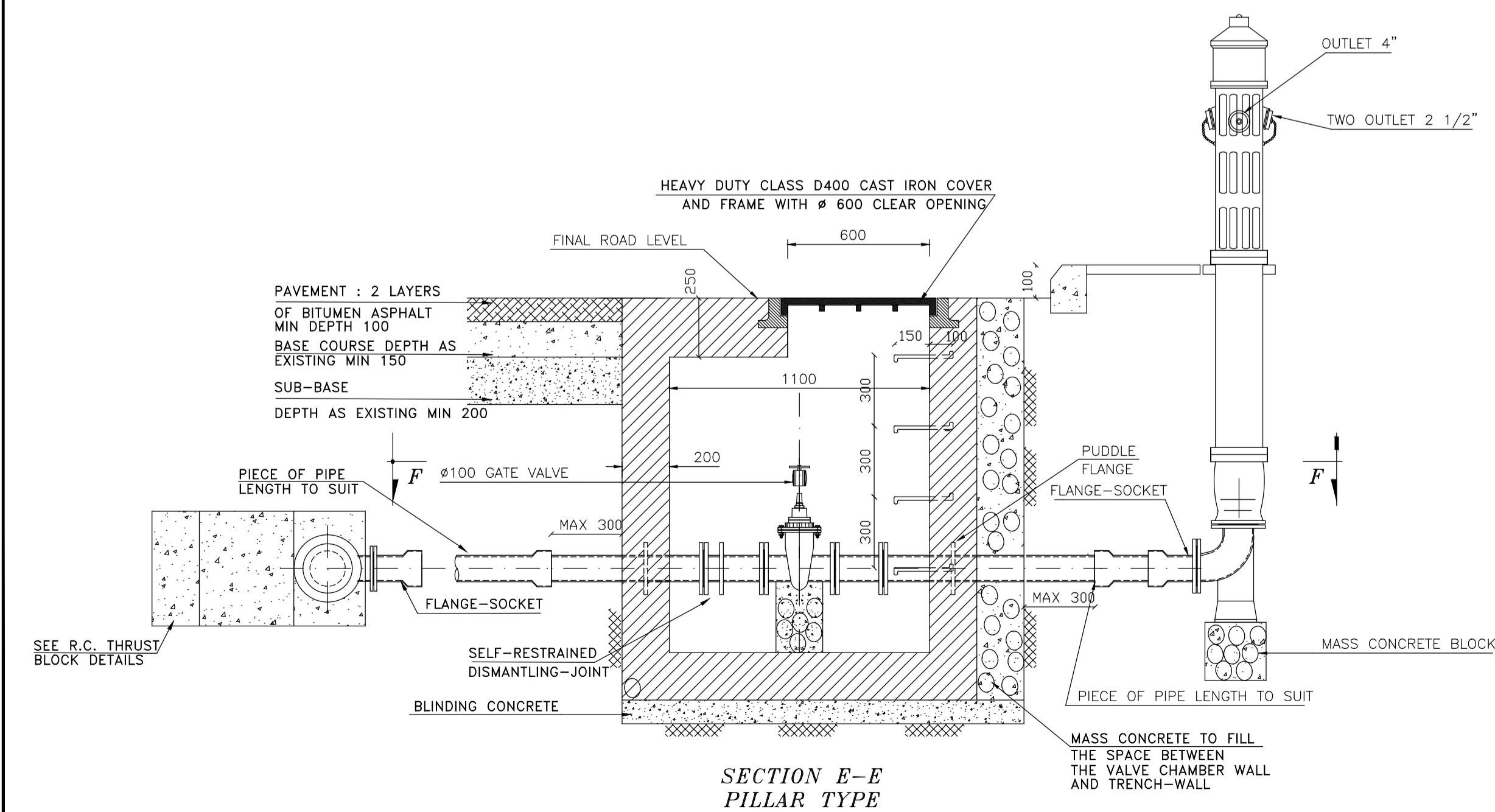
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	1:50 - 1:20	2/23	02



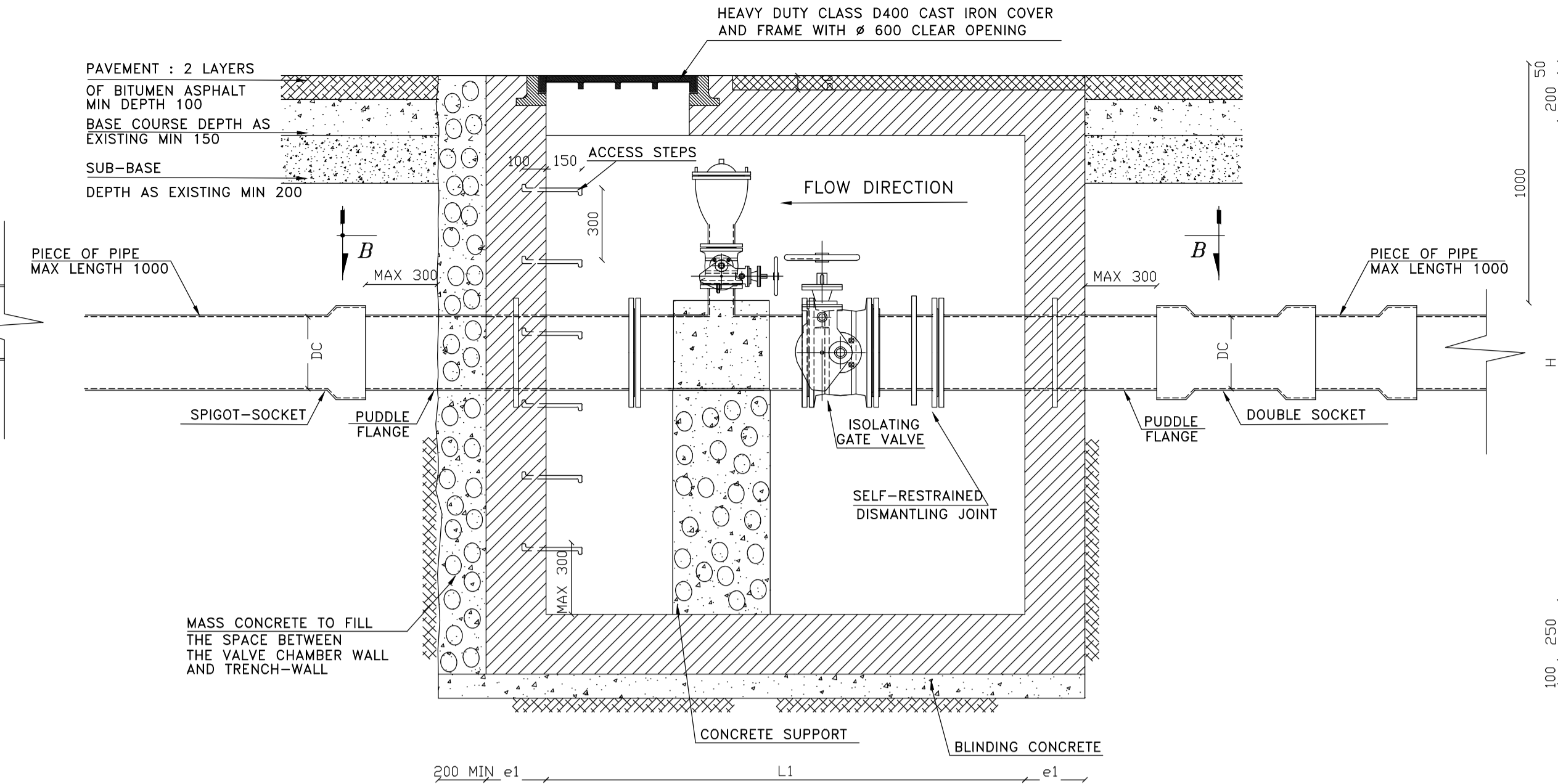
SECTION B-B
TYPICAL STOP VALVE CHAMBER DETAIL



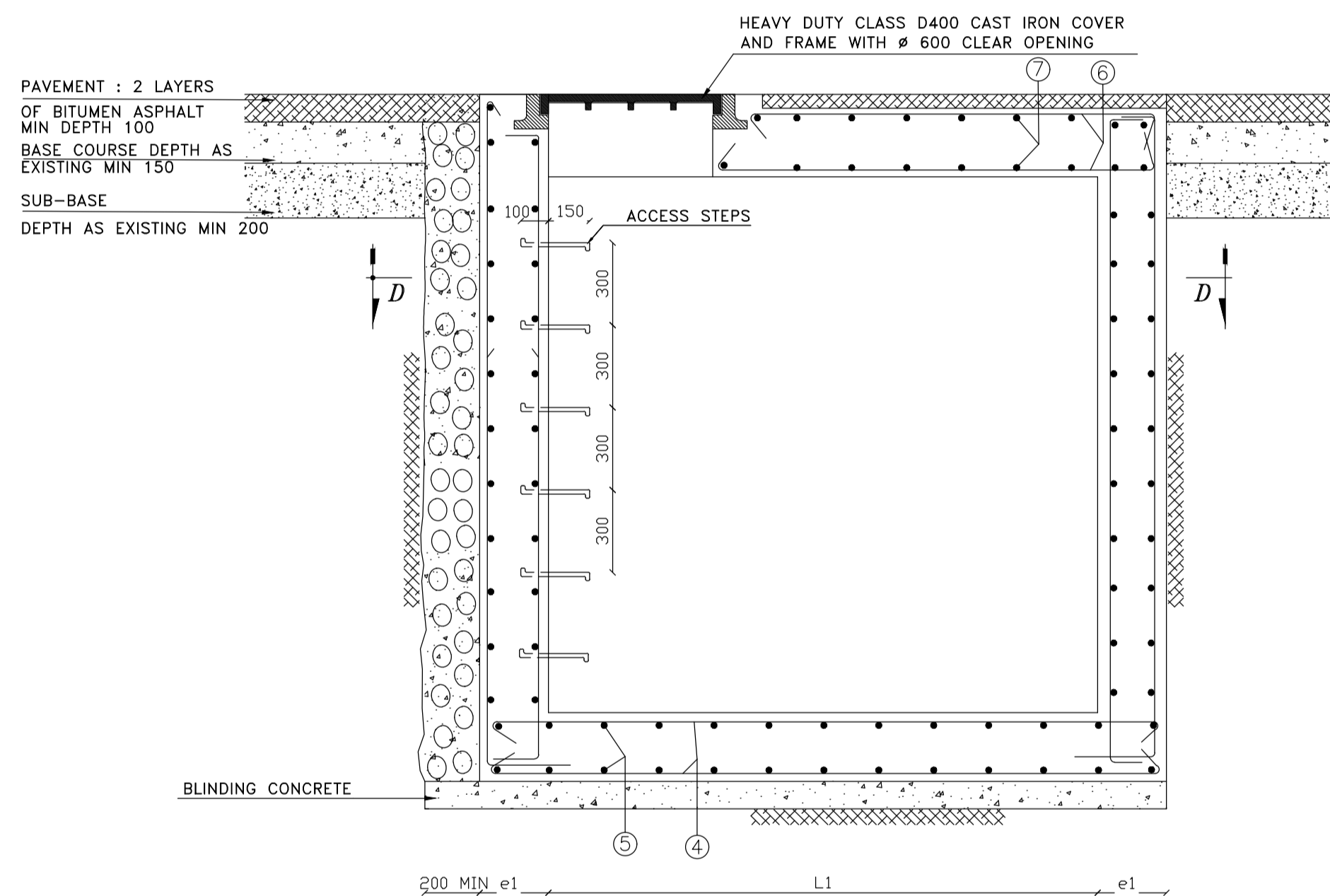
SECTION D-D
TYPICAL VALVE CHAMBER REINFORCEMENT DETAILS



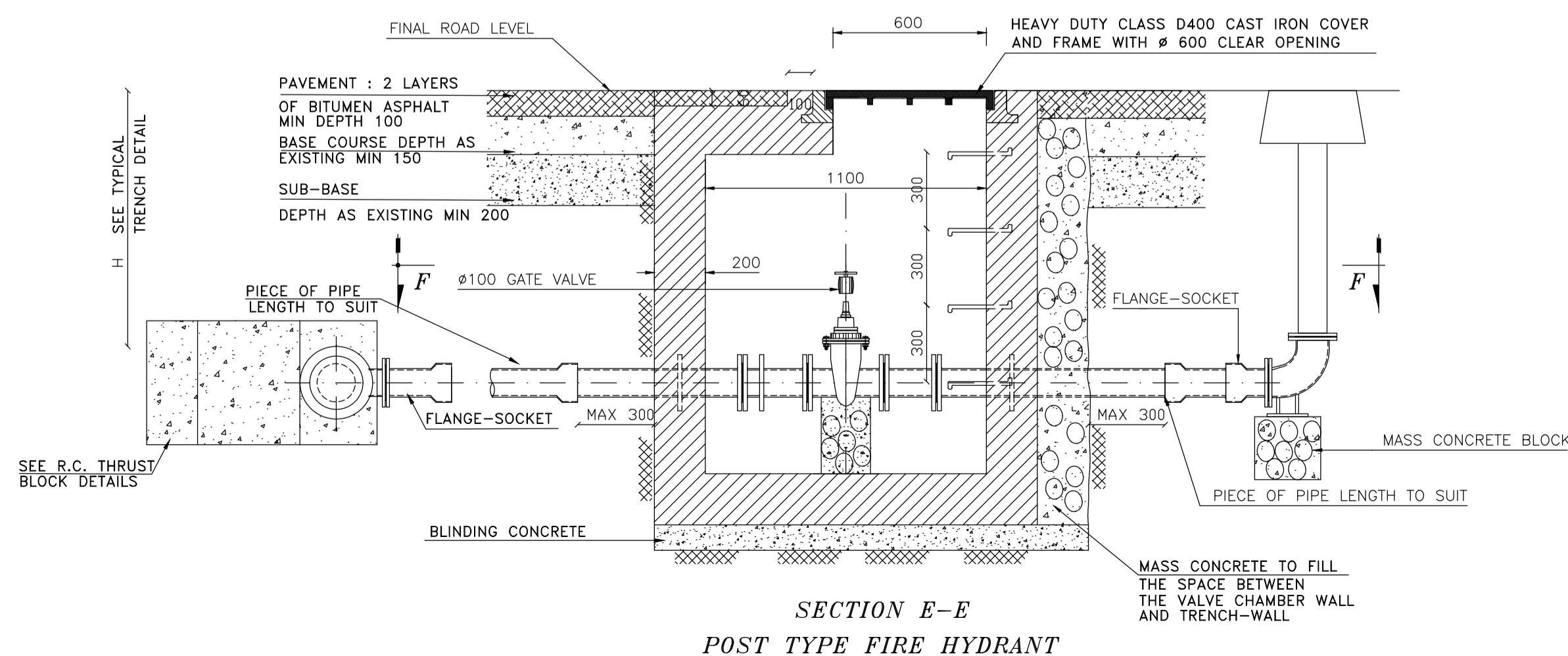
SECTION E-E
PILLAR TYPE



SECTION A-A
TYPICAL STOP VALVE CHAMBER DETAIL



SECTION A-A
TYPICAL VALVE CHAMBER REINFORCEMENT DETAILS



SECTION E-E
POST TYPE FIRE HYDRANT

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: F_y=400 MPa.
MILD STEEL BARS: SYMBOL Ø YIELD STRESS: F_y=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 SPICE 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.
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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

MINISTRY OF ENERGY AND WATER

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

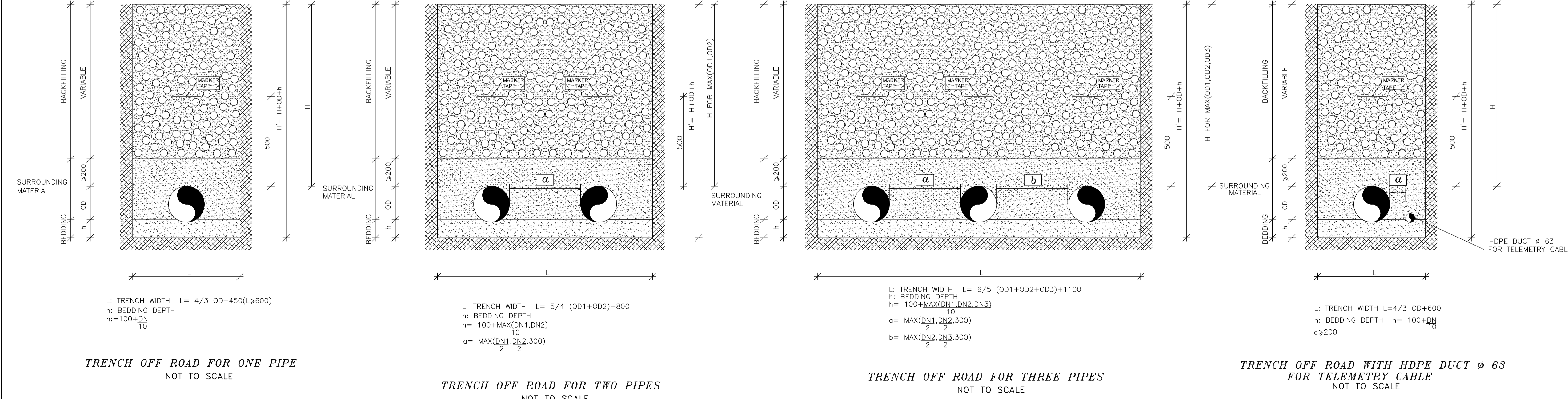
JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

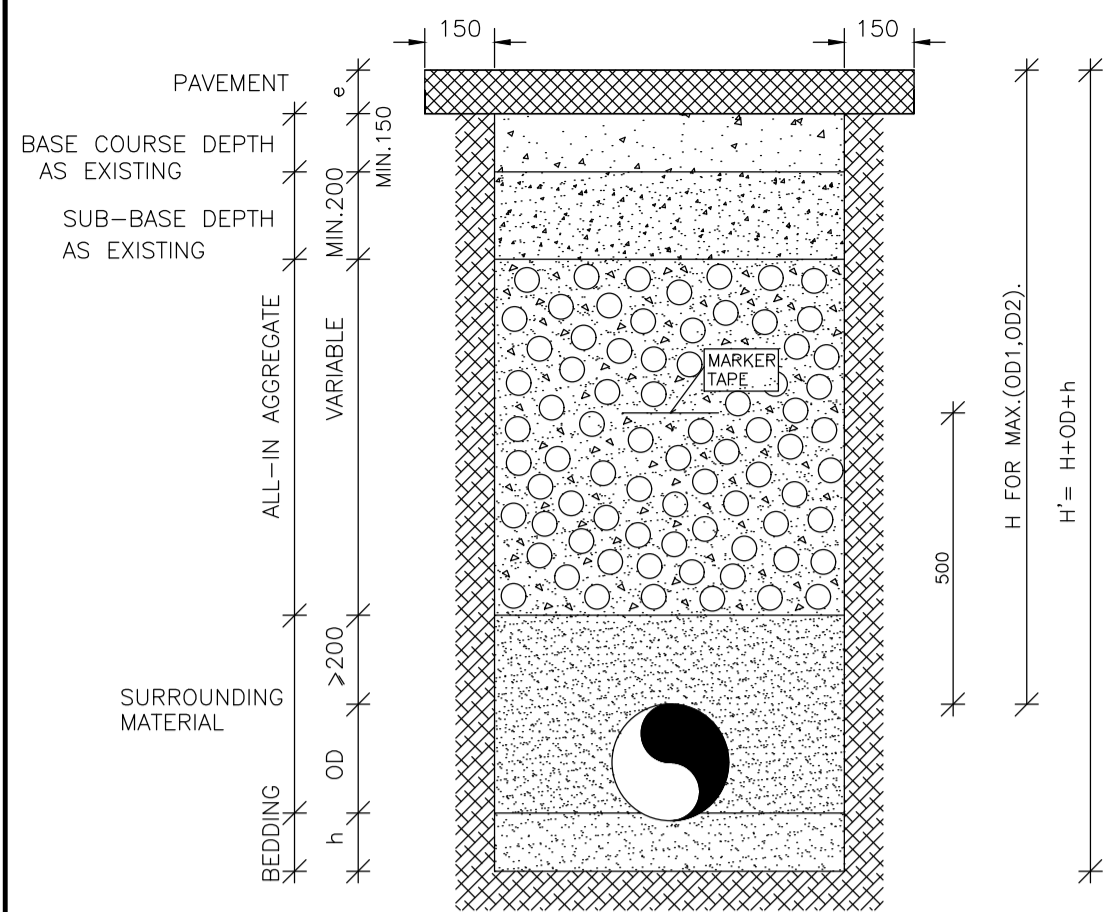
TRANSMISSION AND DISTRIBUTION SYSTEMS	STOP VALVE AND FIRE HYDRANT TYPICAL VALVE CHAMBER DETAILS
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD03	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	3/23	03

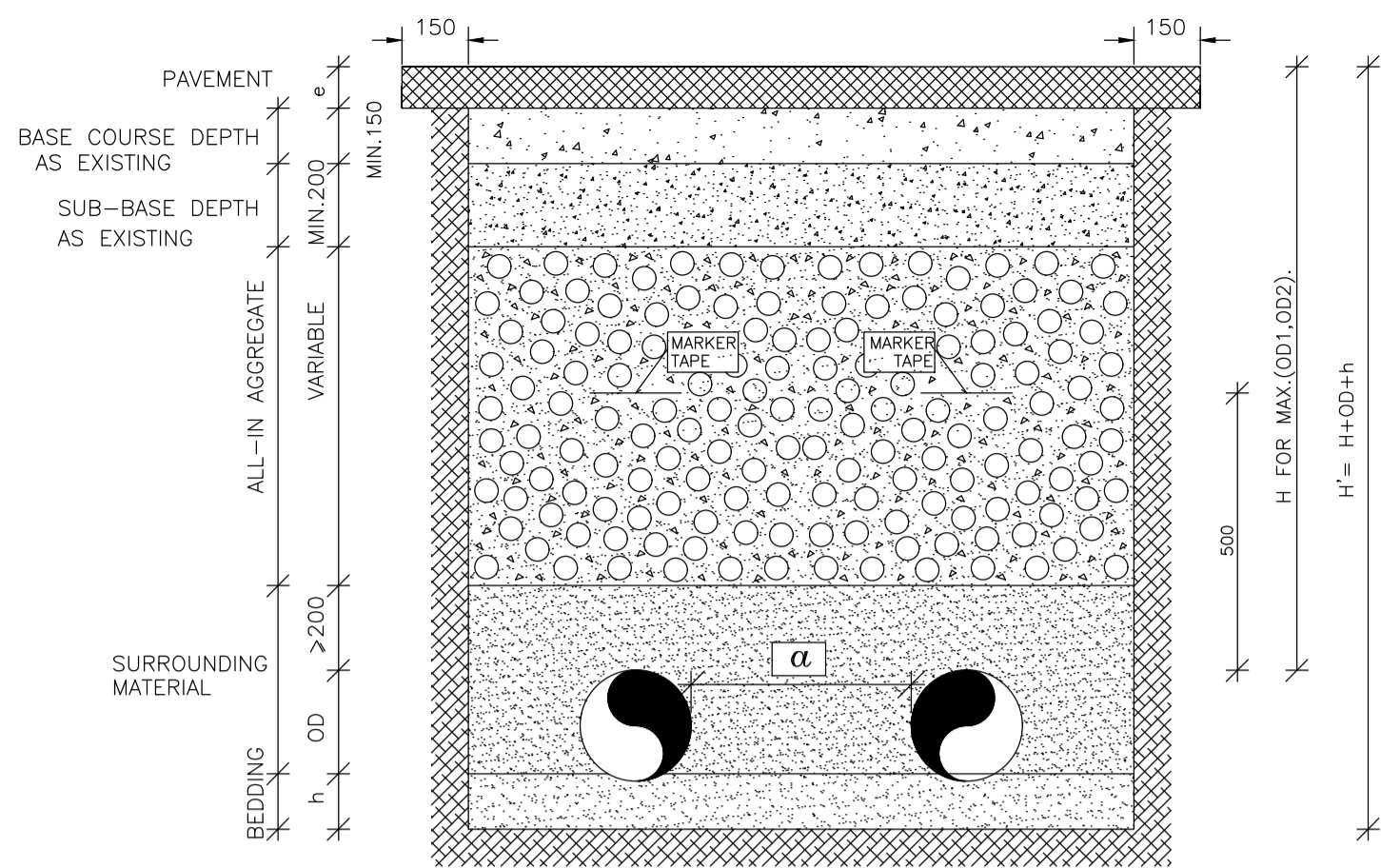


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MAY 2020	1:50 - 1:20	5/23	05



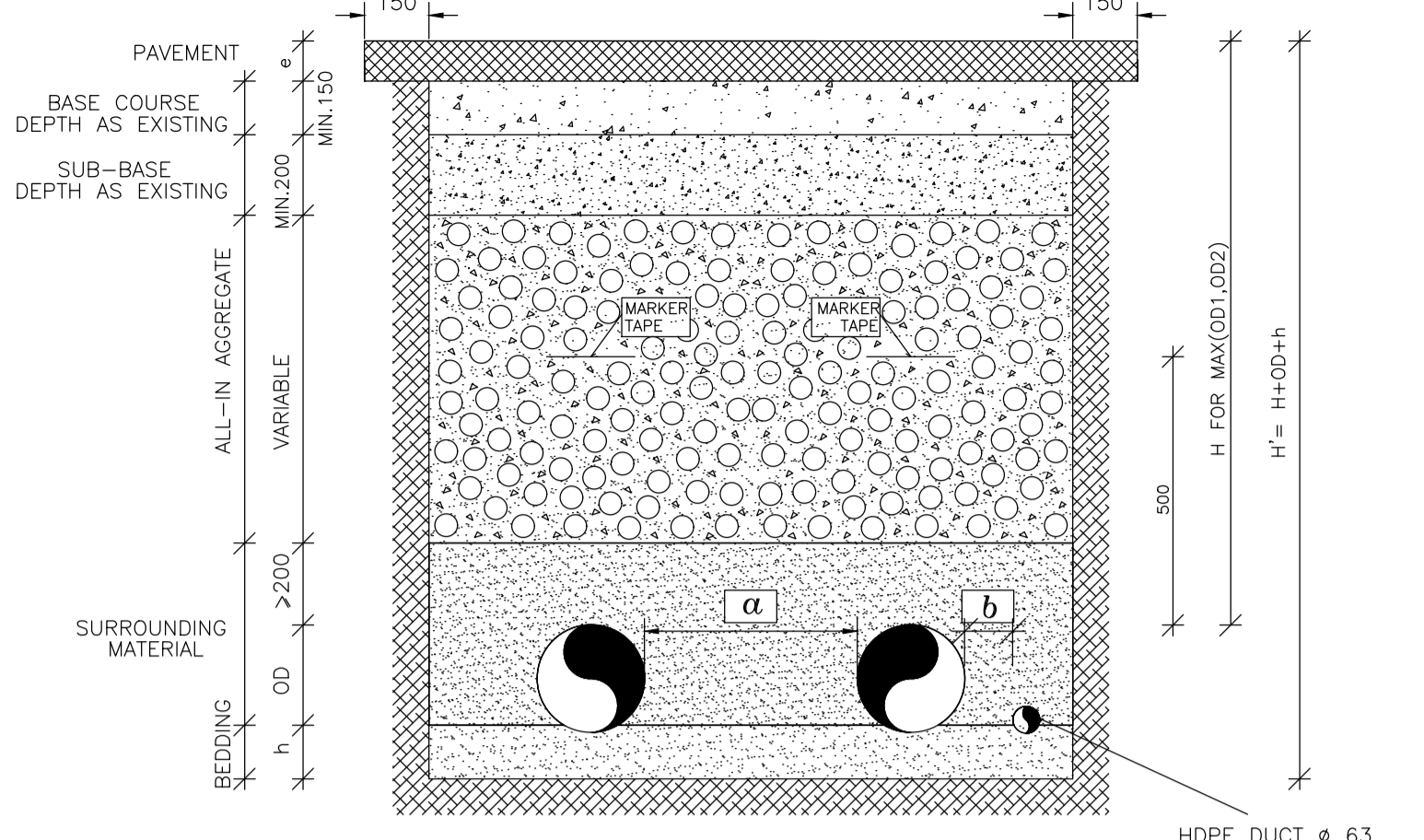
L: TRENCH WIDTH $L = \frac{4}{3} OD + 450 (L > 600)$
h: BEDDING DEPTH $h = 100 + \frac{DN}{10}$

TRENCH IN ROAD FOR ONE PIPE
NOT TO SCALE



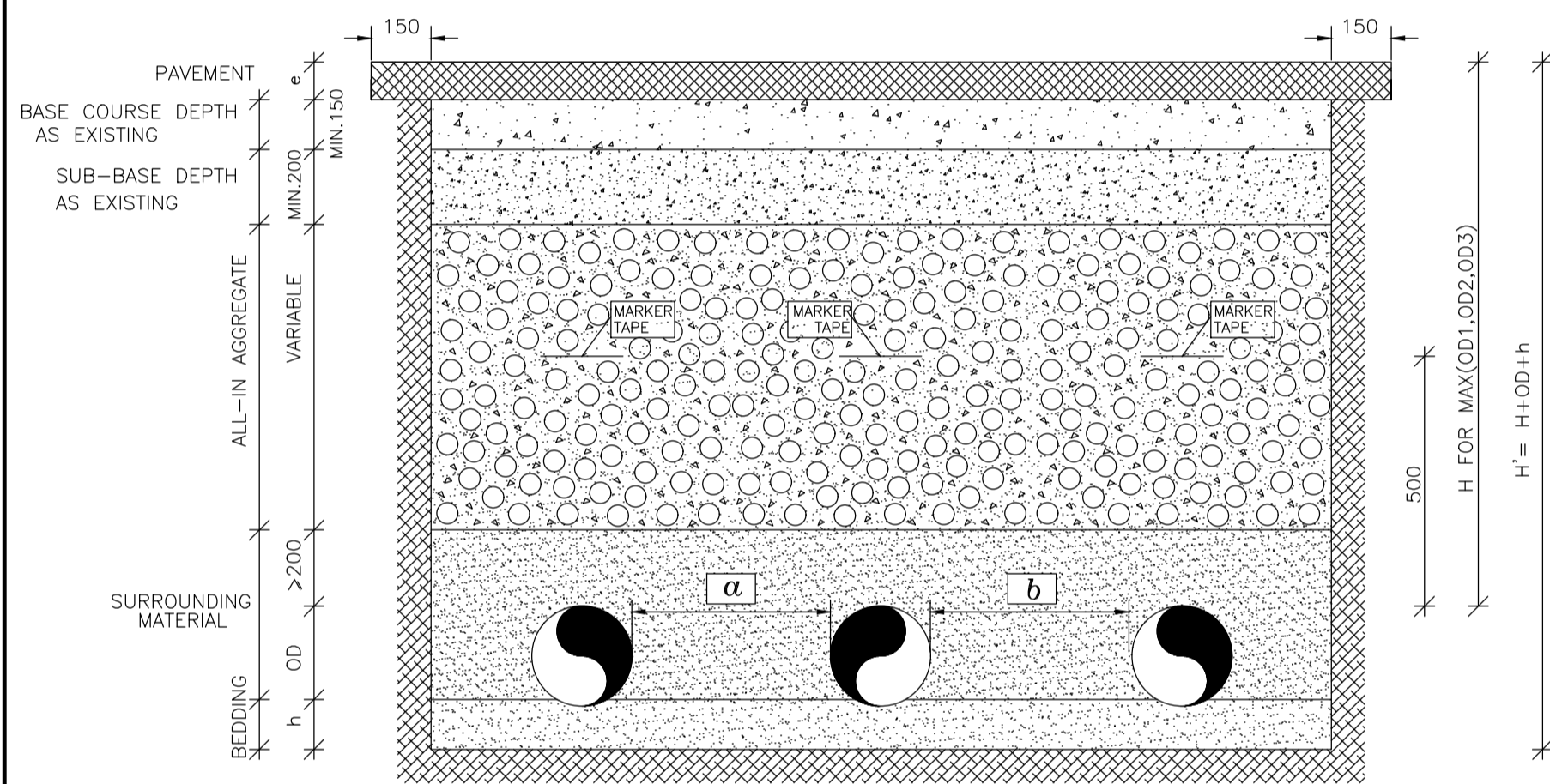
L: TRENCH WIDTH $L = \frac{5}{4} (OD1 + OD2) + 800$
h: BEDDING DEPTH $h = 100 + \frac{\text{MAX}(DN1, DN2)}{10}$
 $a = \frac{\text{MAX}(DN1, DN2, 300)}{2}$

TRENCH IN ROAD FOR TWO PIPES
NOT TO SCALE



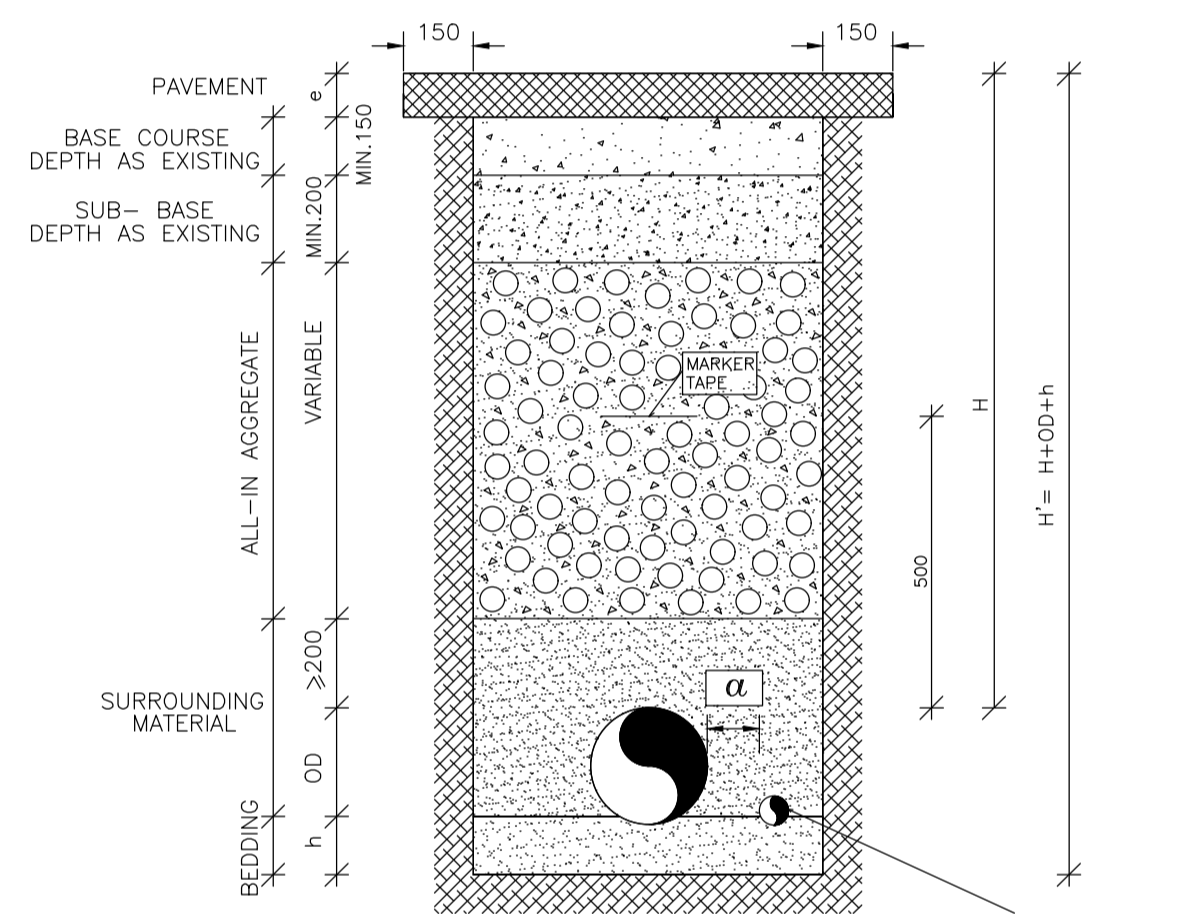
L: TRENCH WIDTH $L = \frac{5}{4} (OD1 + OD2) + 1000$
h: BEDDING DEPTH $h = 100 + \frac{DN}{10}$
 $a = \frac{\text{MAX}(DN1, DN2, 300)}{2}$
 $b \geq 200$

TRENCH IN ROAD WITH HDPE DUCT Ø 63 FOR TELEMETRY CABLE
NOT TO SCALE



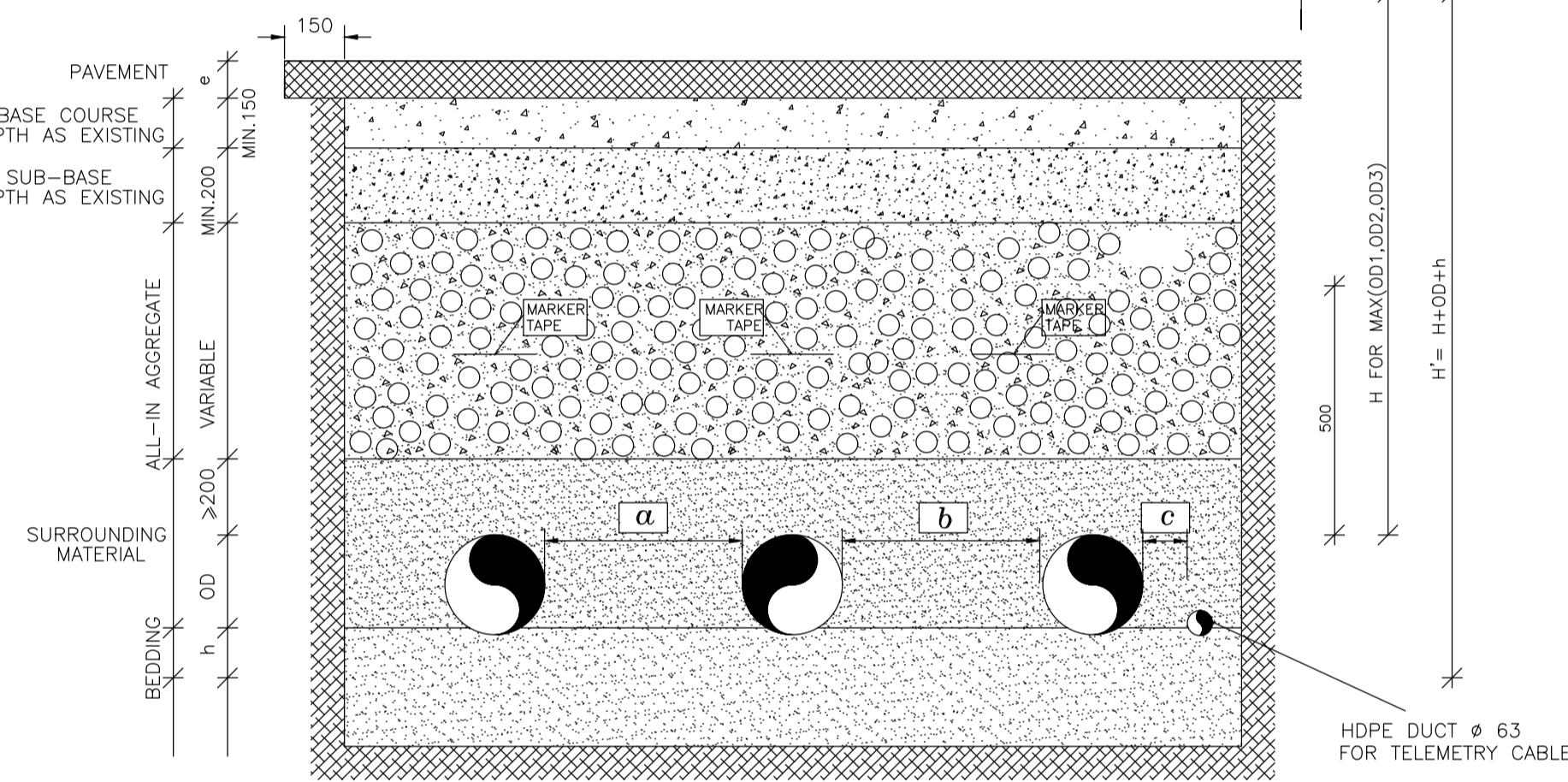
L: TRENCH WIDTH $L = \frac{6}{5} (OD1 + OD2 + OD3) + 1100$
h: BEDDING DEPTH $h = 100 + \frac{\text{MAX}(DN1, DN2 + DN3)}{10}$
 $a = \frac{\text{MAX}(DN1, DN2, 300)}{2}$
 $b = \frac{\text{MAX}(DN2, DN3, 300)}{2}$

TRENCH IN ROAD FOR THREE PIPES
NOT TO SCALE



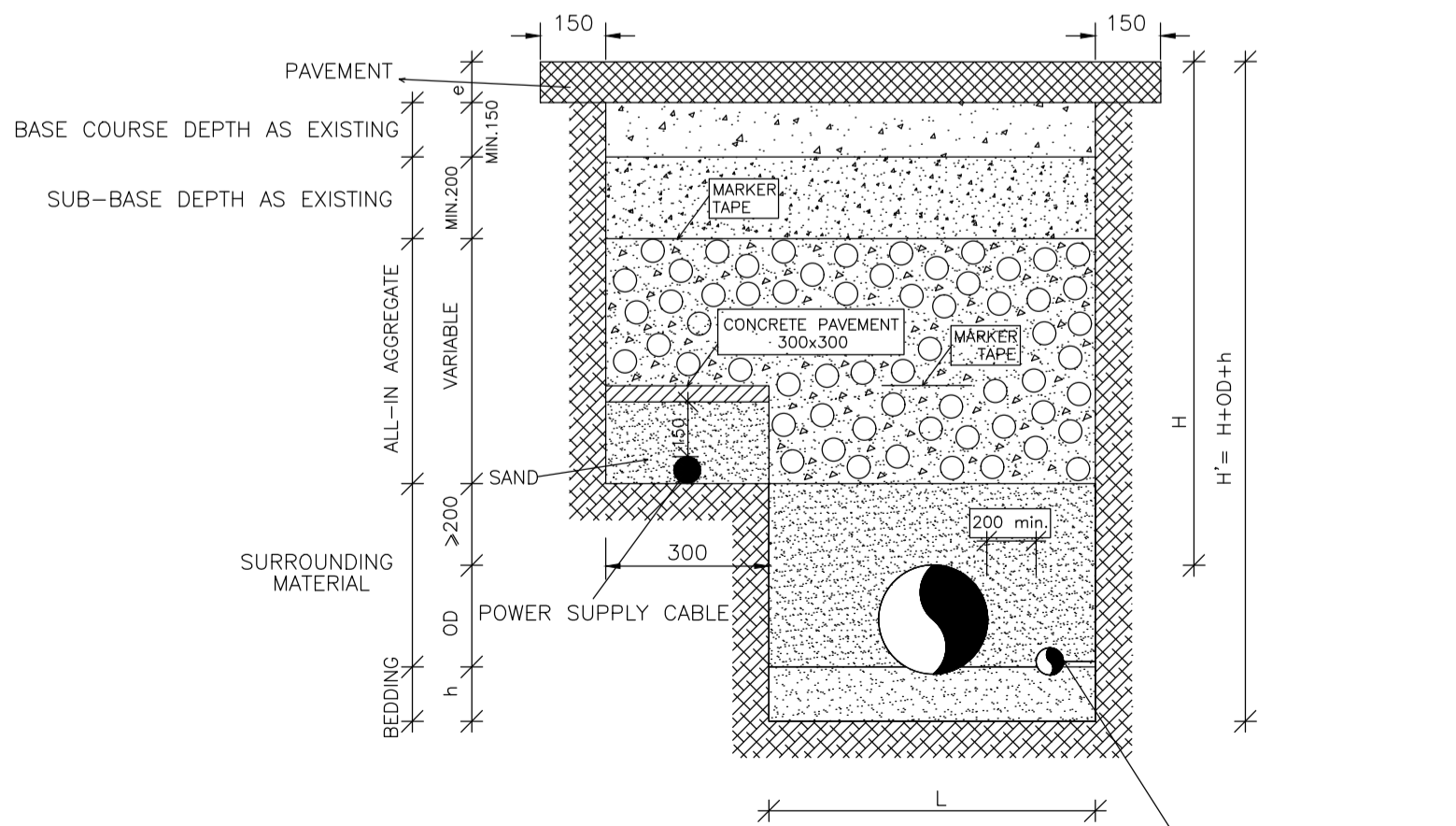
L: TRENCH WIDTH $L = \frac{4}{3} OD + 600$
h: BEDDING DEPTH $h = 100 + \frac{DN}{10}$
 $a \geq 200$

TRENCH IN ROAD WITH HDPE DUCT Ø 63 FOR TELEMETRY CABLE
NOT TO SCALE



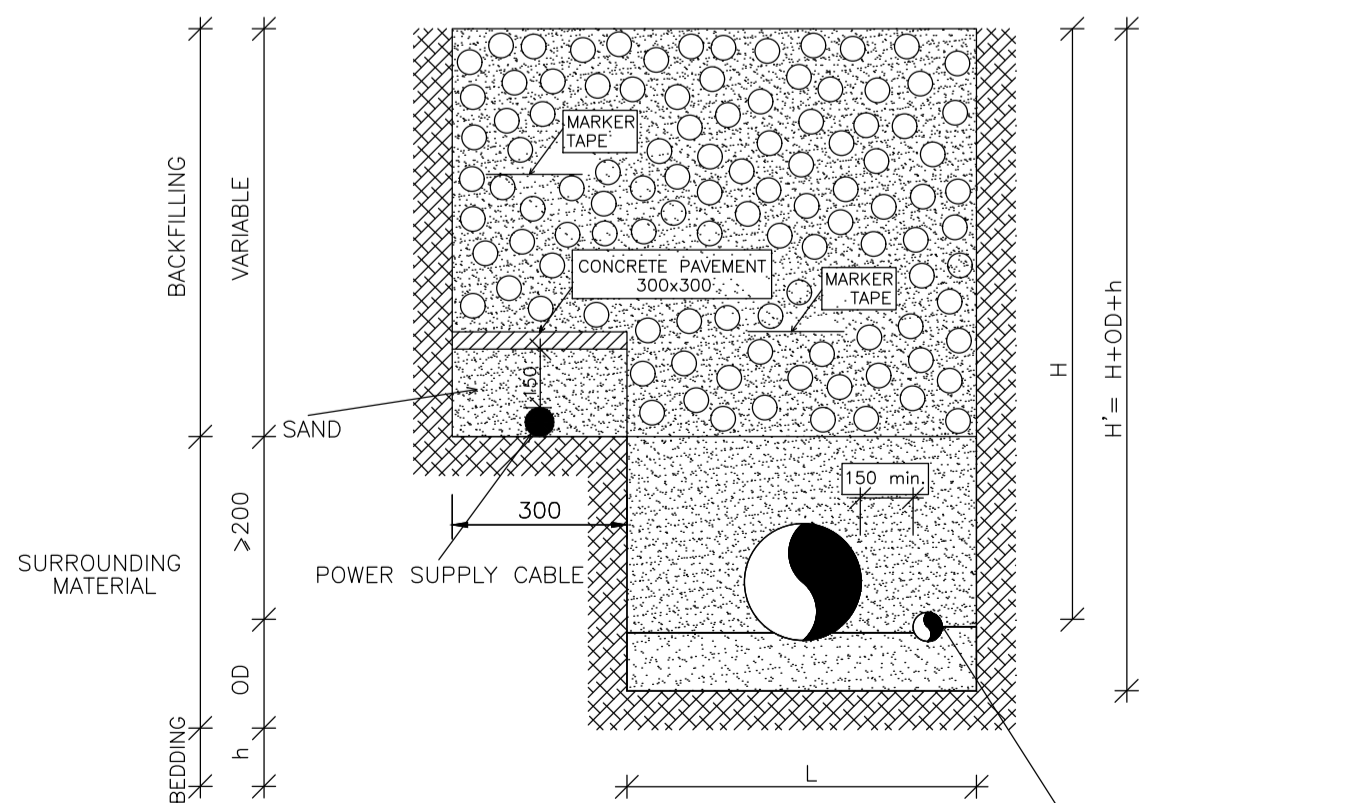
L: TRENCH WIDTH $L = \frac{6}{5} (OD1 + OD2 + OD3) + 1300$
h: BEDDING DEPTH $h = 100 + \frac{\text{MAX}(DN1, DN2 + DN3)}{10}$
 $a = \frac{\text{MAX}(DN1, DN2, 300)}{2}$
 $b = \frac{\text{MAX}(DN2, DN3, 300)}{2}$
 $c > 200$

TRENCH IN ROAD WITH HDPE DUCT Ø 63 FOR TELEMETRY CABLE
NOT TO SCALE



L: TRENCH WIDTH $L = \frac{4}{3} OD + 600$
h: BEDDING DEPTH $h = 100 + \frac{DN}{10}$

TRENCH IN ROAD WITH HDPE DUCT Ø 63 FOR TELEMETRY CABLE AND POWER SUPPLY CABLE
NOT TO SCALE



L: TRENCH WIDTH $L = \frac{4}{3} DEXT + 600$
h: BEDDING DEPTH $h = 100 + \frac{DN}{10}$
 $b \geq 200$

TRENCH OFF ROAD WITH HDPE DUCT Ø 63 FOR TELEMETRY CABLE AND POWER SUPPLY CABLE
NOT TO SCALE

NOTES:

—ALL DIMENSIONS ARE IN MILLIMETERS.

—OD : OUTER PIPE DIAMETER

—DN : NOMINAL PIPE DIAMETER

—e : ASPHALT LAYER THICKNESS:

FOR MAIN ROADS: 2 LAYERS TOTAL $e \geq 9\text{cm}$

FOR OTHER ROADS: 1 LAYER total $e \geq 5\text{cm}$

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

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BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

JALL ED DIB - HAJAL Bldg P.O.BOX:70492 - ANTELIAS

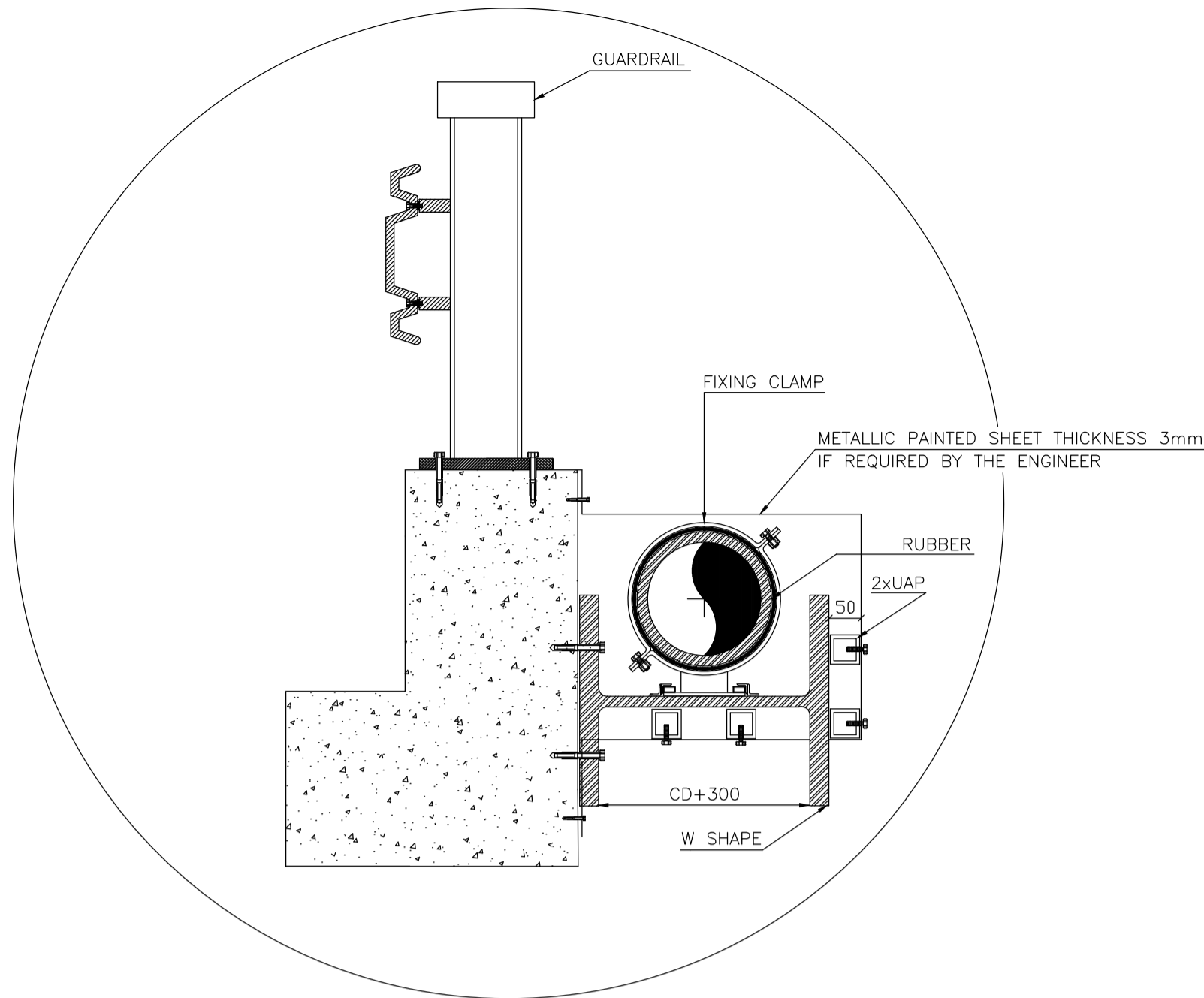
PHONE:(04) 712157/712158 (03) 291016 FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

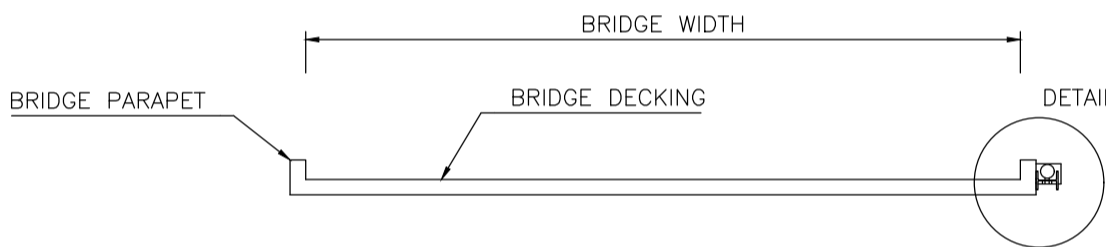
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL TRENCH DETAILS AND TELEMETRY CABLE DRAW PIT
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD06	BTD	BTD	BTD

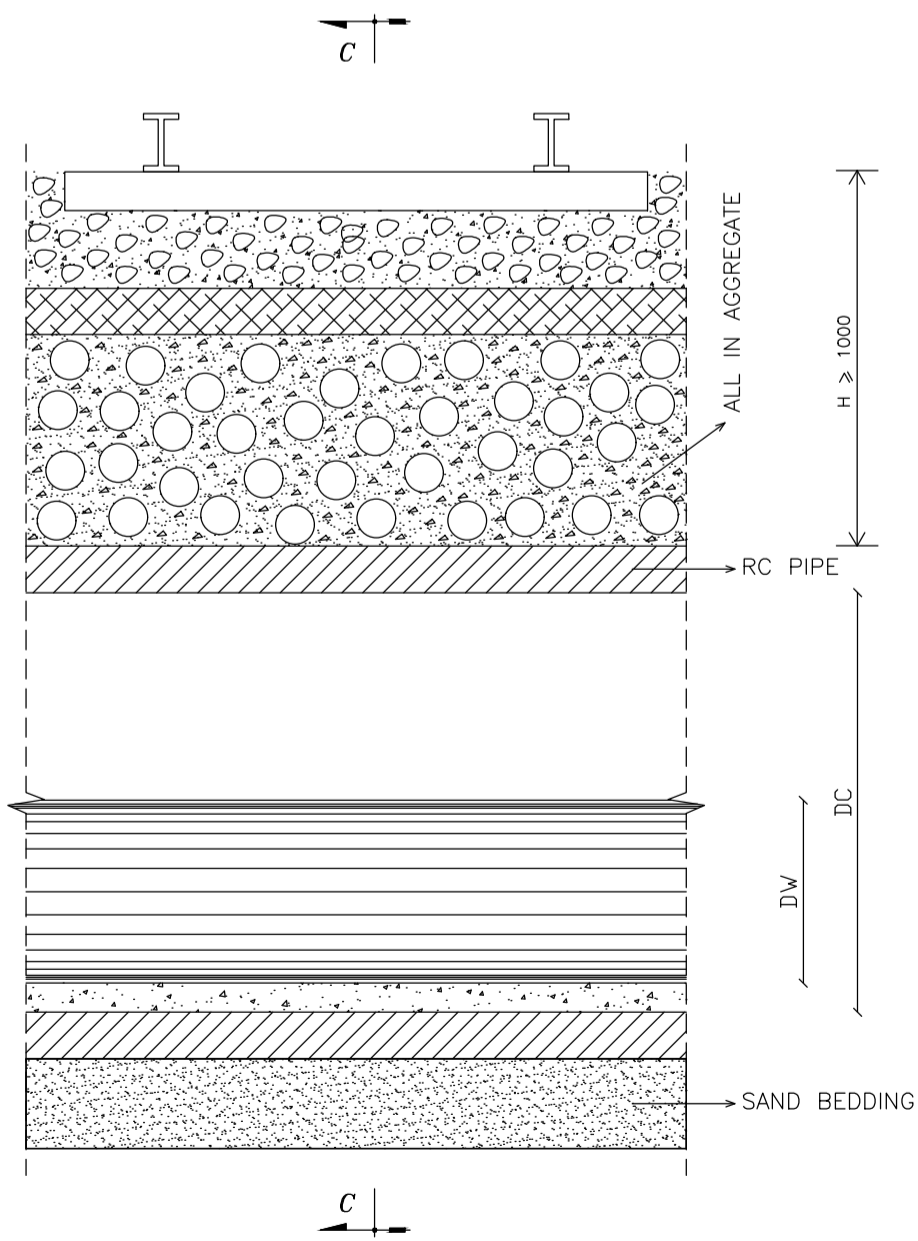
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	6/23	06



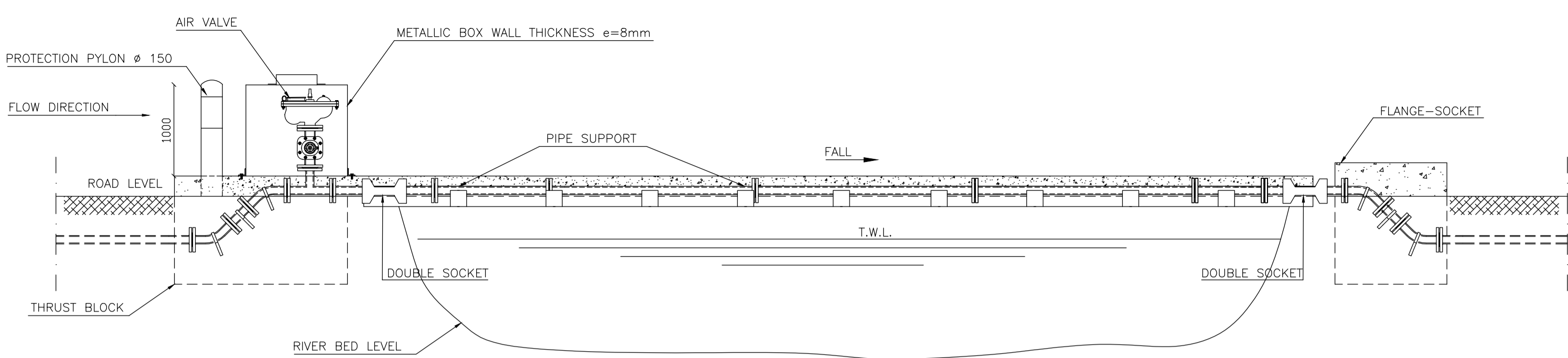
DETAIL A
TYPICAL PIPE SUPPORT ON
ROAD BRIDGE HIGHWAY CROSSING



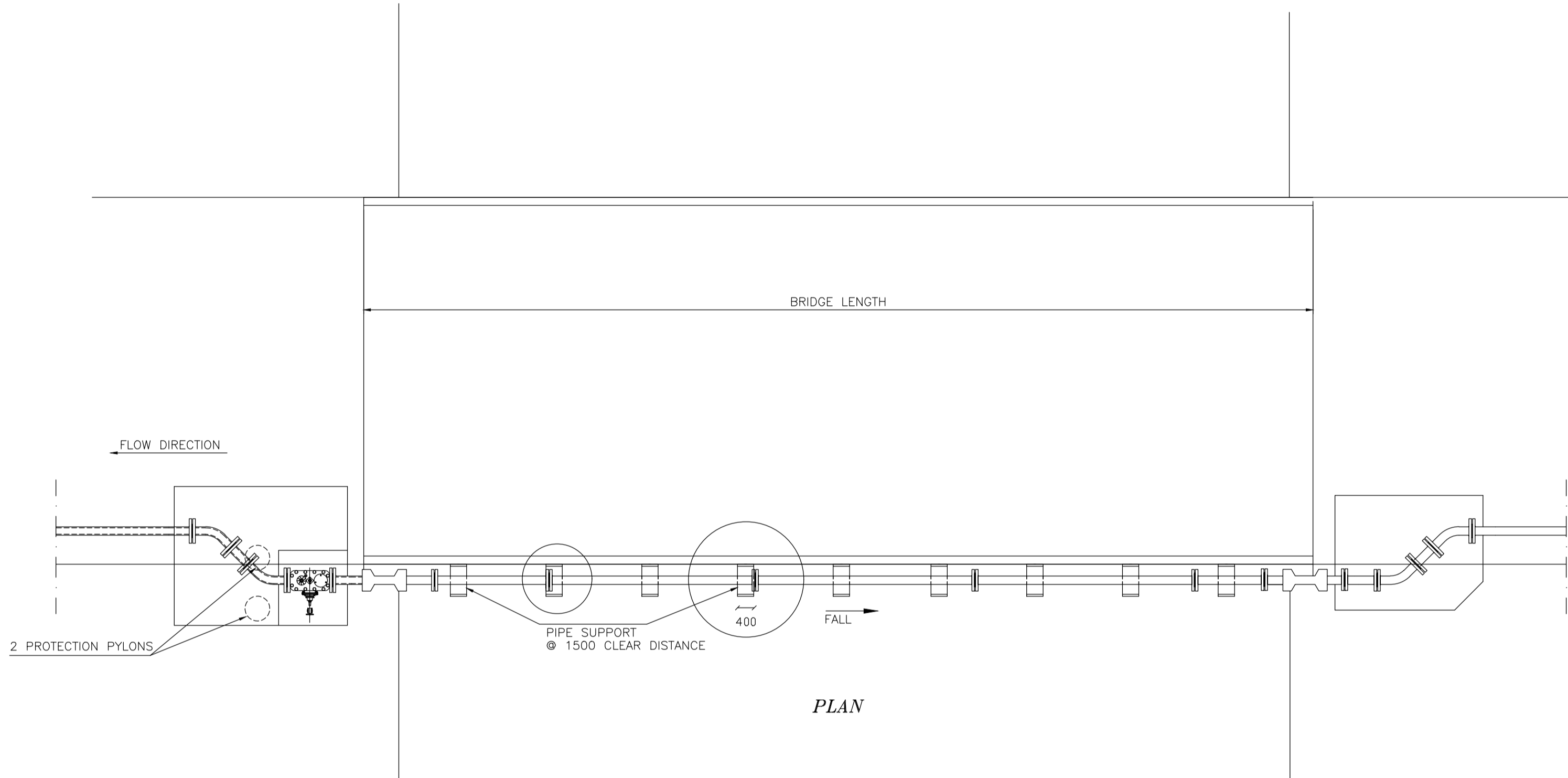
SECTION A-A



RAILWAY CROSSING
SECTION B-B

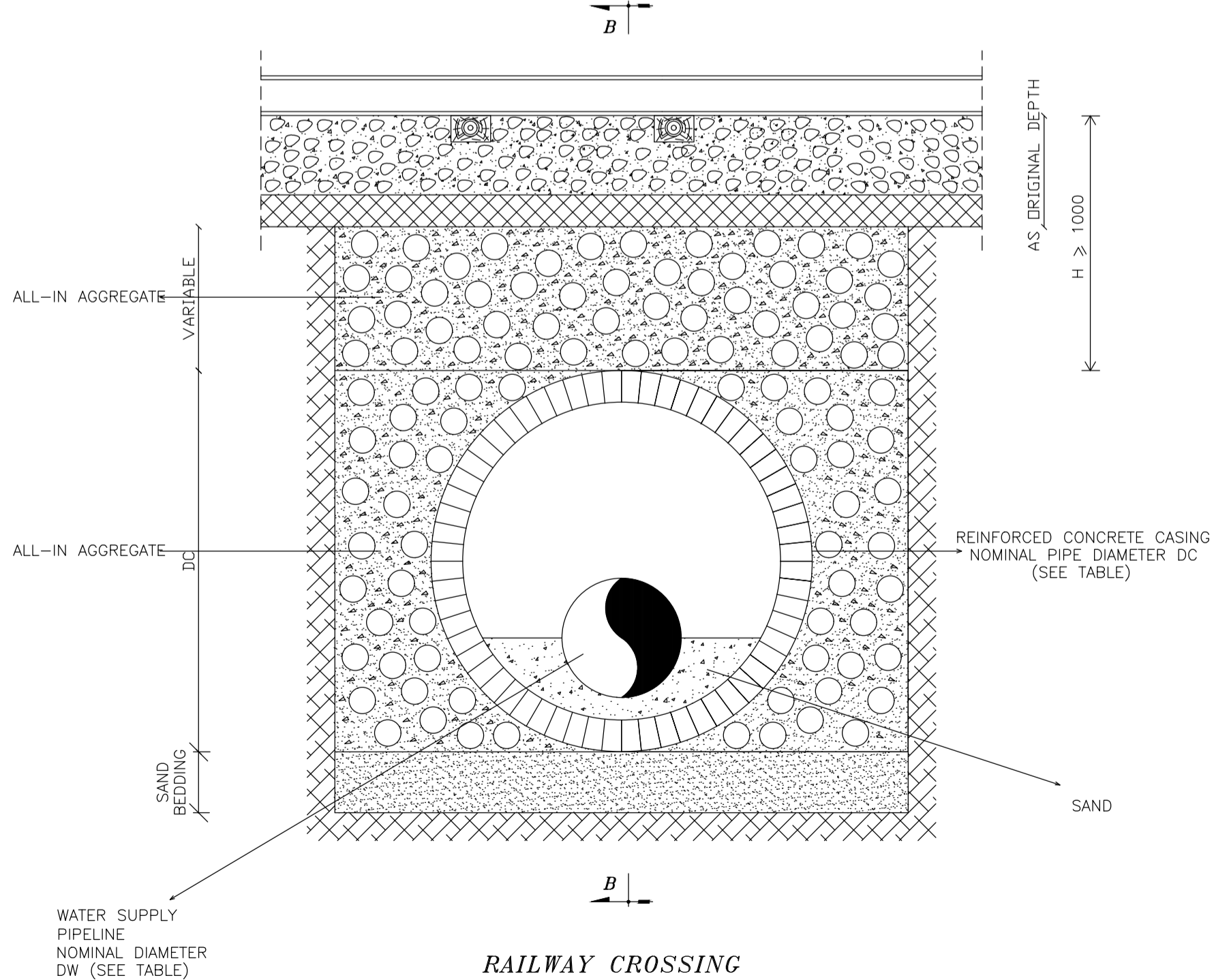


ELEVATION



PLAN

WATER SUPPLY PIPE	CONCRETE CASING PIPE
DW MM	DC MM
80-100	400
150	600
200-300	800
350-400	1000
450-600	1200



RAILWAY CROSSING
SECTION C-C

NOTES:
-ALL DIMENSIONS ARE IN MILLIMETERS.

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

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MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

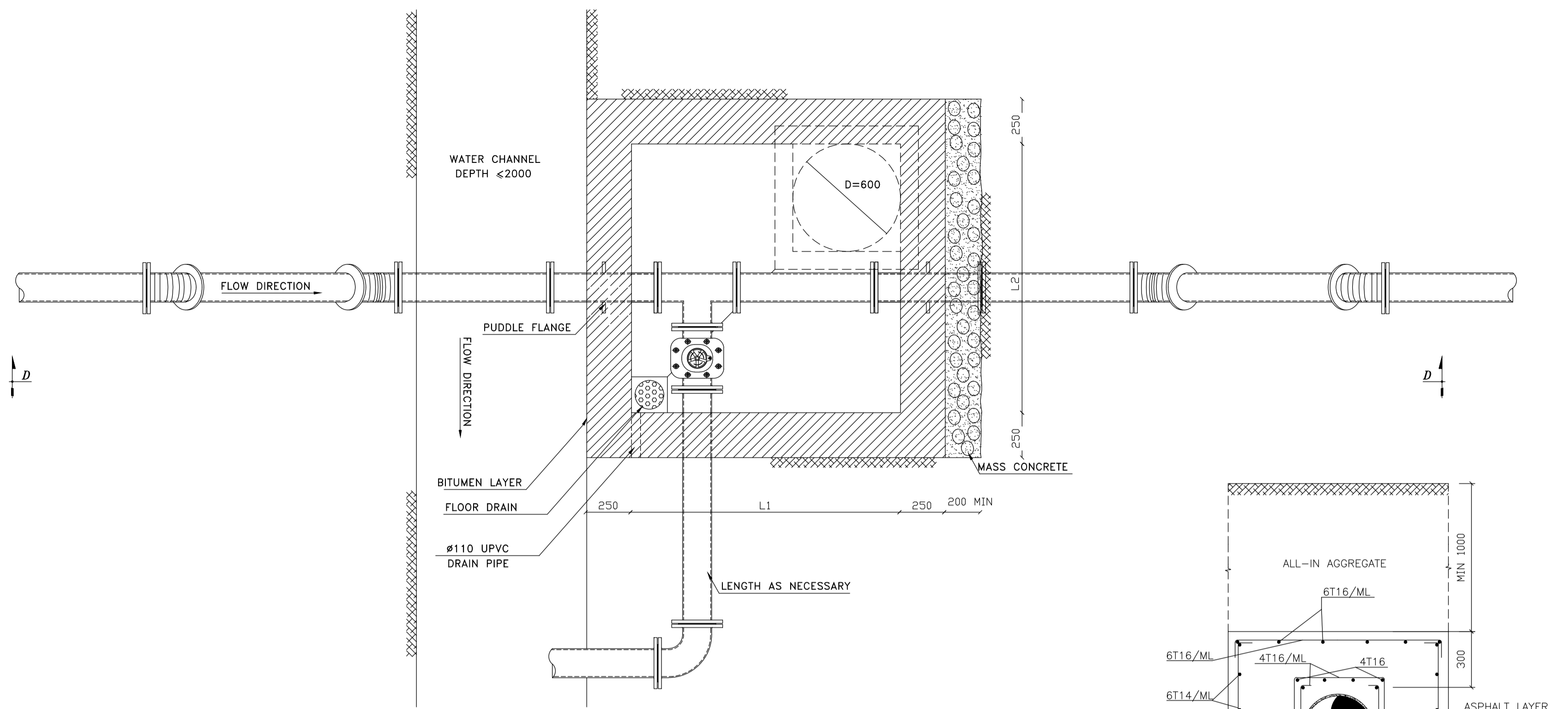
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

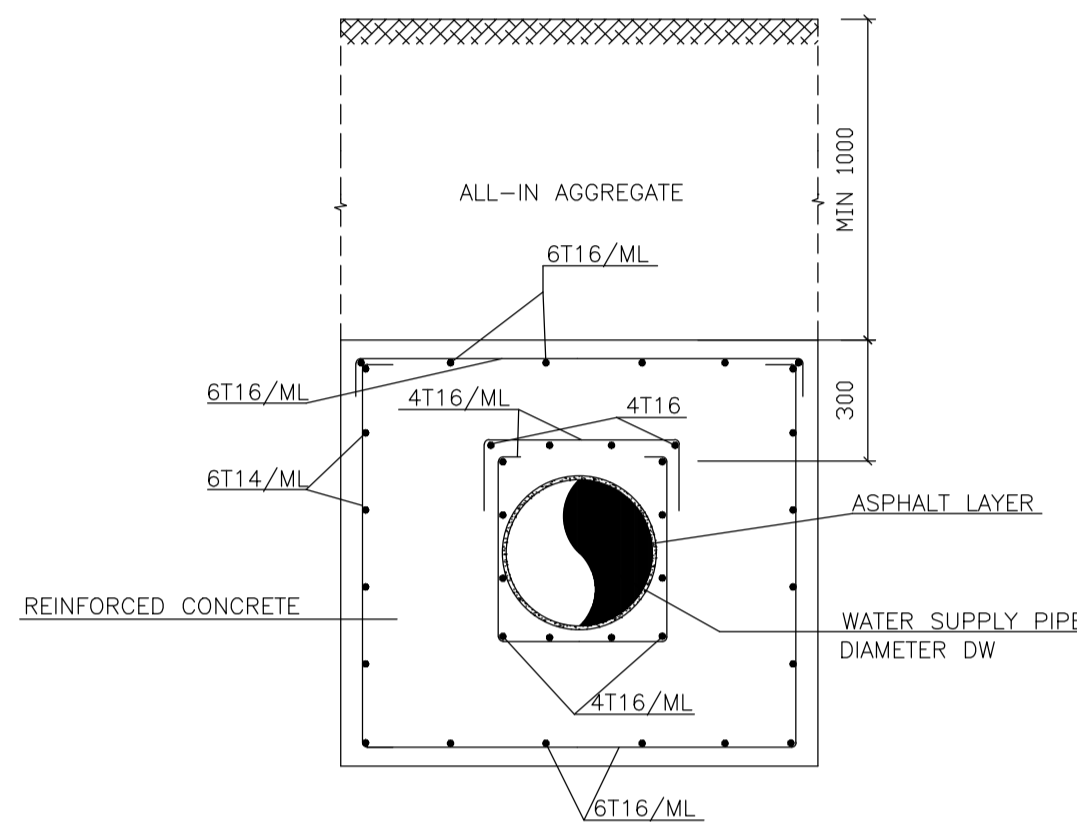
TRANSMISSION AND DISTRIBUTION SYSTEMS	PIPING UNDER SPECIAL CONDITIONS

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STDP07	BTD	BTD	BTD

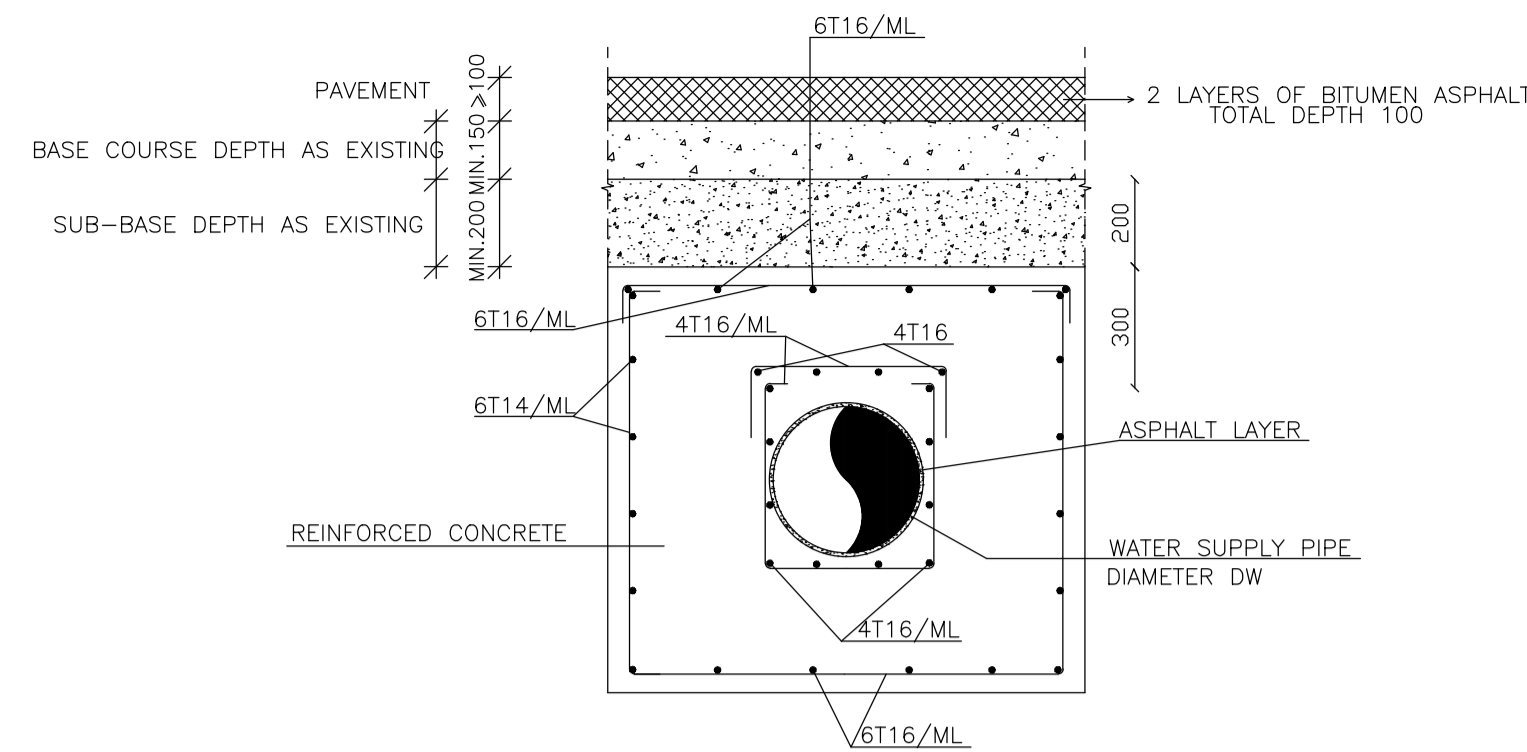
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	7/23	07



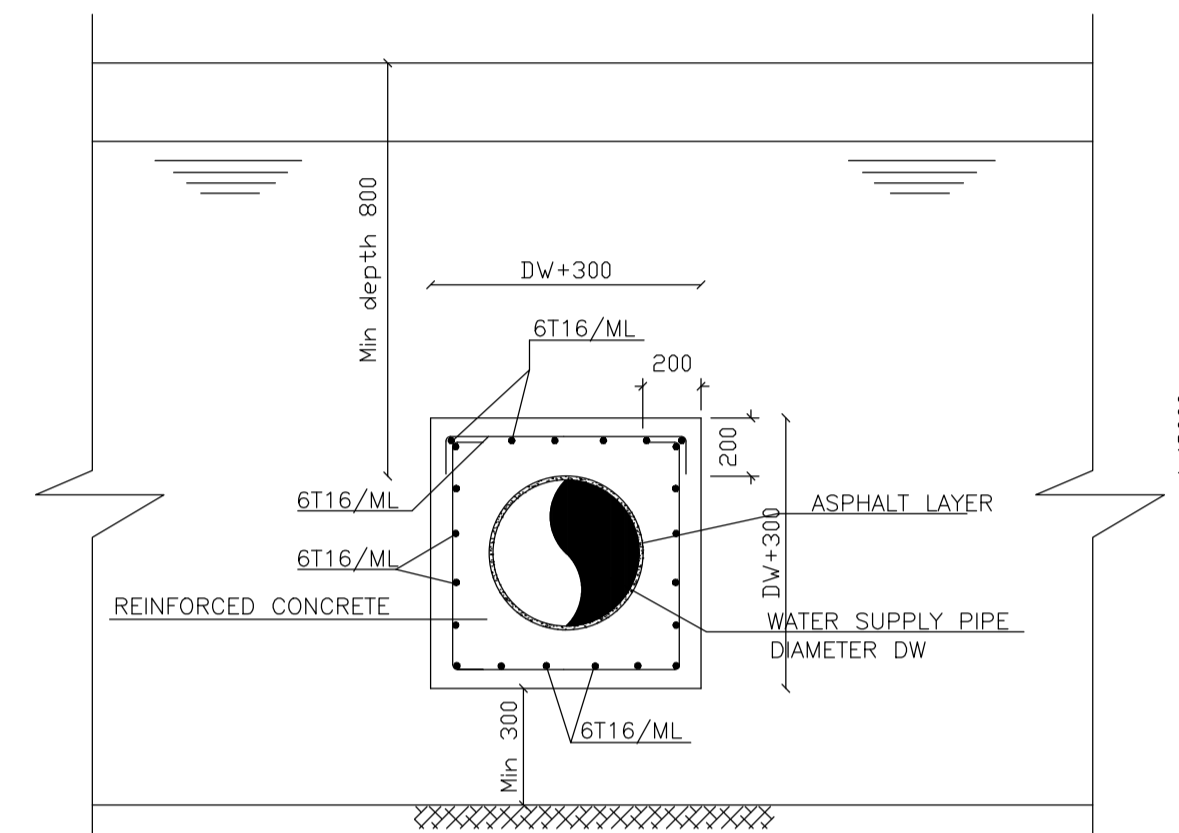
WATER CHANNEL CROSSING (TYPE I)
PLAN



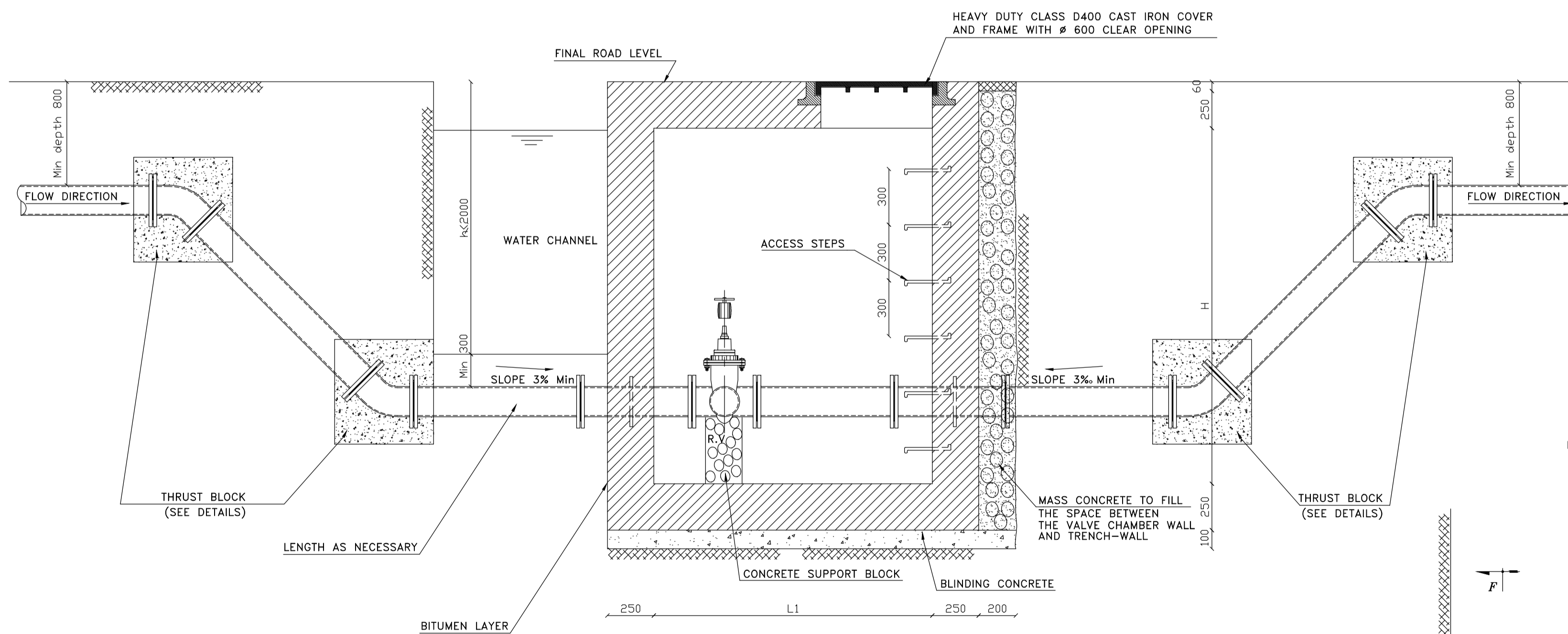
ALONG WATER COURSES
NOT TO SCALE



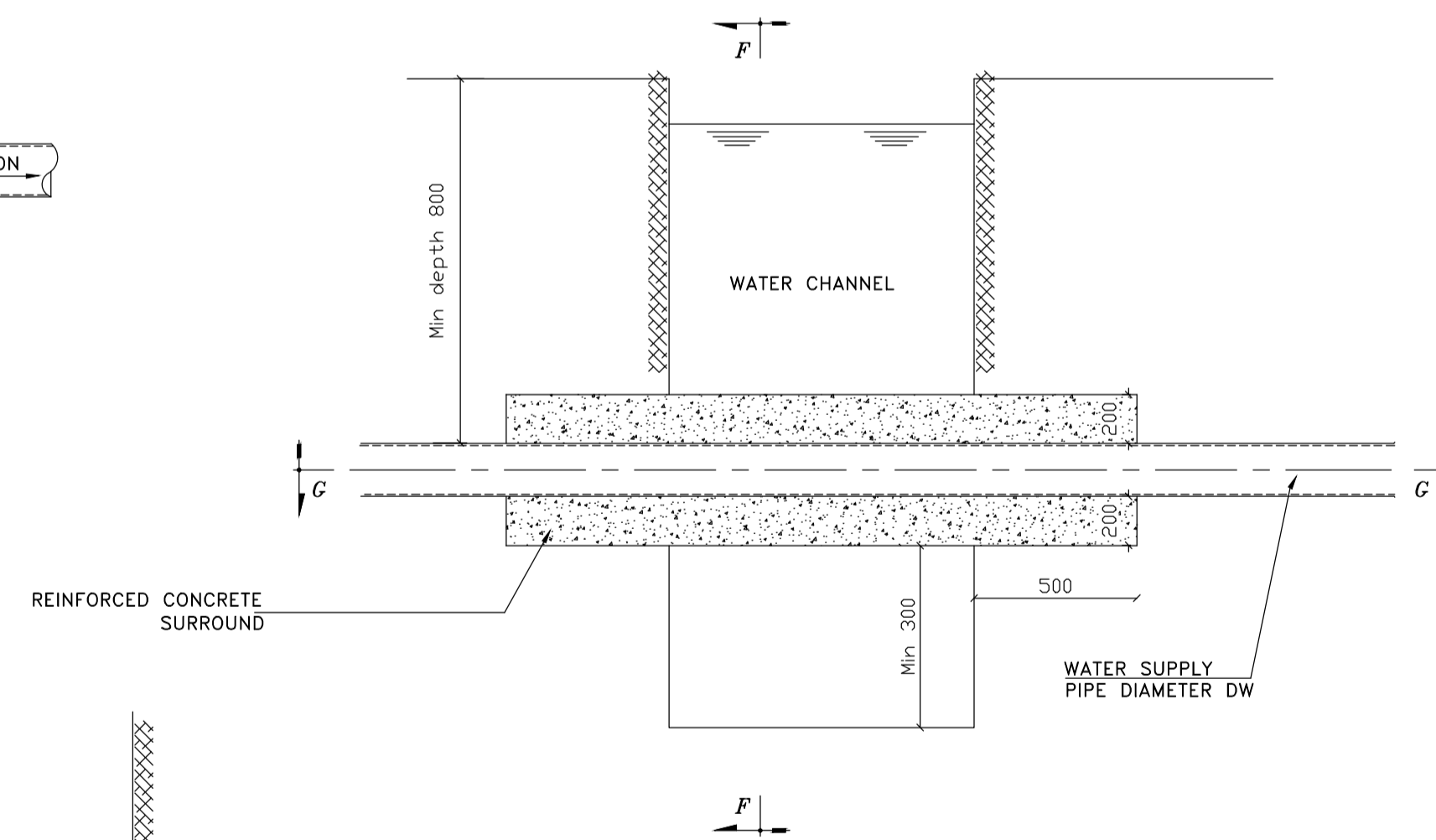
IN ROAD TRENCH SHALLOW DEPTH



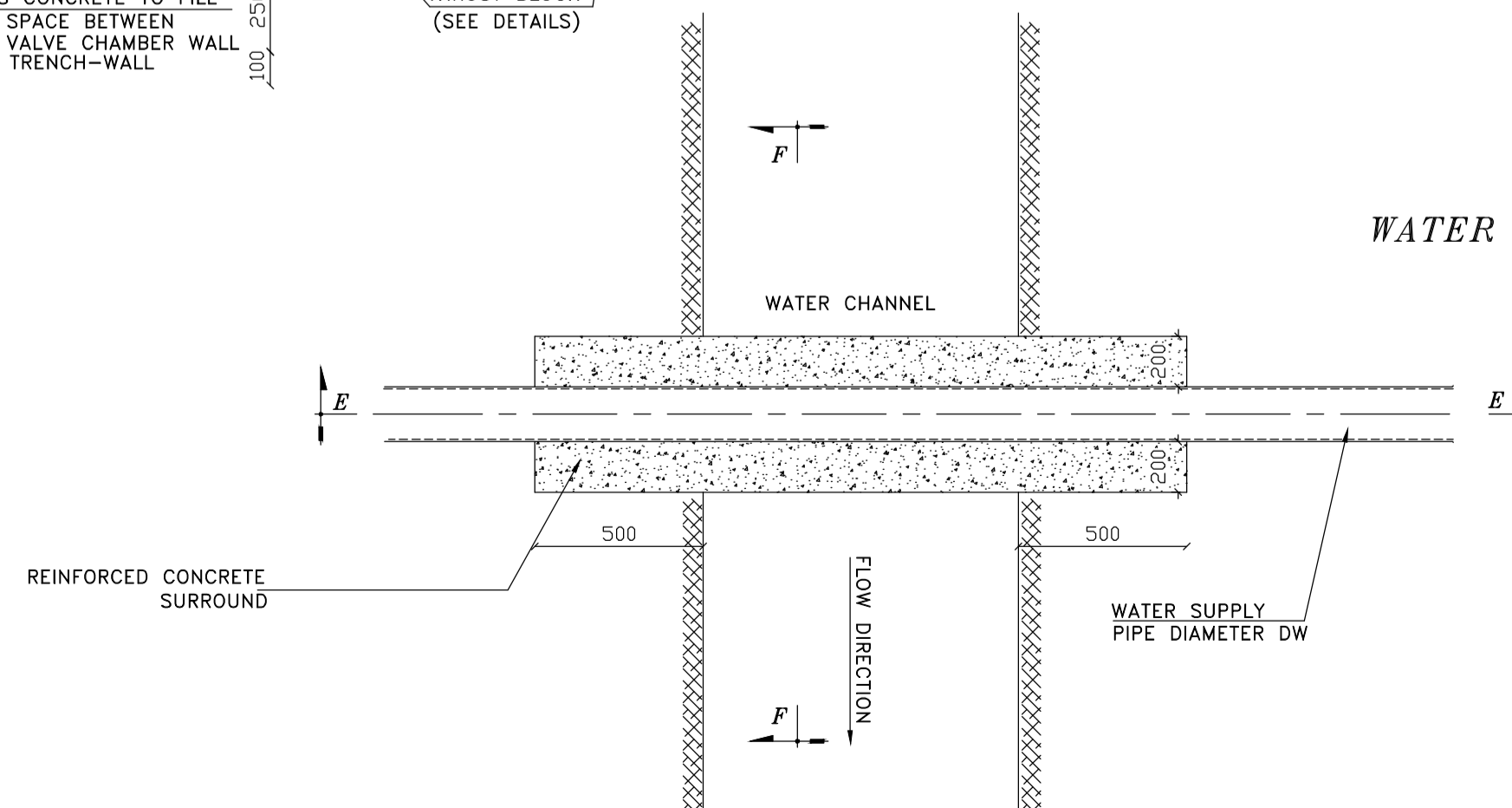
WATER CHANNEL CROSSING (TYPE II)
SECTION F-F



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.

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COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
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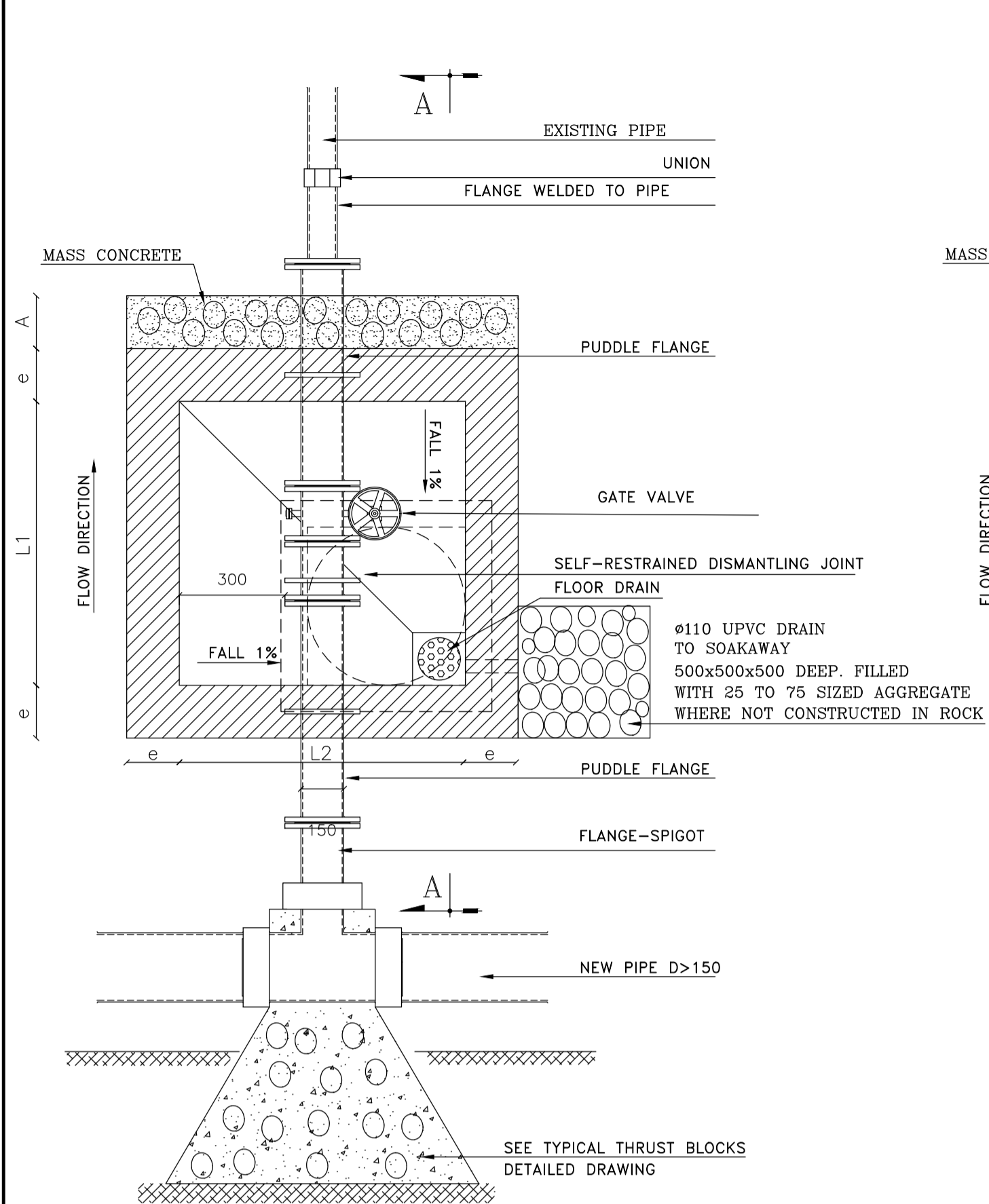
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND DISTRIBUTION SYSTEMS	PIPING UNDER SPECIAL CONDITIONS
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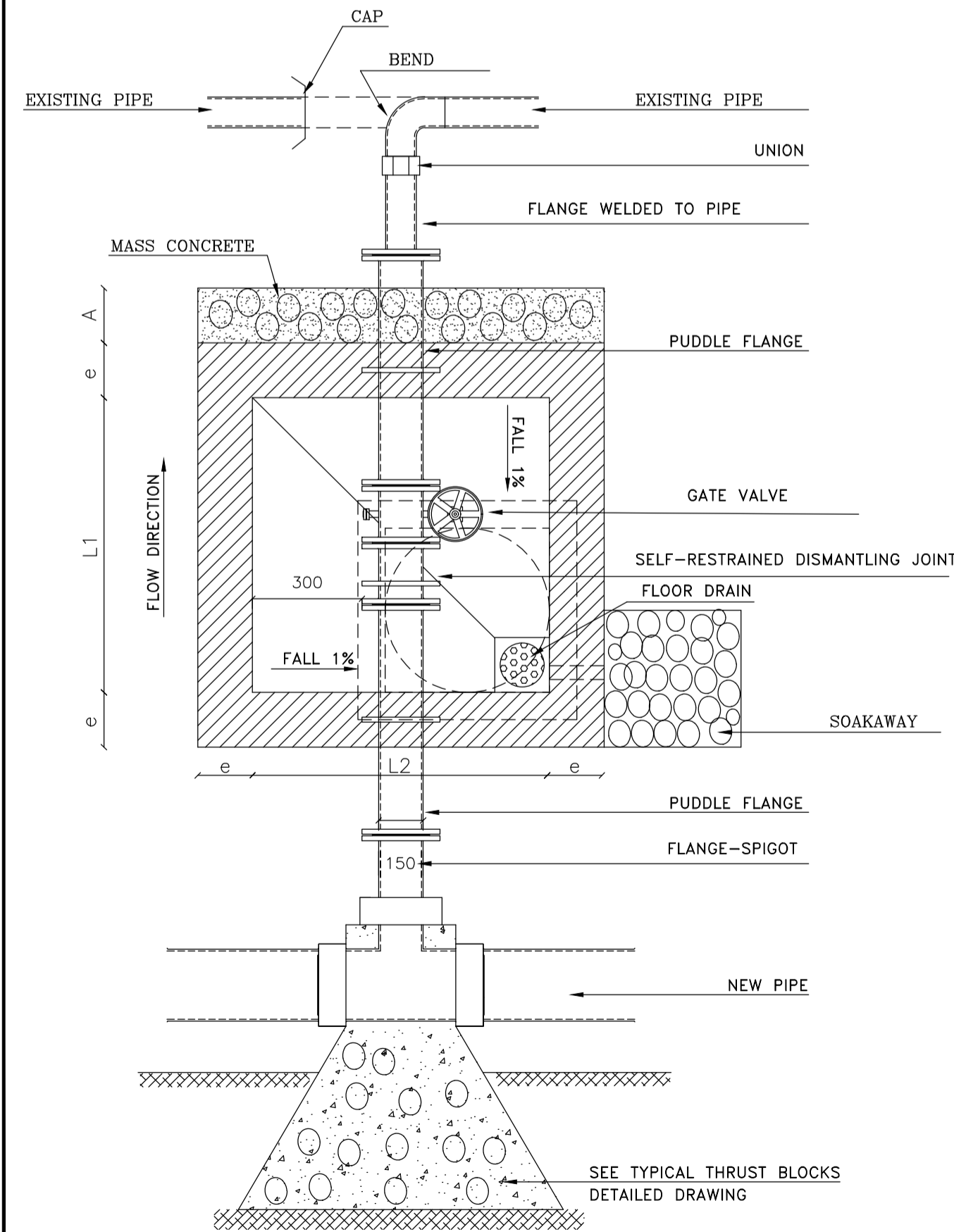
DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STDP08	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	8/23	08

TYPE 1
SECTION C-C

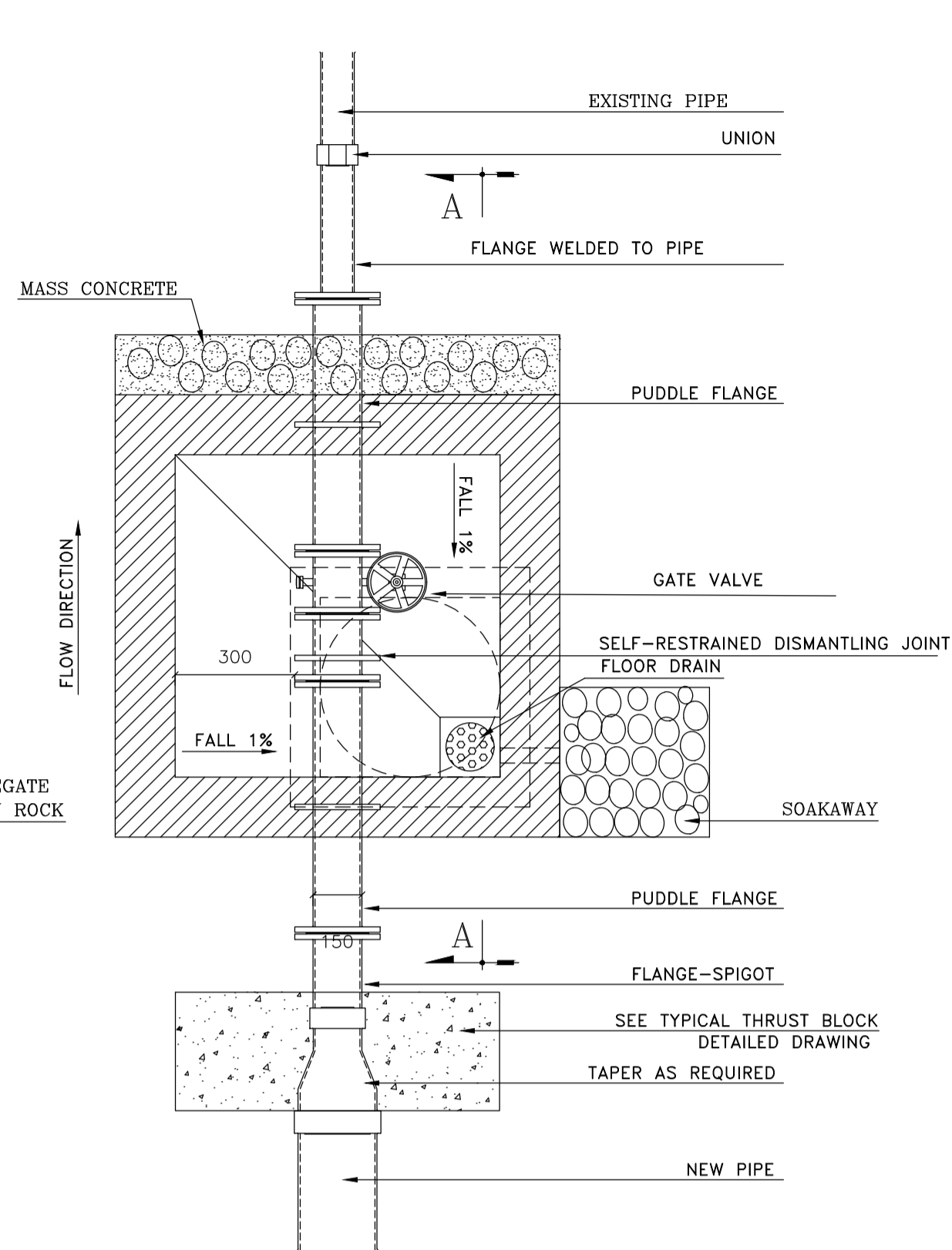


TYPE 1-A

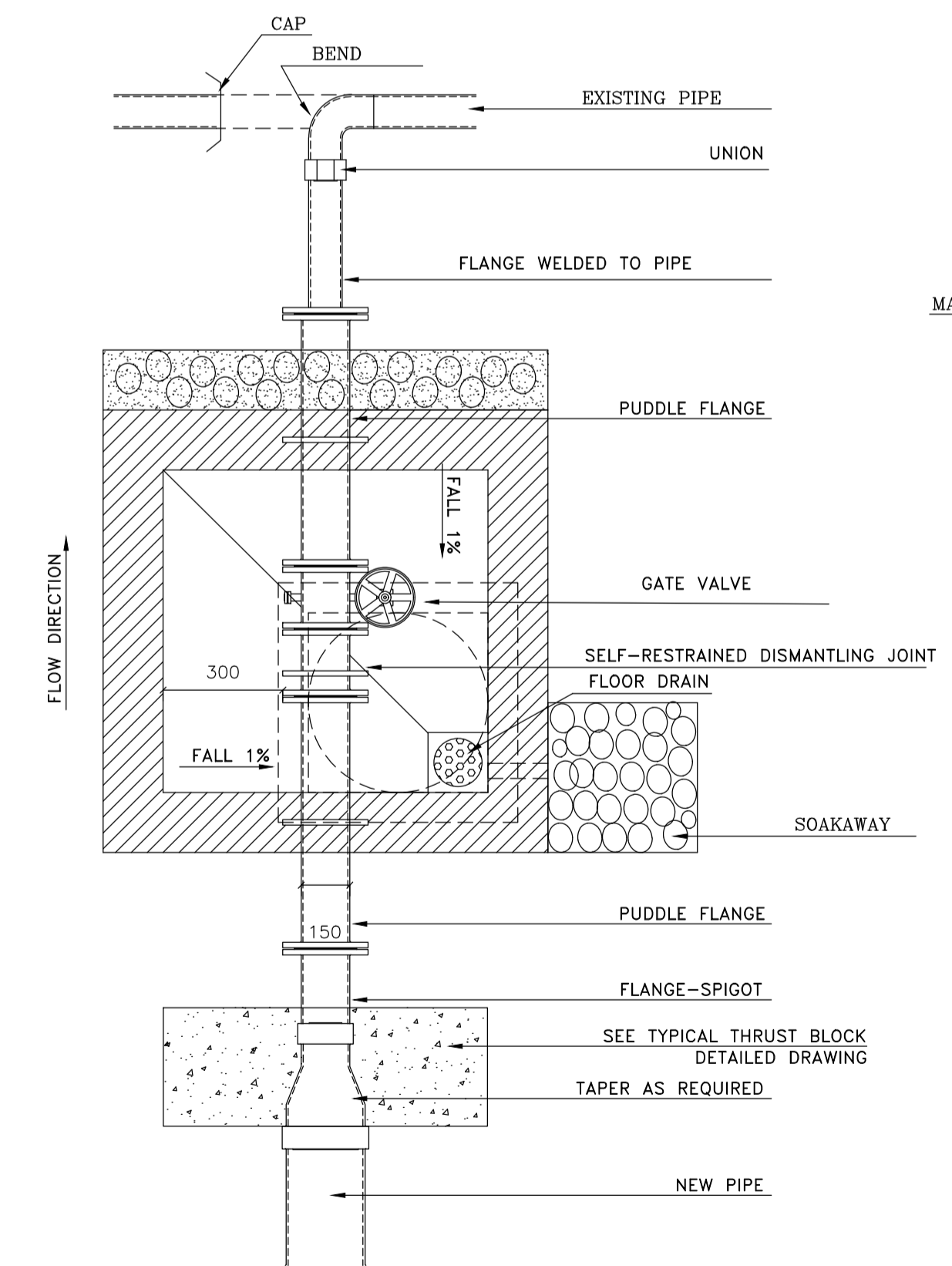


TYPE 1-B

TYPE 2
SECTION C-C

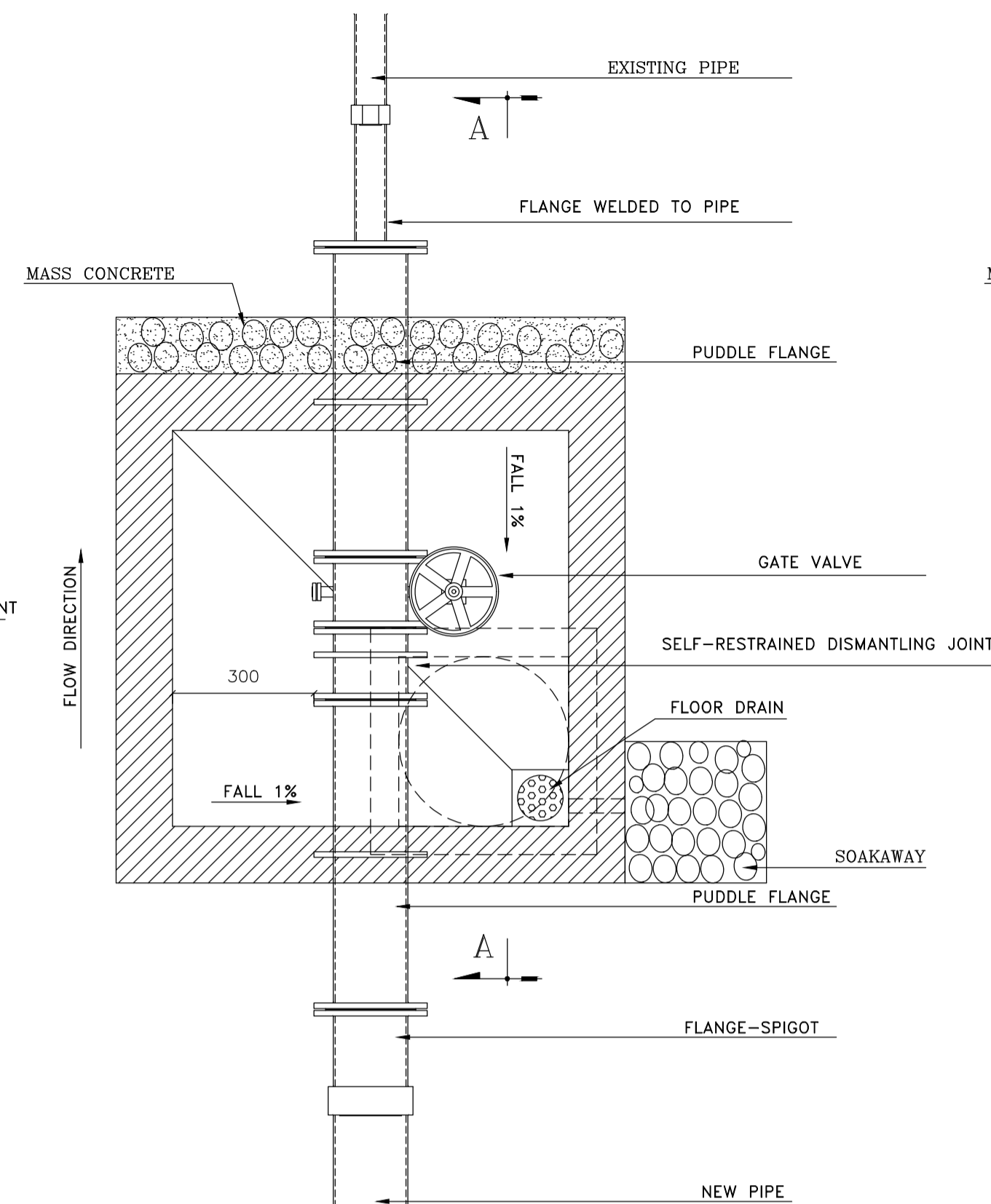


TYPE 2-A

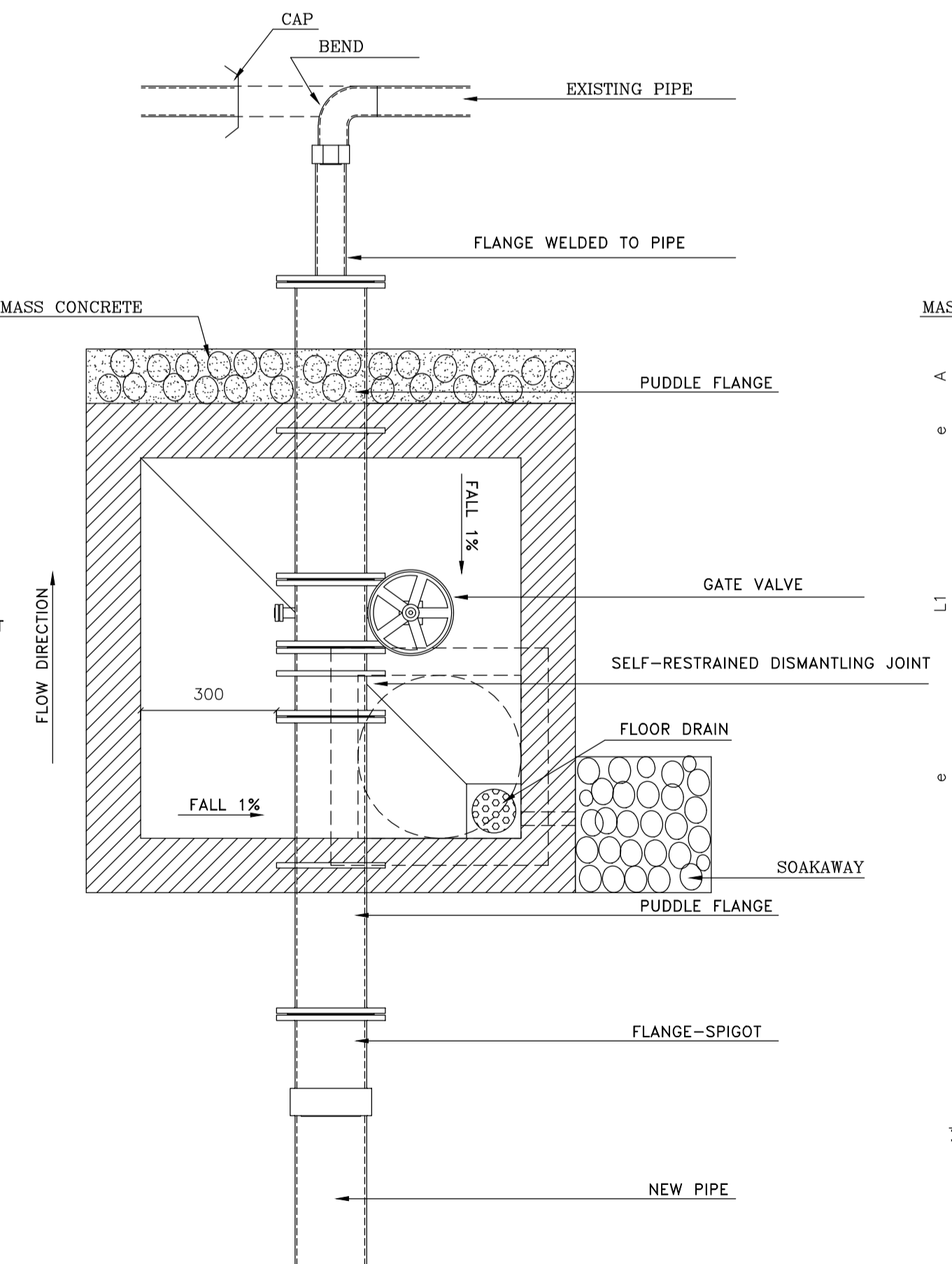


TYPE 2-B

TYPE 3
SECTION C-C

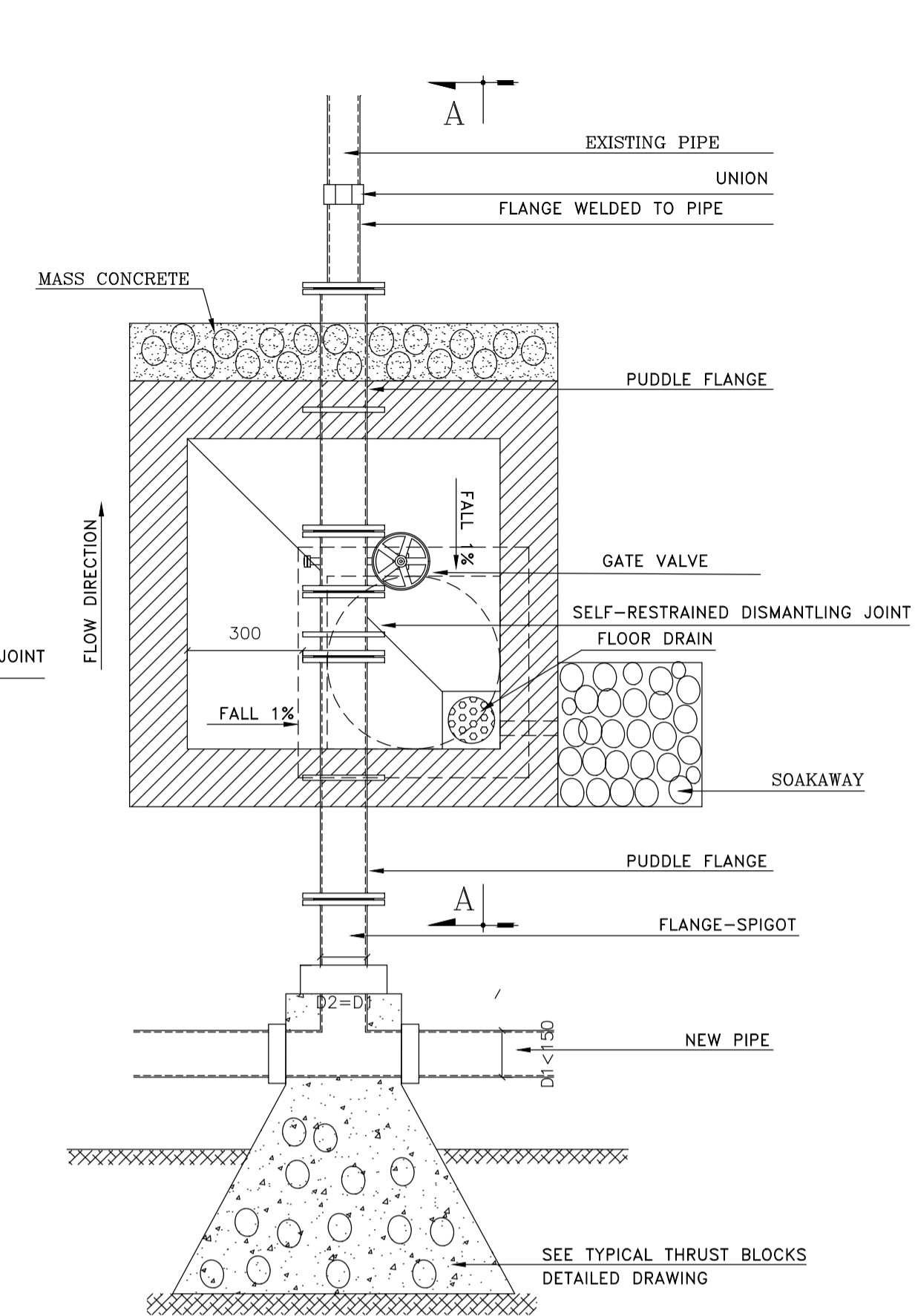


TYPE 3-A

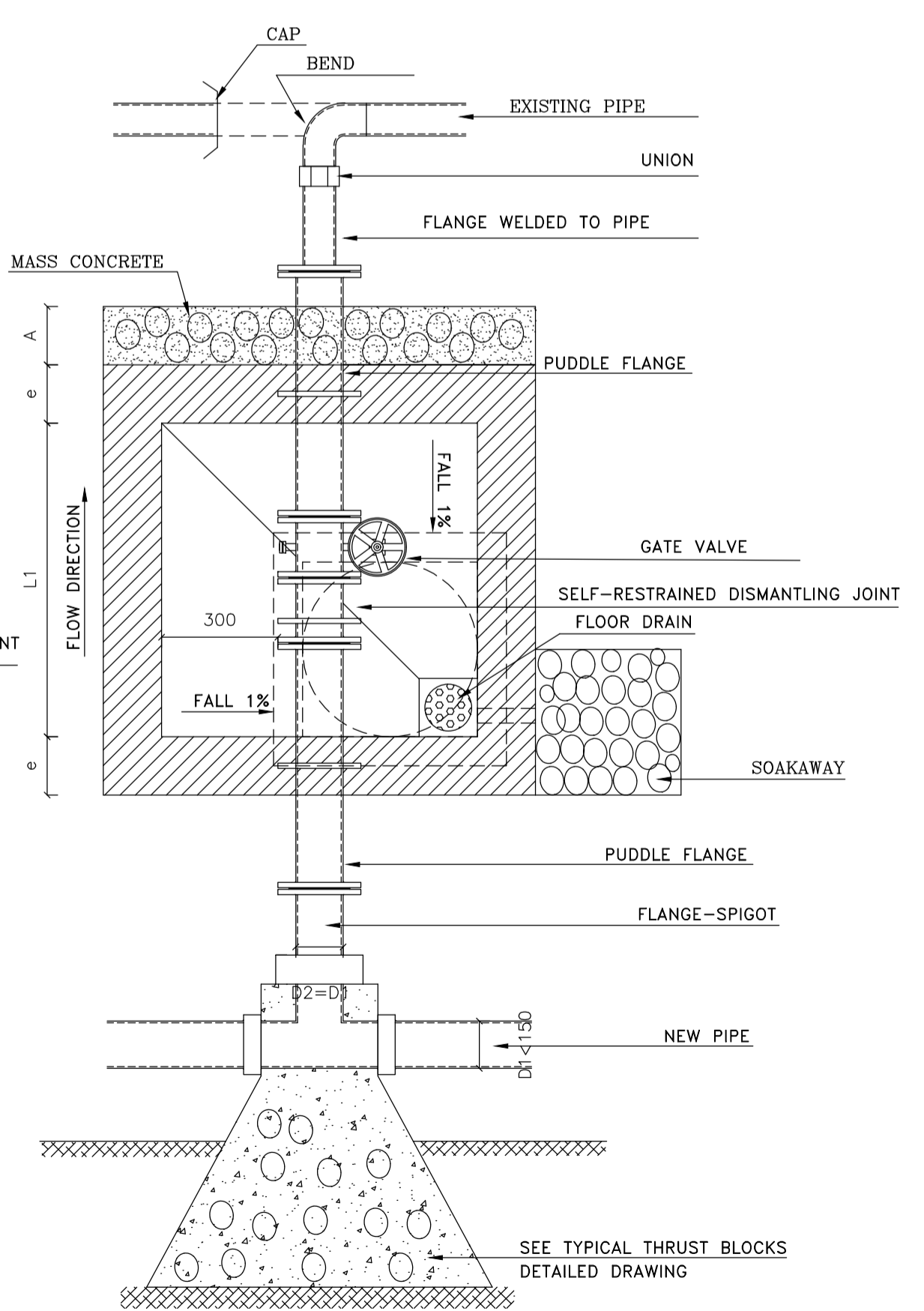


TYPE 3-B

TYPE 4
SECTION C-C



TYPE 4-A



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: F_y=400 MPa.
MILD STEEL BARS : SYMBOL Ø YIELD STRESS: F_y=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

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

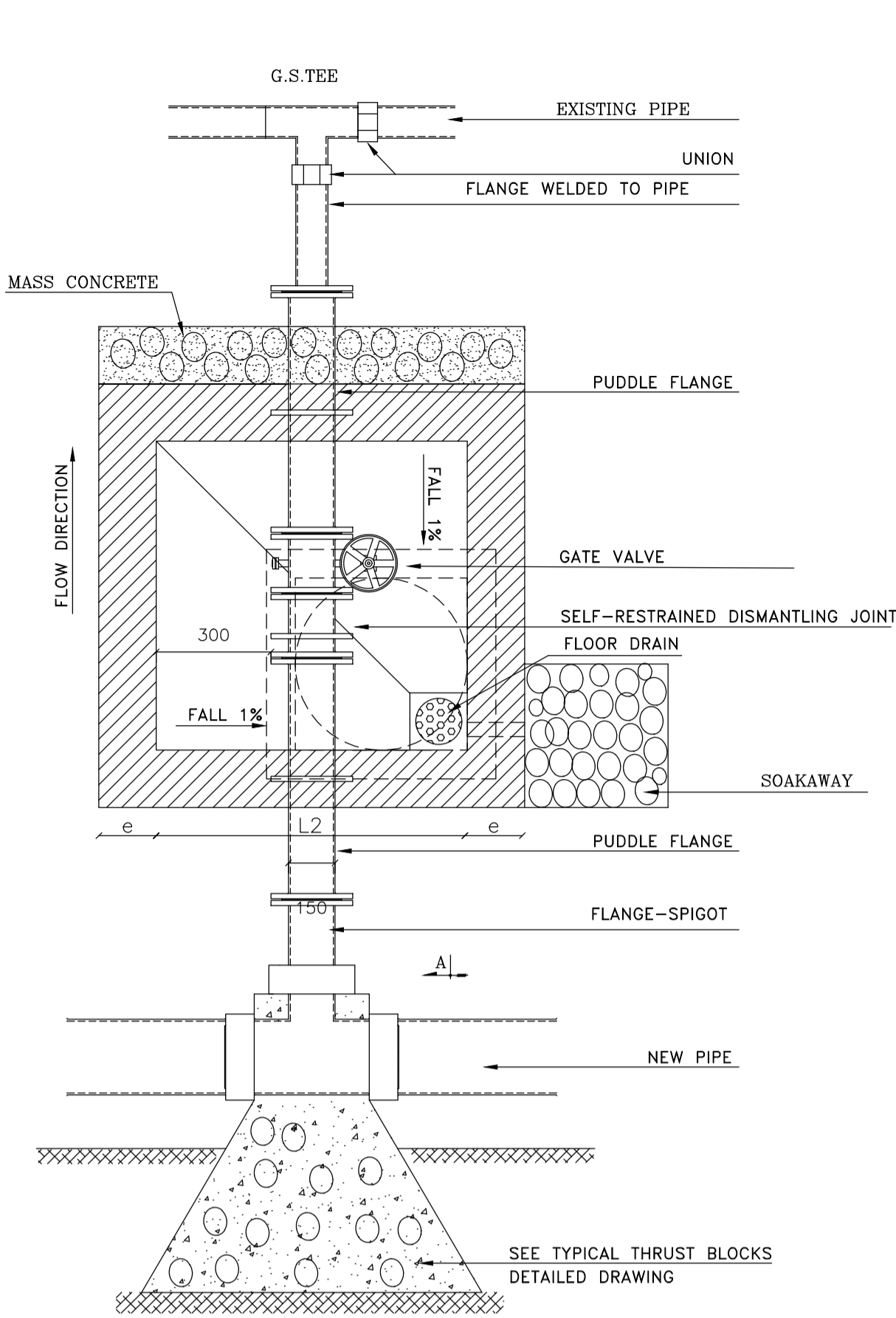
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

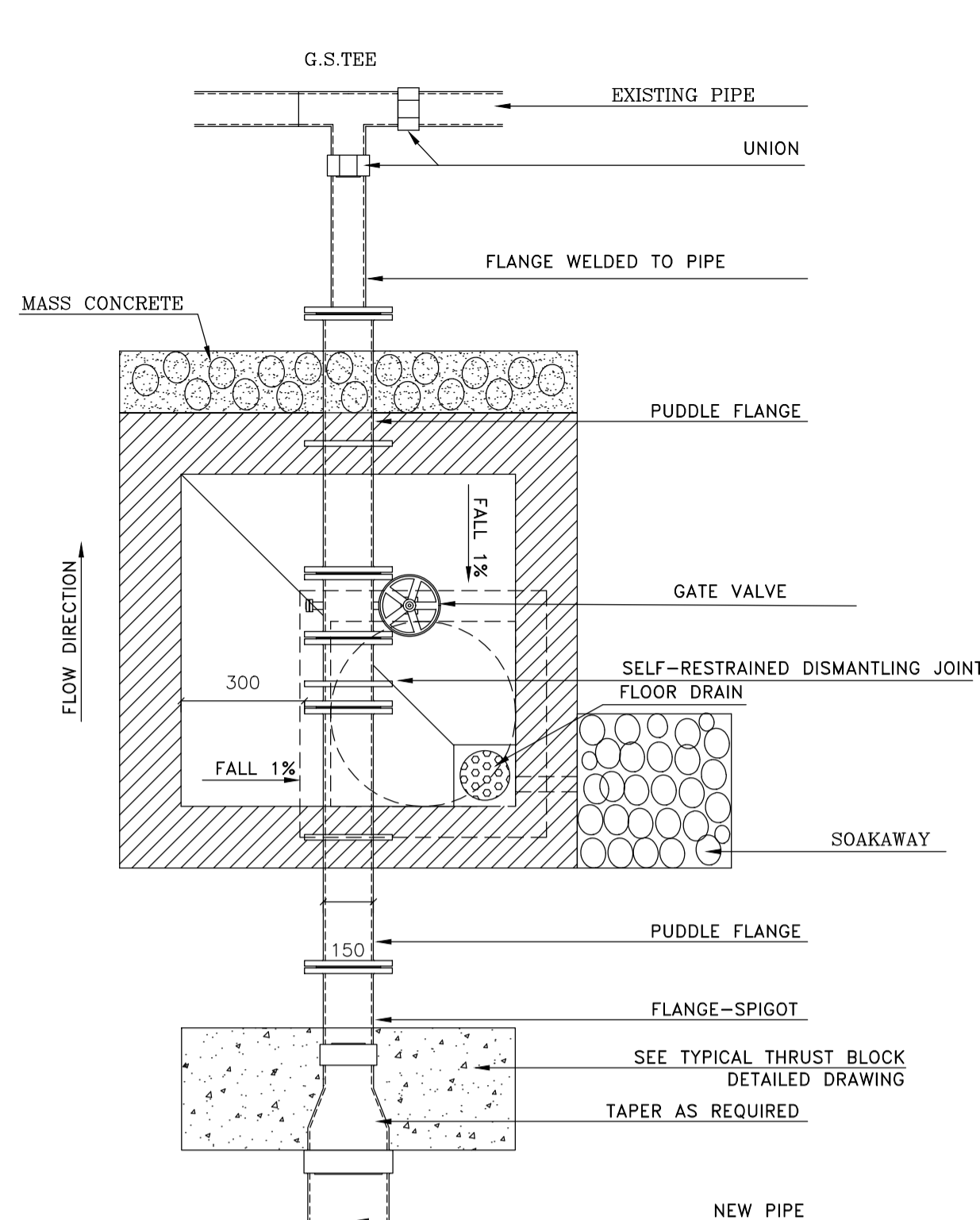
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL CONNECTIONS OF NEW PIPES TO EXISTING PIPES
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD09	BTD	BTD	BTD

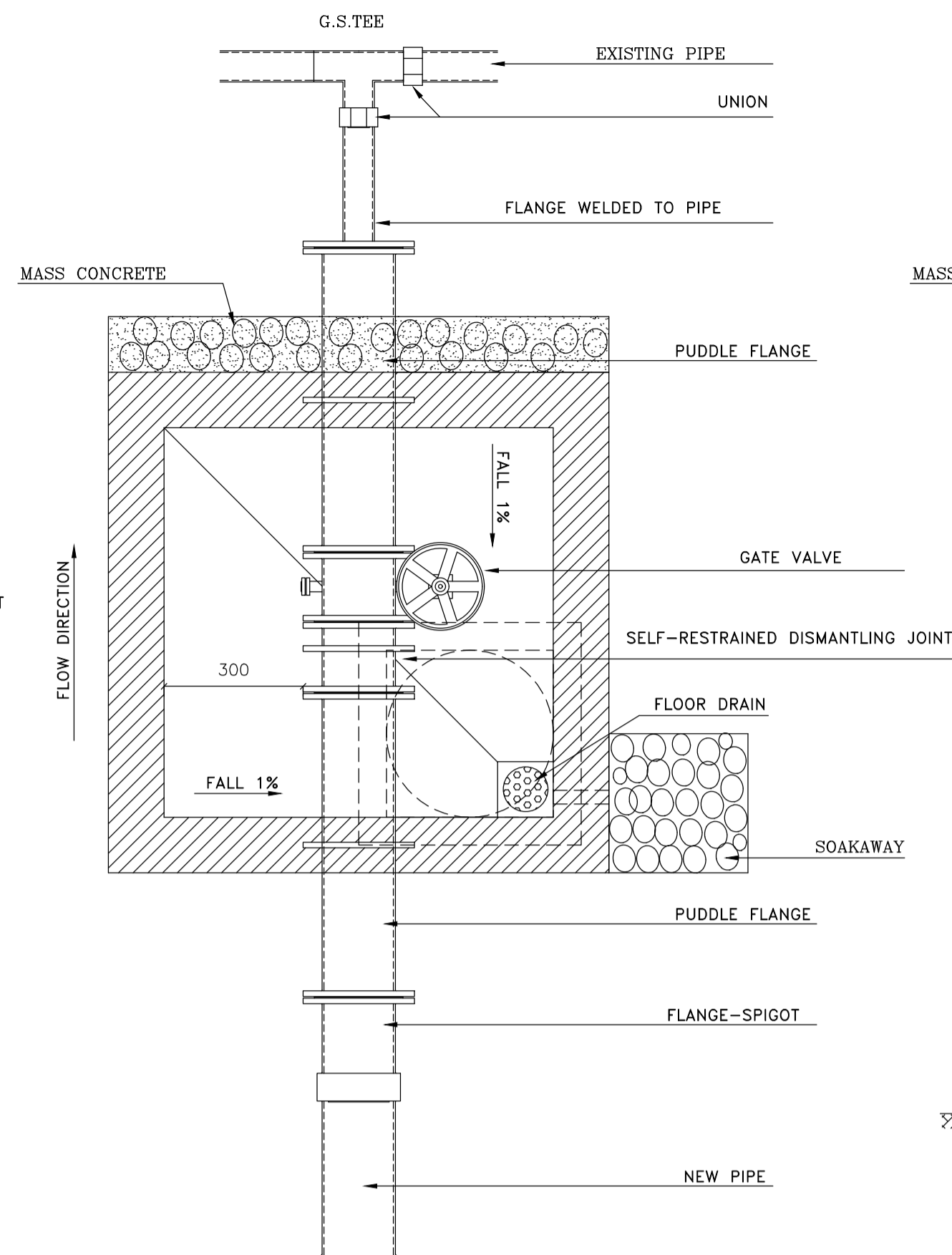
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	9/23	09



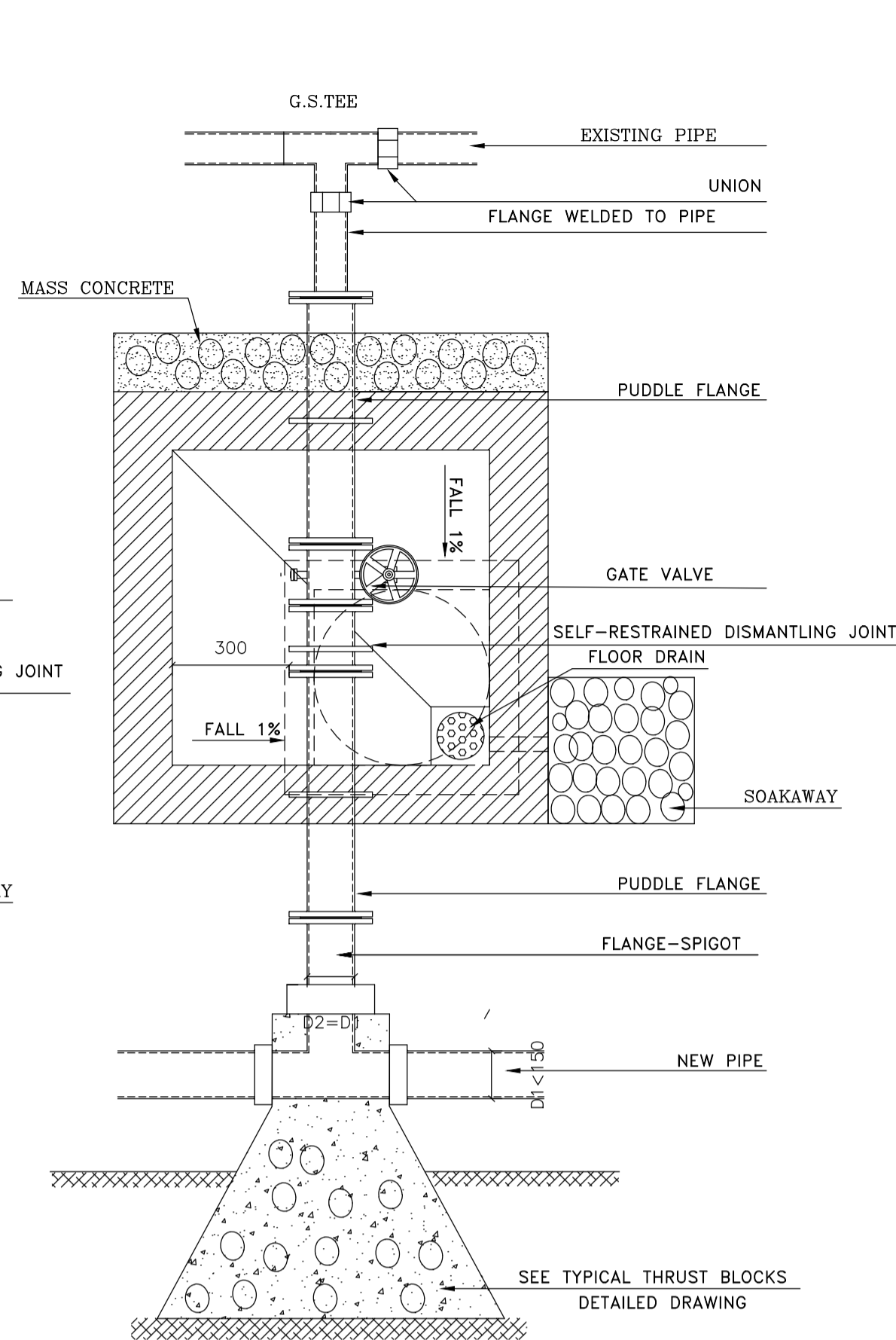
TYPE 1-C



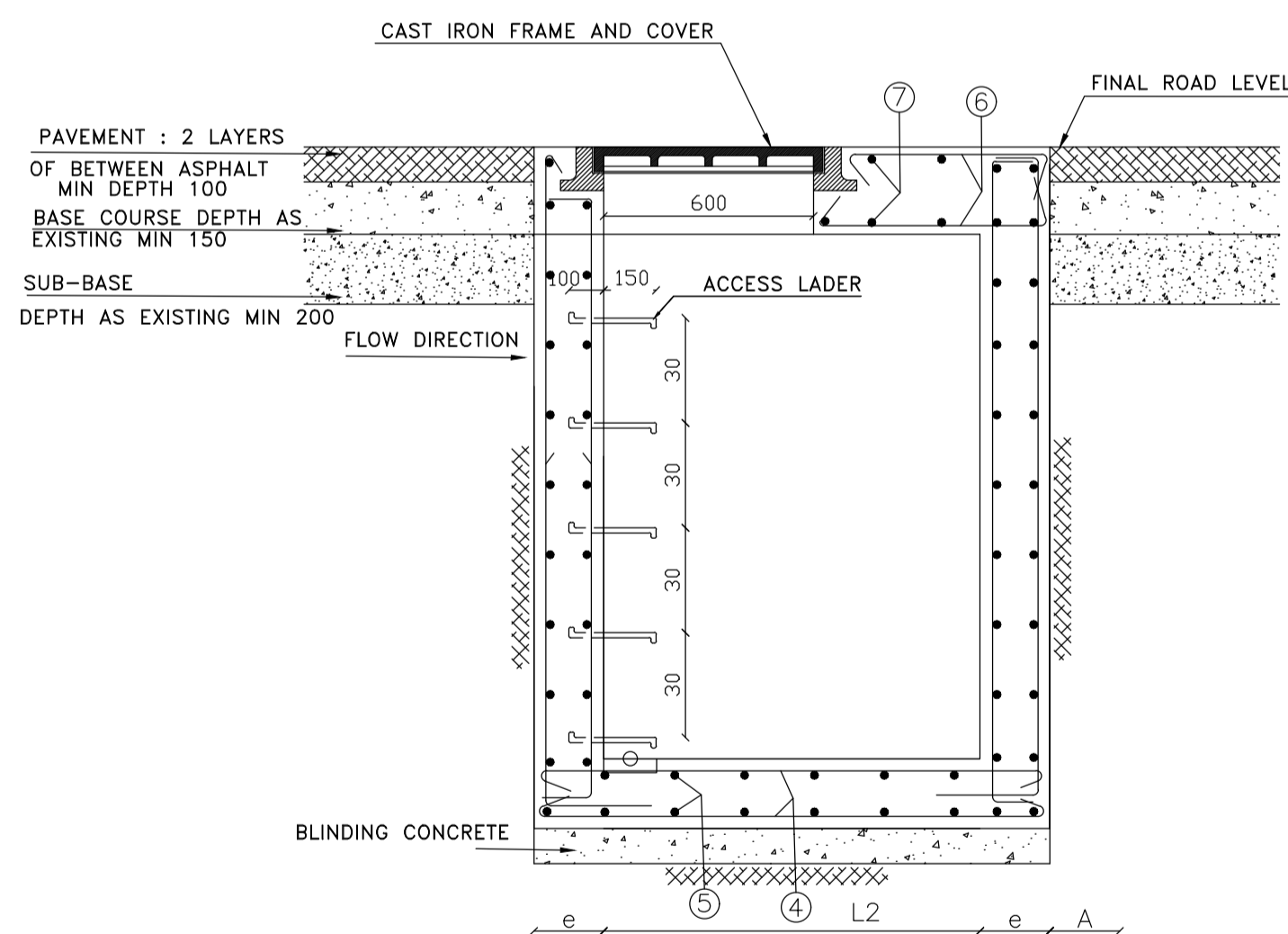
TYPE 2-C



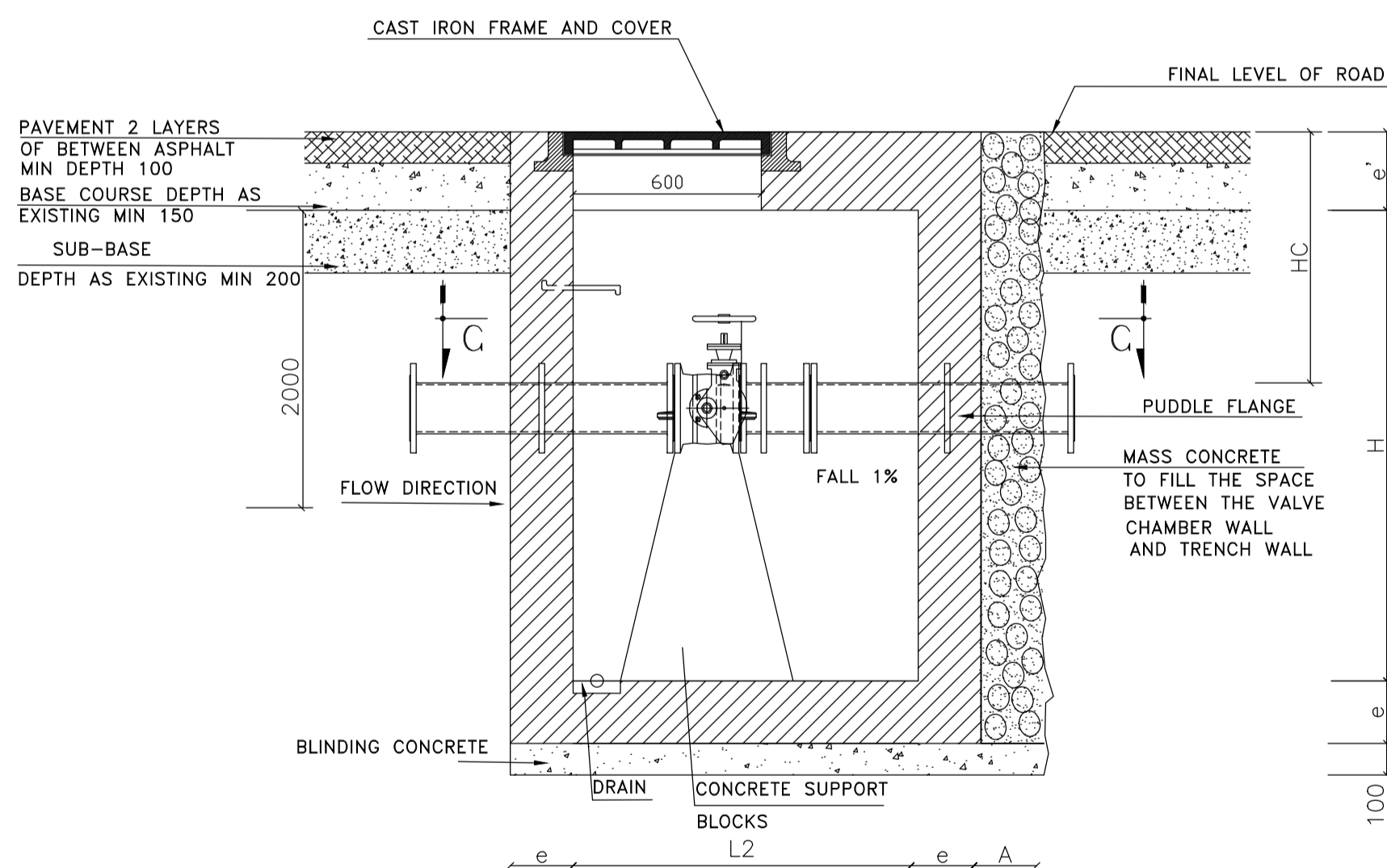
TYPE 3-C



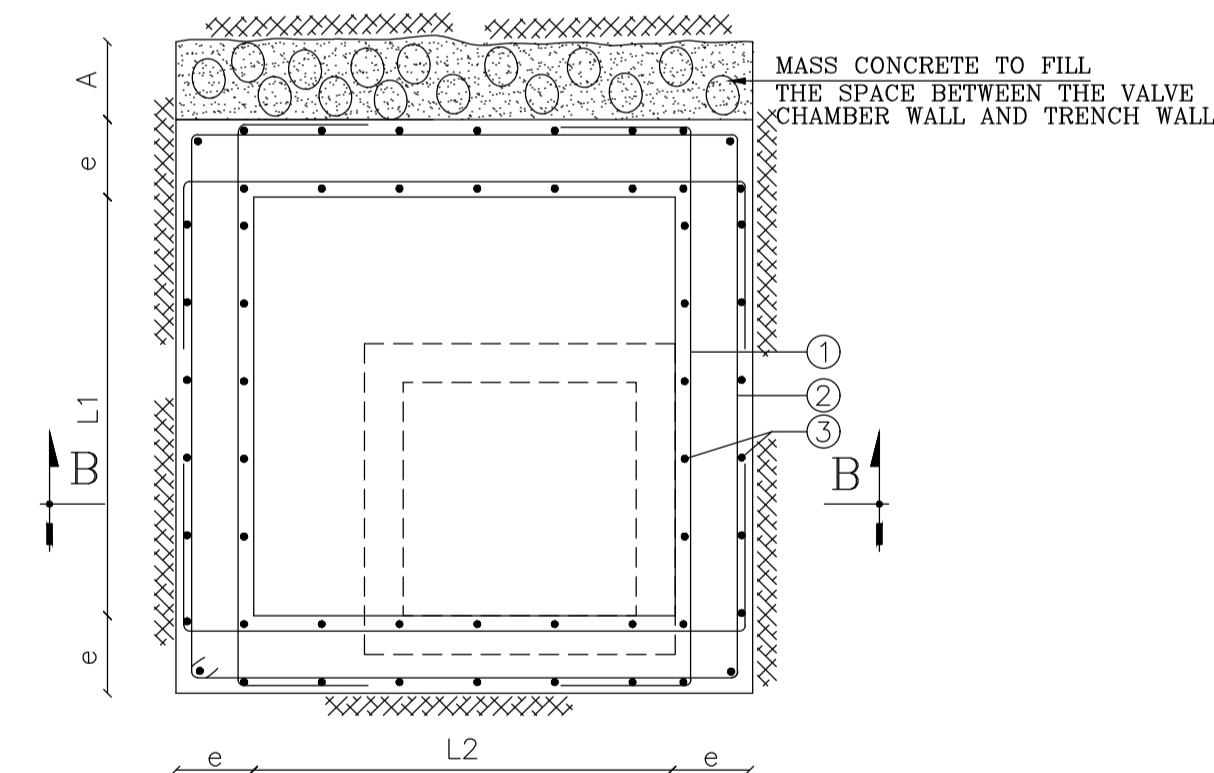
TYPE 4-C



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 mm	L1 mm	L2 mm	H mm	e mm	e' mm	A mm	HC 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 mm	1 mm	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm
80-150	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
200	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
250	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
300	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
350	T12 Ø200	T12 Ø200	T10 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
400	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
450	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200	T12 Ø200
500	T14 Ø200	T14 Ø200	T12 Ø200	T14 Ø200	T14 Ø200	T12 Ø200	T12 Ø200
600	T14 Ø200	T14 Ø200	T14 Ø200	T14 Ø200	T14 Ø200	T12 Ø200	T12 Ø200

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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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.
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(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:
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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

MINISTRY OF ENERGY AND WATER

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

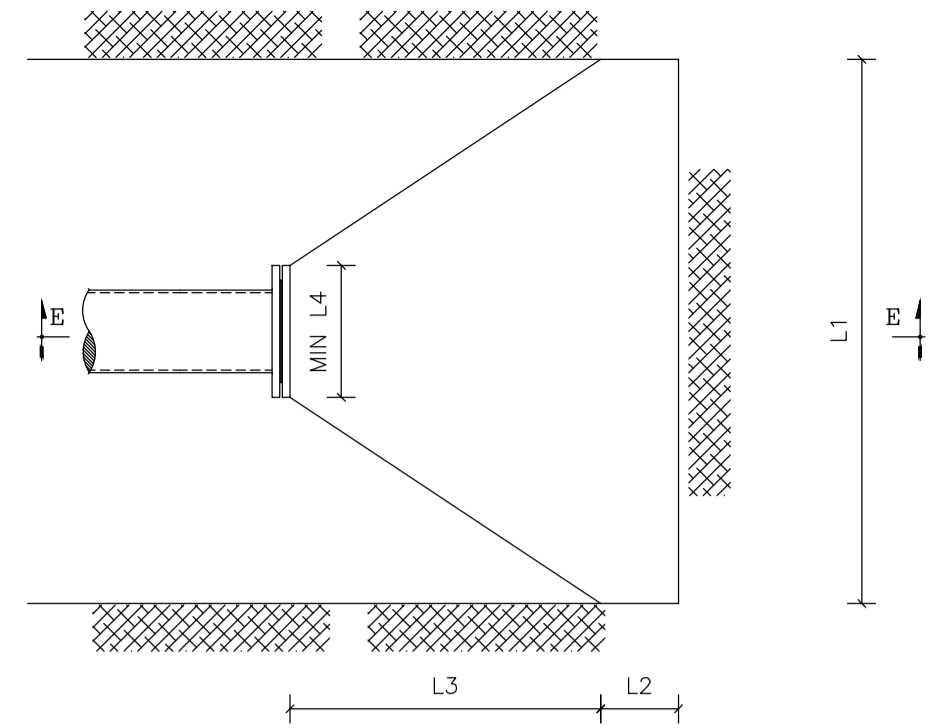
UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

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

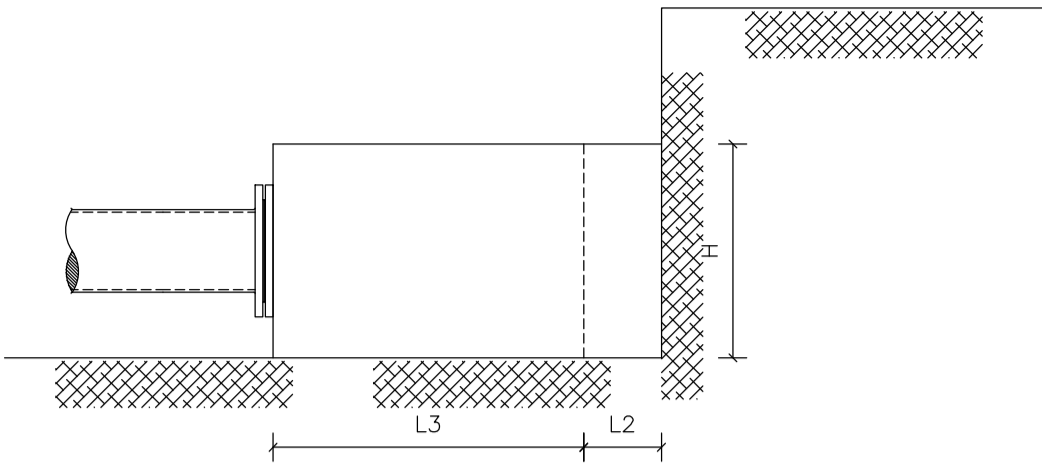
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562STDP10	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	10/23	10

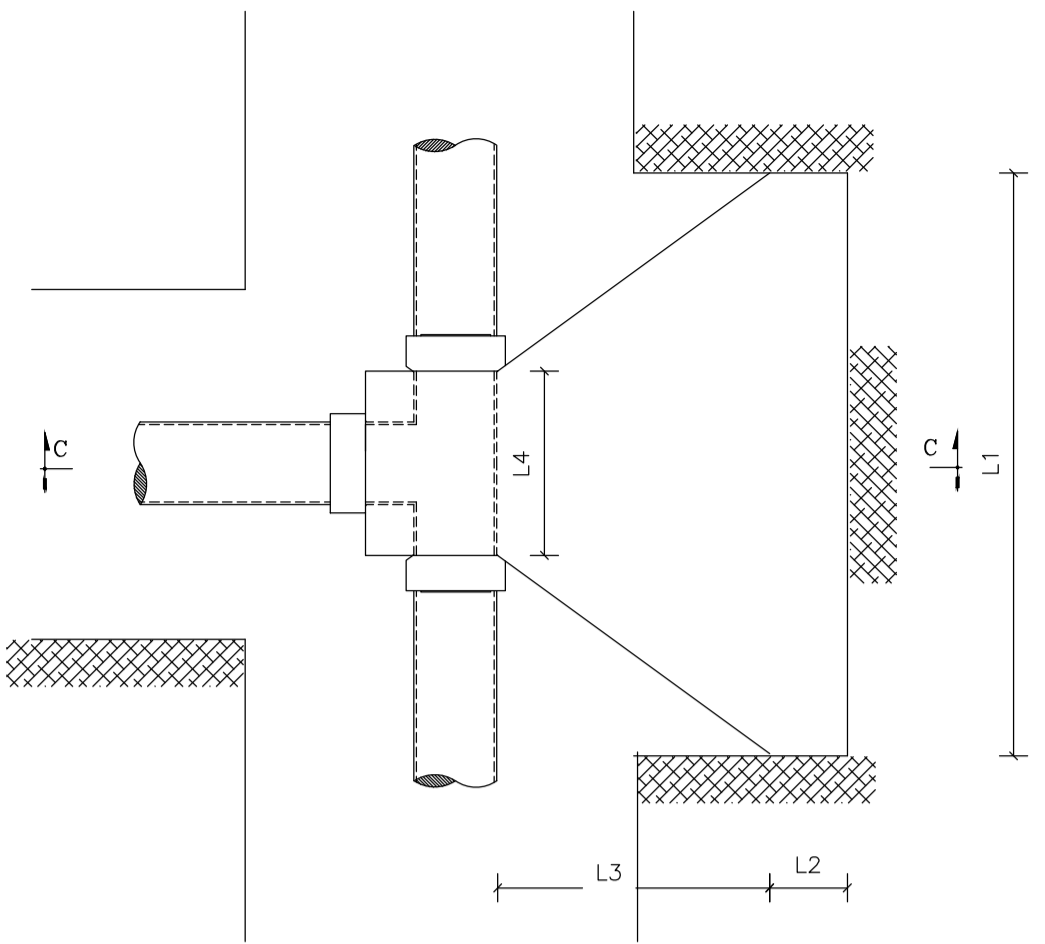
TYPICAL THRUST BLOCKS FOR TEES – HORIZONTAL BENDS – END CAPS



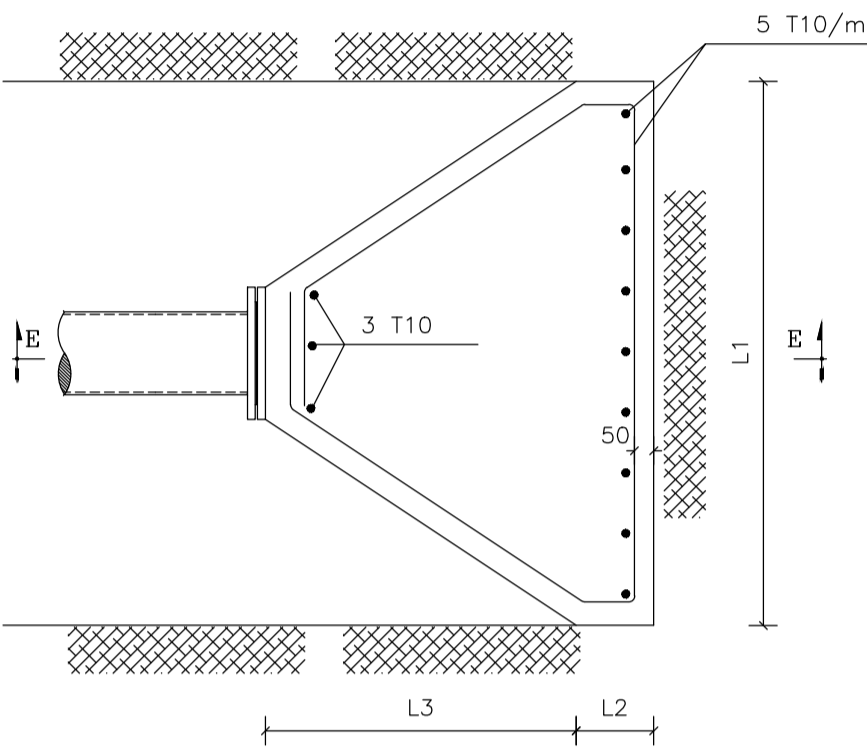
PLAN
END-CAP THRUST BLOCK



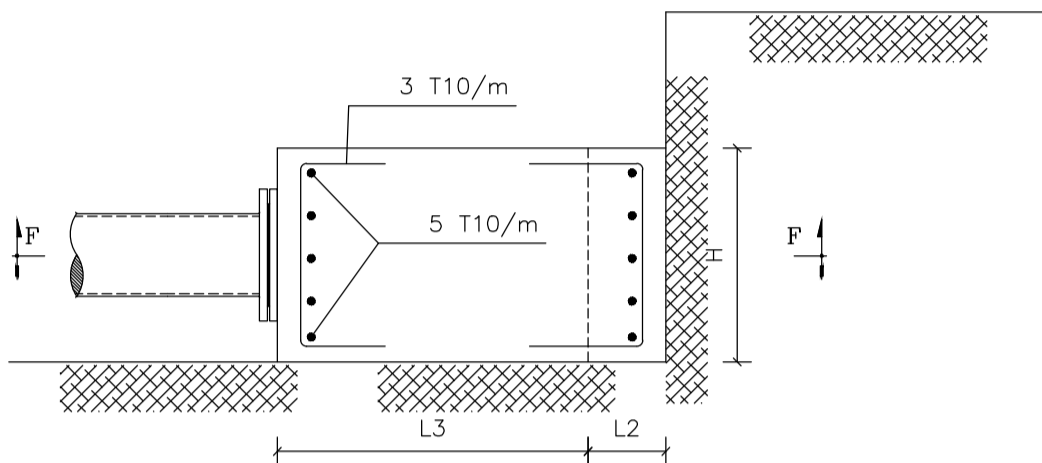
SECTION E-E
END-CAP THRUST BLOCK



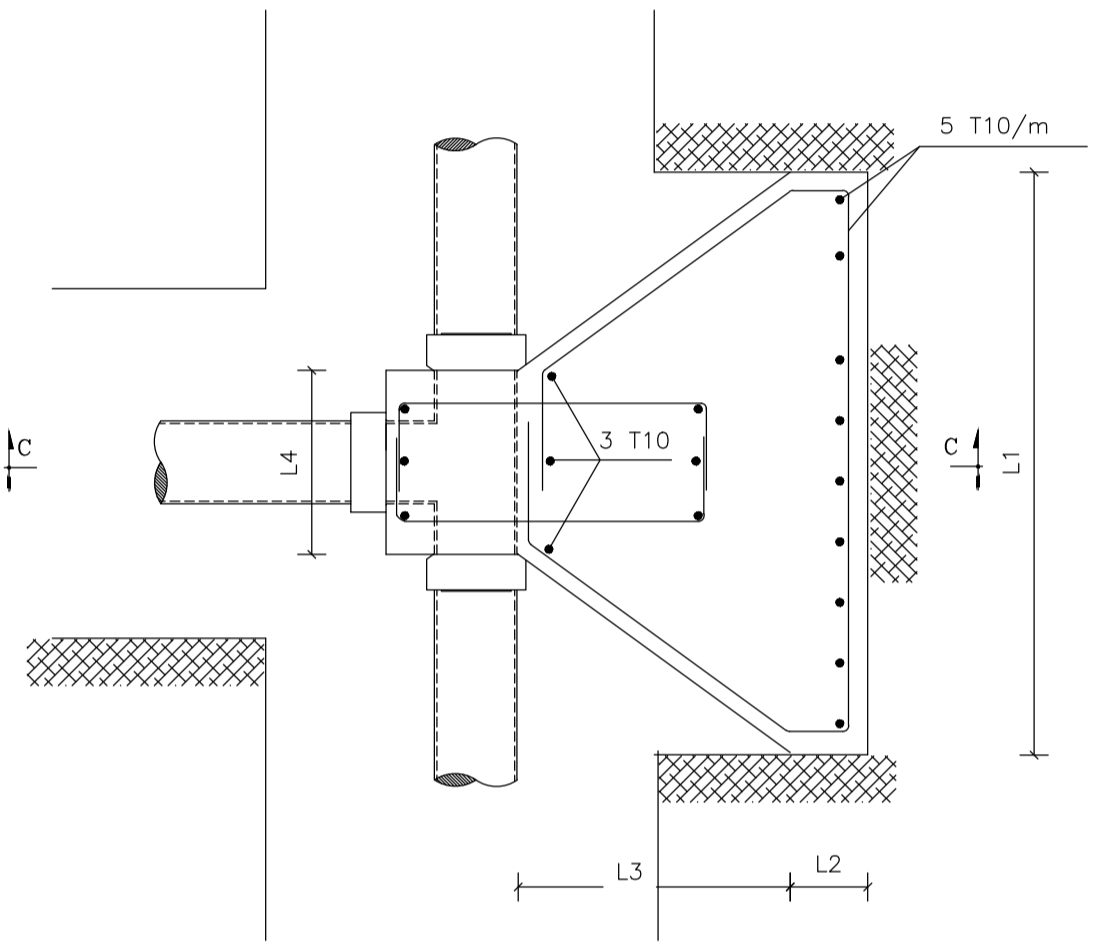
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TEE THRUST BLOCK



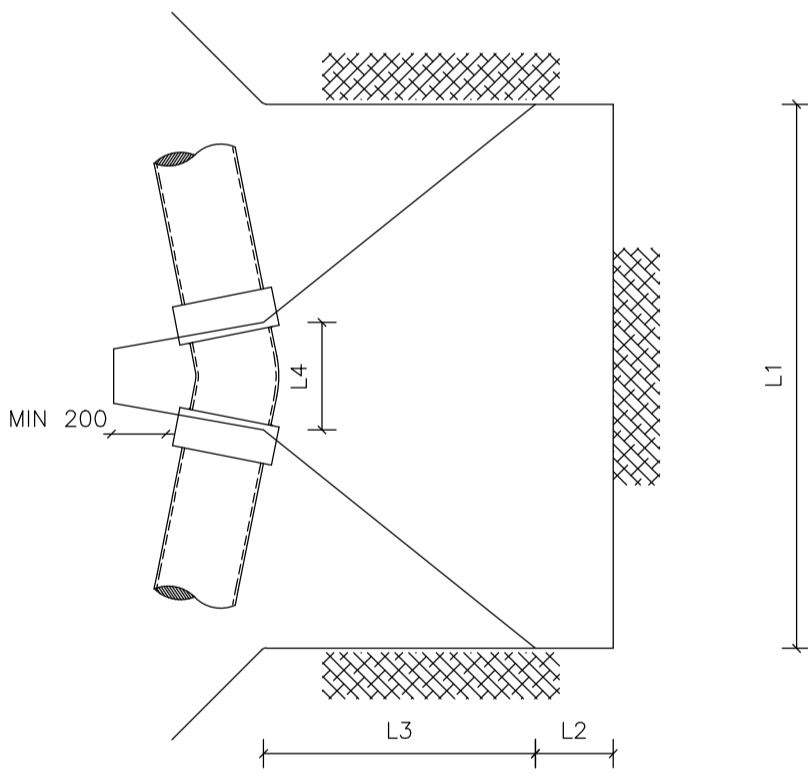
SECTION F-F
END-CAP THRUST BLOCK
TYPICAL REINFORCEMENT



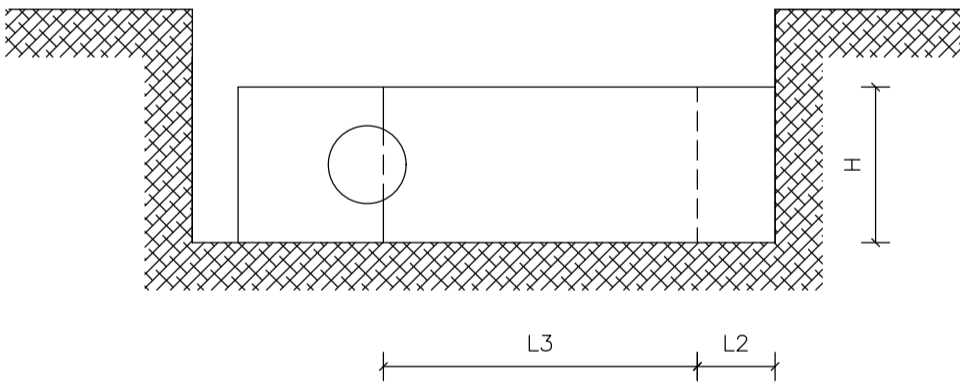
SECTION E-E
END-CAP THRUST BLOCK
TYPICAL REINFORCEMENT



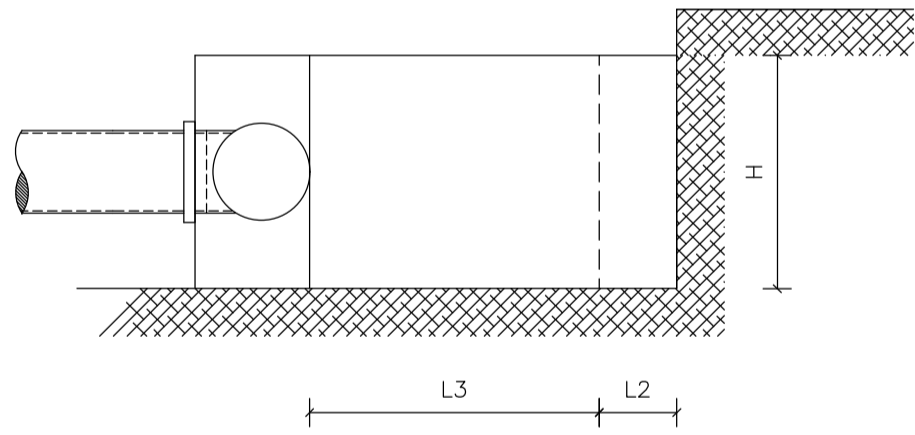
SECTION D-D
TEE THRUST BLOCK
TYPICAL REINFORCEMENT



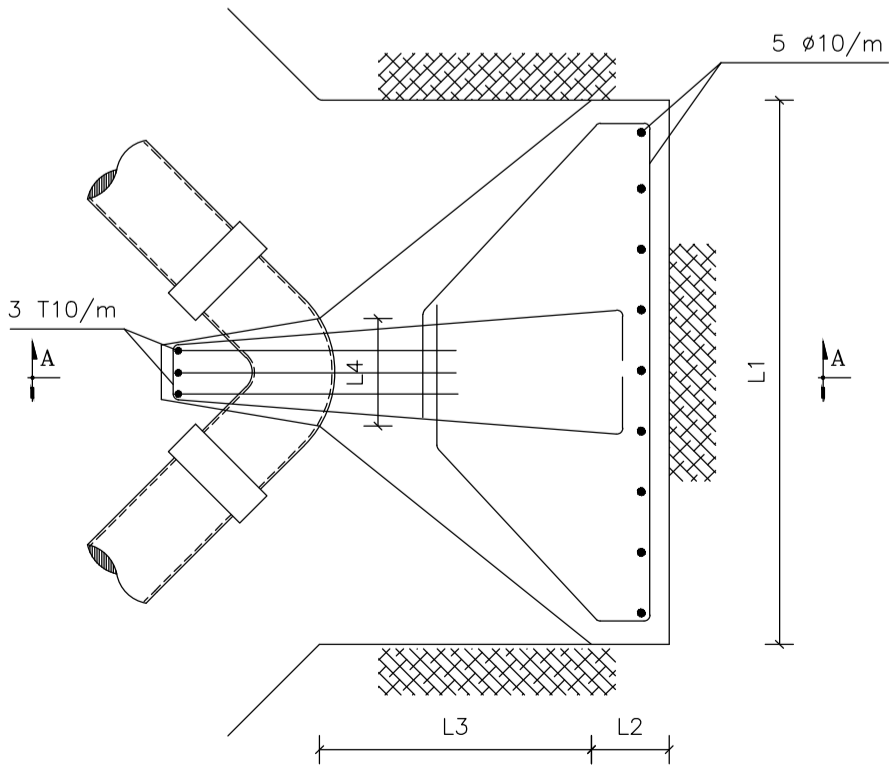
PLAN
TYPICAL HORIZONTAL BEND
THRUST BLOCK



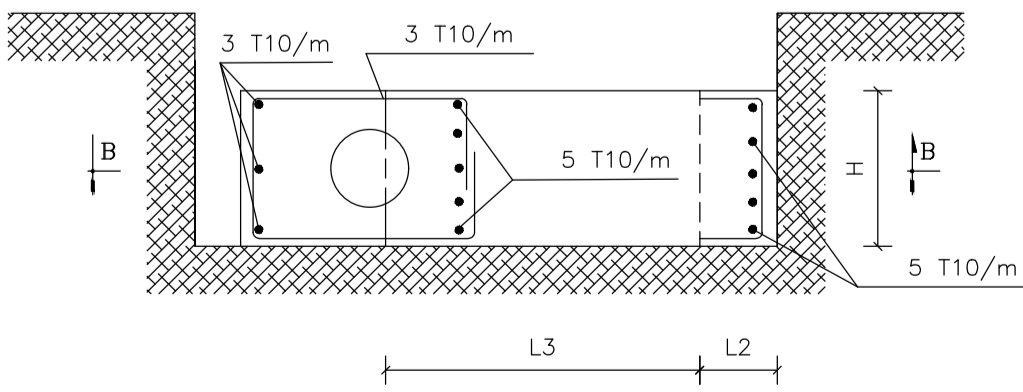
SECTION A-A
TYPICAL HORIZONTAL BEND
THRUST BLOCK



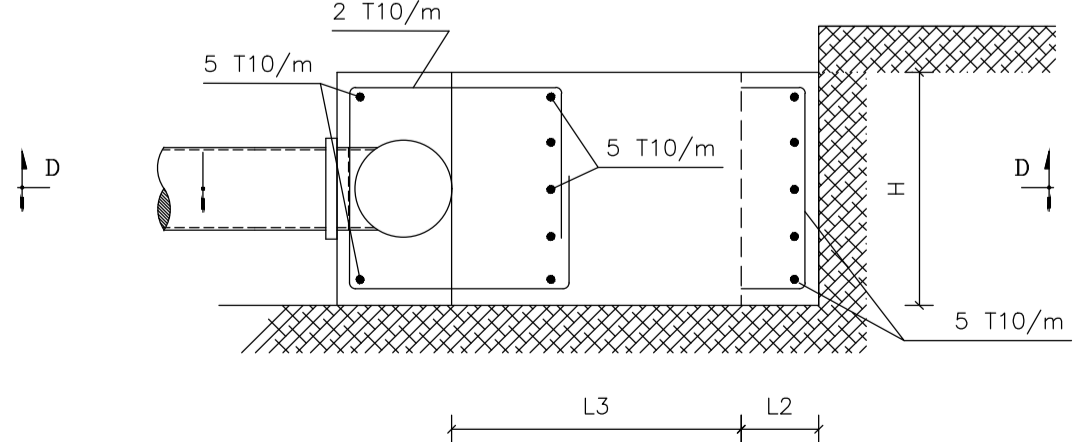
SECTION C-C
TEE THRUST BLOCK



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/m ³
PIPE MATERIAL DENSITY (DUCTILE IRON)	7050	kg/m ³
WATER SPECIFIC WEIGHT	1000	kg/m ³
CONCRETE SPECIFIC WEIGHT	2300	kg/m ³
SOIL INTERNAL FRICTION ANGLE	ϕ	°
SECURITY FACTOR	1.2	
SOIL BEARING CAPACITY	3	kg/cm ²
SOIL-CONCRETE FRICTION ANGLE	$2/3 \cdot \phi$	°

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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND DISTRIBUTION SYSTEMS	PIPELINE THRUST BLOCKS
--	------------------------

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DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	11/23	11

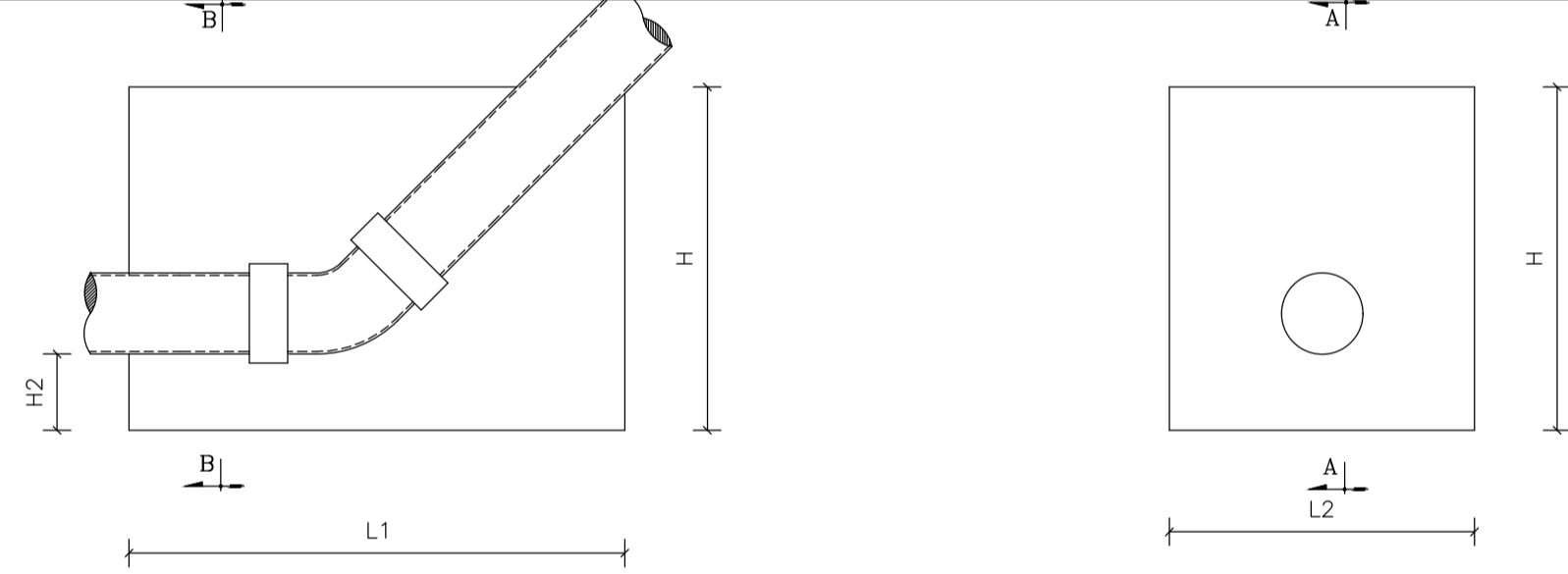
TYPICAL THRUST BLOCKS FOR TEES – HORIZONTAL BENDS – END CAPS

TABLE NO. 1 : THRUST BLOCKS TYPES

Diam. (mm)	Theta BEND ANGLE (°)	Soil Cover (m)	Pressure (bars)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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TYPICAL THRUST BLOCKS FOR VERTICAL BENDS

DOWNWARD DIRECTION TYPES

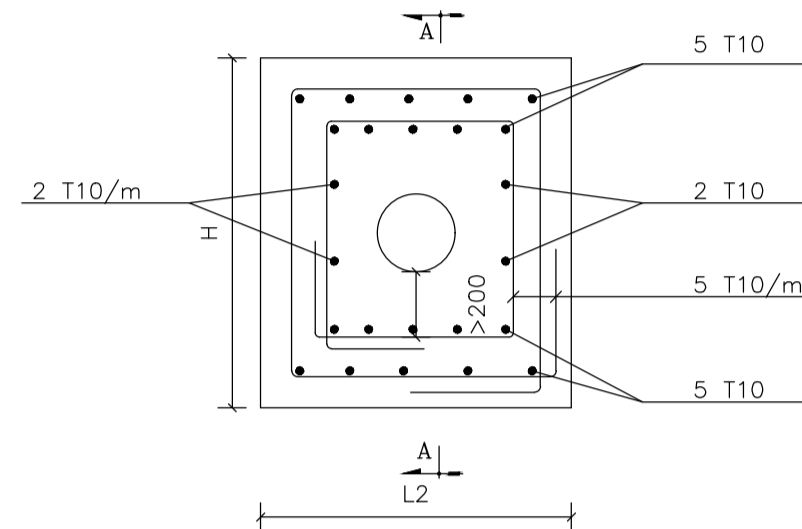
[illegible]

SECTION A-A
UPWARD FLOW DIRECTION

SECTION B-B
VERTICAL BEND ANCHOR BLOCK
UPWARD FLOW DIRECTION

DIMENSIONS OF THRUST BLOCKS FOR VERTICAL BENDS

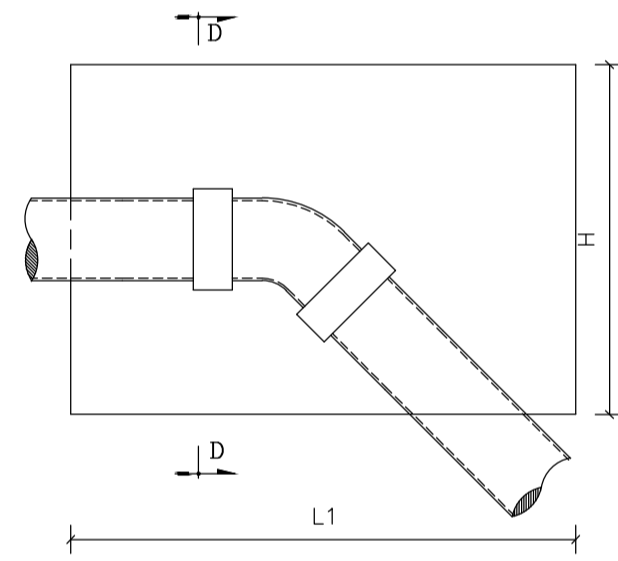
Type	L2(m)	L1(m)	H(m)	Volume (m3)
1	0.20	0.30	0.24	0.01
2	0.30	0.45	0.36	0.05
3	0.40	0.60	0.48	0.12
4	0.50	0.75	0.60	0.23
5	0.60	0.90	0.72	0.39
6	0.70	1.05	0.84	0.62
7	0.80	1.20	0.96	0.92
8	0.90	1.35	1.08	1.31
9	1.00	1.50	1.20	1.80
10	1.20	1.80	1.44	3.11
11	1.40	2.10	1.68	4.94
12	1.60	2.40	1.92	7.37



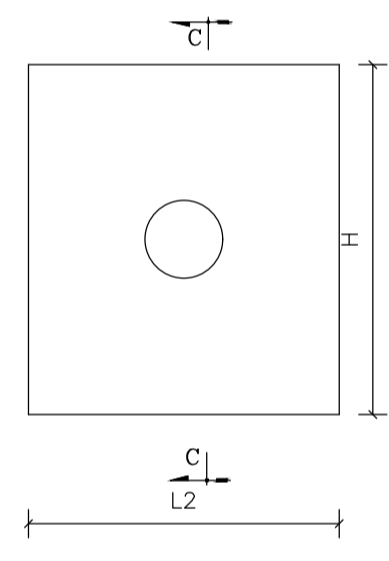
SECTION B-B
VERTICAL BEND ANCHOR BLOCK
TYPICAL REINFORCEMENT DETAIL

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
1000	90	1.20	-	-	-	-	-	-	-	-	-	-	-	-	-
1000	45	1.20	12	-	-	-	-	-	-	-	-	-	-	-	-
1000	22.5	1.20	12	-	-	-	-	-	-	-	-	-	-	-	-
1000	11.25	1.20	12	12	-	-	-	-	-	-	-	-	-	-	-
900	90	1.20	-	-	-	-	-	-	-	-	-	-	-	-	-
900	45	1.20	11	-	-	-	-	-	-	-	-	-	-	-	-
900	22.5	1.20	11	-	-	-	-	-	-	-	-	-	-	-	-
900	11.25	1.20	11	11	12	-	-	-	-	-	-	-	-	-	-
800	90	1.20	-	-	-	-	-	-	-	-	-	-	-	-	-
800	45	1.20	11	11	-	-	-	-	-	-	-	-	-	-	-
800	22.5	1.20	11	12	-	-	-	-	-	-	-	-	-	-	-
800	11.25	1.20	11	11	11	-	-	-	-	-	-	-	-	-	-
700	90	1.20	12	-	-	-	-	-	-	-	-	-	-	-	-
700	45	1.20	10	-	-	-	-	-	-	-	-	-	-	-	-
700	22.5	1.20	10	11	-	-	-	-	-	-	-	-	-	-	-
700	11.25	1.20	10	10	11	12	-	-	-	-	-	-	-	-	-
600	90	1.20	11	-	-	-	-	-	-	-	-	-	-	-	-
600	45	1.20	10	-	-	-	-	-	-	-	-	-	-	-	-
600	22.5	1.20	10	11	12	-	-	-	-	-	-	-	-	-	-
600	11.25	1.20	10	10	10	11	12	12	-	-	-	-	-	-	-
500	90	1.20	11	-	-	-	-	-	-	-	-	-	-	-	-
500	45	1.20	9	12	-	-	-	-	-	-	-	-	-	-	-
500	22.5	1.20	9	10	11	-	-	-	-	-	-	-	-	-	-
500	11.25	1.20	9	9	9	10	11	11	12	12	-	-	-	-	-
450	90	1.10	10	-	-	-	-	-	-	-	-	-	-	-	-
450	45	1.10	8	12	-	-	-	-	-	-	-	-	-	-	-
450	22.5	1.10	8	9	11	12	-	-	-	-	-	-	-	-	-
450	11.25	1.10	8	8	8	10	11	11	12	12	-	-	-	-	-
400	90	1.10	10	-	-	-	-	-	-	-	-	-	-	-	-
400	45	1.10	8	11	-	-	-	-	-	-	-	-	-	-	-
400	22.5	1.10	8	8	10	11	12	-	-	-	-	-	-	-	-
400	11.25	1.10	8	8	8	9	10	10	11	11	12	12	12	12	-
350	90	1.00	9	-	-	-	-	-	-	-	-	-	-	-	-
350	45	1.00	7	11	12	-	-	-	-	-	-	-	-	-	-
350	22.5	1.00	7	8	10	11	12	12	-	-	-	-	-	-	-
350	11.25	1.00	7	7	7	8	9	10	10	11	11	11	12	12	12
300	90	1.00	8	12	-	-	-	-	-	-	-	-	-	-	-
300	45	1.00	7	10	12	-	-	-	-	-	-	-	-	-	-
300	22.5	1.00	7	7	9	10	11	11	12	12	-	-	-	-	-
300	11.25	1.00	7	7	7	7	8	9	10	10	10	10	11	11	11
250	90	0.80	7	11	-	-	-	-	-	-	-	-	-	-	-
250	45	1.00	6	9	11	12	-	-	-	-	-	-	-	-	-
250	22.5	1.00	6	6	8	9	10	10	11	11	12	12	12	-	-
250	11.25	1.00	6	6	6	6	6	7	8	8	9	9	10	10	10
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	6	7	7	8	8	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	5	6	6	6	7	7	8
125	90	0.80	5	8	11	12	-	-	-	-	-	-	-	-	-
125	45	0.80	5	7	7	8	9	10	10	11	11	11	12	12	12
125	22.5	0.80	5	5	5	5	6	7	7	8	8	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	4	5	6	7	8	8	9	10	10	10	10	11	11
100	22.5	0.80	5	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	4	5	6	7	8	8	9	9	9	10	10
80	22.5	0.80	4	4	4	4	4	4	4	5	5	6	6	6	6
80	11.25	0.80	4	4	4	4	4	4	4	4	4	4	4	4	4



SECTION C-C
DOWNWARD FLOW DIRECTION

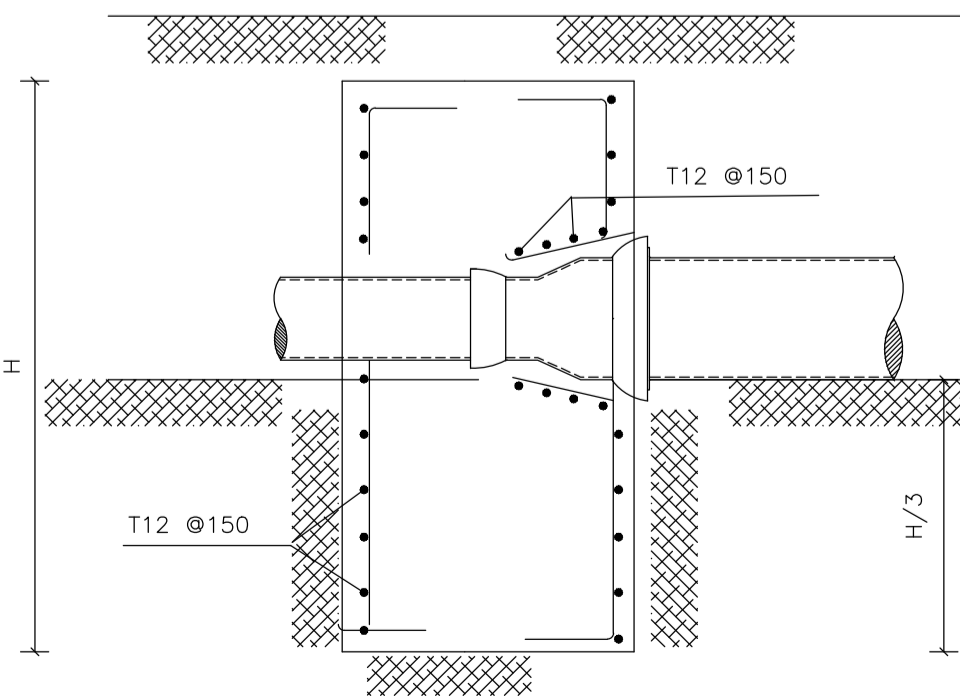


SECTION D-D
VERTICAL BEND ANCHOR BLOCK
DOWNWARD FLOW DIRECTION

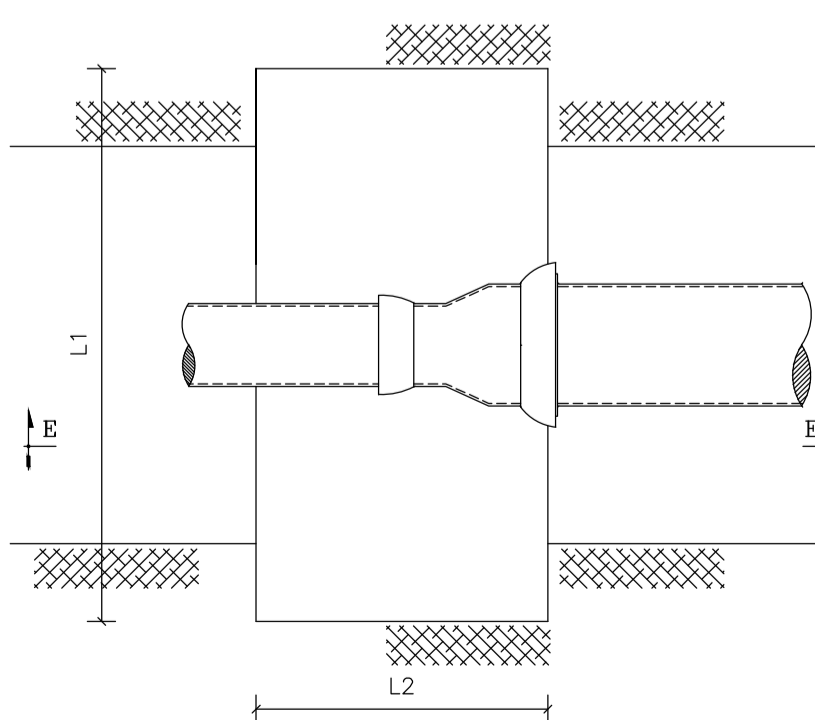
TYPICAL THRUST BLOCKS FOR TAPERS

THRUST BLOCK DIMENSIONS

Type	L1 (m)	L2 (m)	H (m)	Volume (m ³)
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



PLAIN

THRUST BLOCKS TYPE

Large Diam (mm)	Small Diam (mm)	PRESSURE (BARs)													
		1	5	10	15	20	25	30	35	40	45	50	55	60	
1000	900	9	—	—	—	—	—	—	—	—	—	—	—	—	
1000	800	10	—	—	—	—	—	—	—	—	—	—	—	—	
900	800	8	—	—	—	—	—	—	—	—	—	—	—	—	
900	700	10	—	—	—	—	—	—	—	—	—	—	—	—	
800	700	8	—	—	—	—	—	—	—	—	—	—	—	—	
800	600	9	—	—	—	—	—	—	—	—	—	—	—	—	
800	500	10	—	—	—	—	—	—	—	—	—	—	—	—	
700	600	7	—	—	—	—	—	—	—	—	—	—	—	—	
700	500	9	—	—	—	—	—	—	—	—	—	—	—	—	
600	500	7	11	—	—	—	—	—	—	—	—	—	—	—	
600	450	8	—	—	—	—	—	—	—	—	—	—	—	—	
600	400	8	—	—	—	—	—	—	—	—	—	—	—	—	
500	450	6	9	11	—	—	—	—	—	—	—	—	—	—	
500	400	6	11	—	—	—	—	—	—	—	—	—	—	—	
500	350	7	—	—	—	—	—	—	—	—	—	—	—	—	
450	400	5	8	10	—	—	—	—	—	—	—	—	—	—	
450	350	6	10	—	—	—	—	—	—	—	—	—	—	—	
450	300	7	—	—	—	—	—	—	—	—	—	—	—	—	
400	350	5	8	10	—	—	—	—	—	—	—	—	—	—	
400	300	5	10	—	—	—	—	—	—	—	—	—	—	—	
400	250	6	11	—	—	—	—	—	—	—	—	—	—	—	
350	300	4	8	10	11	—	—	—	—	—	—	—	—	—	
300	250	4	7	9	10	11	—	—	—	—	—	—	—	—	
300	200	4	9	11	—	—	—	—	—	—	—	—	—	—	
300	150	5	10	—	—	—	—	—	—	—	—	—	—	—	
250	200	3	7	9	10	11	—	—	—	—	—	—	—	—	
250	150	3	8	10	—	—	—	—	—	—	—	—	—	—	
250	125	4	9	11	—	—	—	—	—	—	—	—	—	—	
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	

NOTES

BASIC DATA :

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

<i>Rev.</i>	<i>Date</i>	<i>Dsgn</i>	<i>Drwn</i>	<i>Chk'd</i>	<i>Appr'd</i>

REPUBLIC OF LEBANON

MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION



BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

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P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

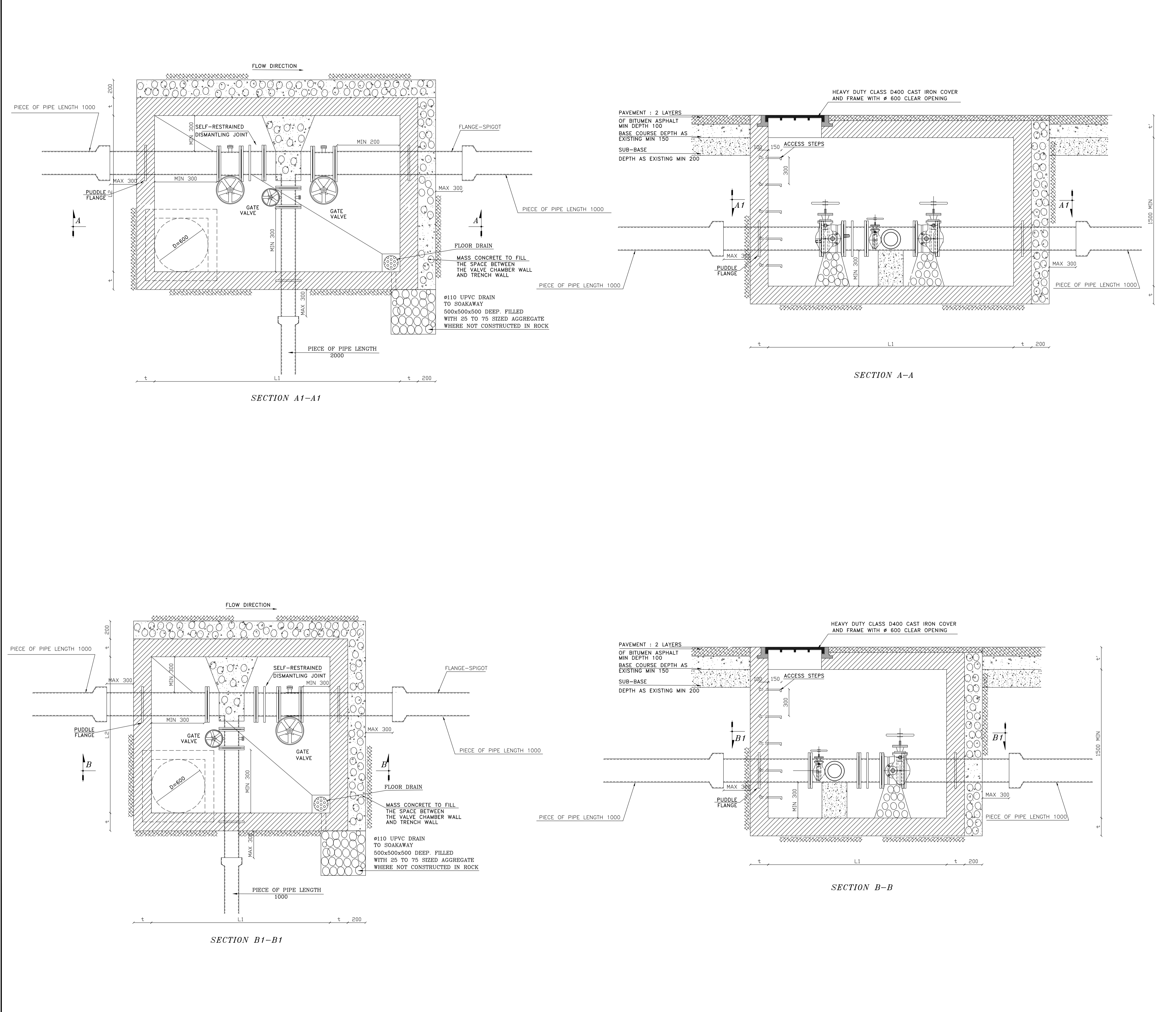
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND
DISTRIBUTION SYSTEMS

PIPELINE THRUST BLOCKS

<i>DRAWING No.</i>	<i>DESIGNED BY</i>	<i>DRAWN BY</i>	<i>CHECKED BY</i>
562STDP13	BTD	BTD	BTD

<i>DATE</i>	<i>SCALE</i>	<i>SHEET No.</i>	<i>SEQ No.</i>
MAY 2020	NOT TO SCALE	13/23	13



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: F_y=400 MPa.
MILD STEEL BARS: SYMBOL Ø. YIELD STRESS: F_y=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 2x5Ø.
(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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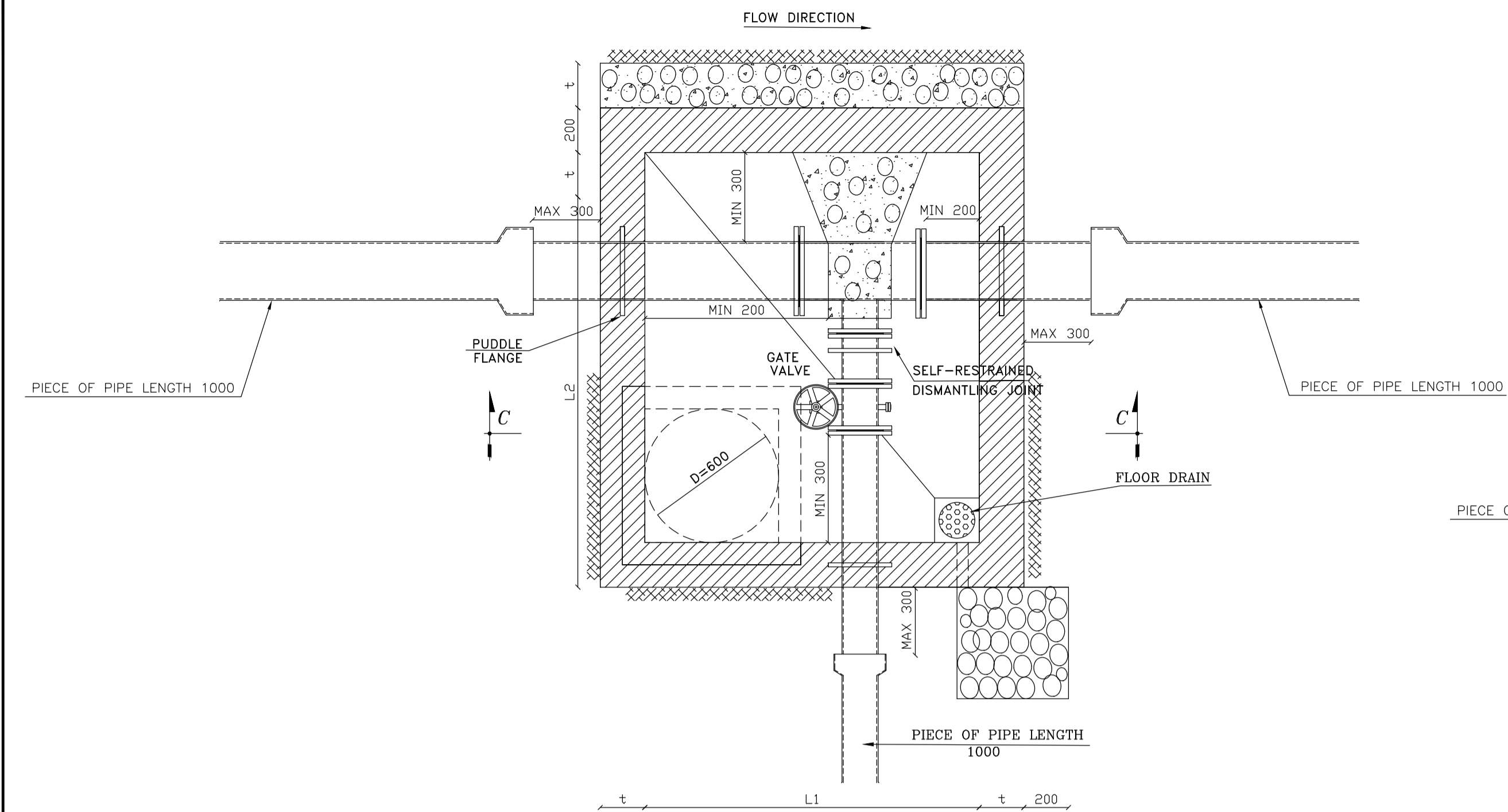
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
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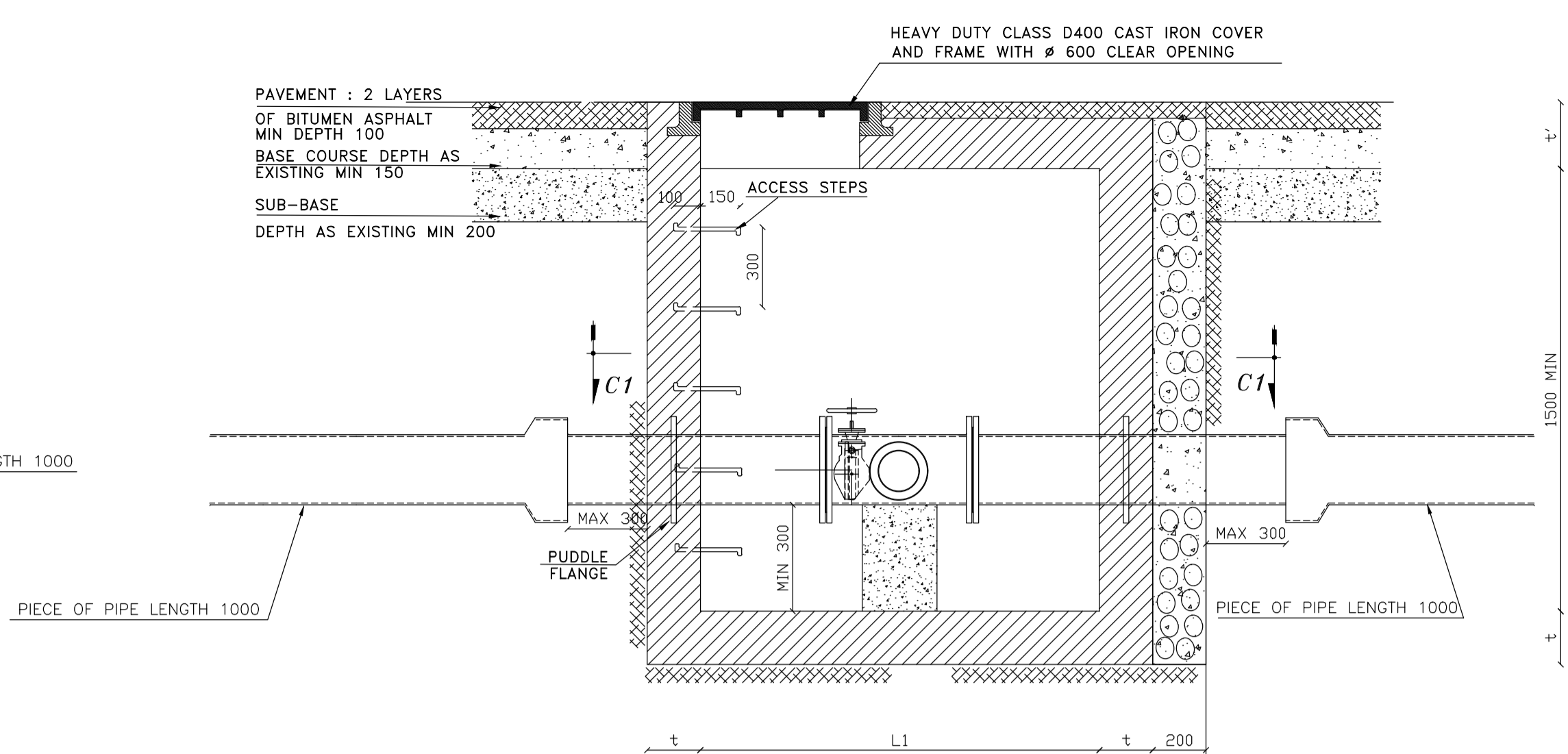
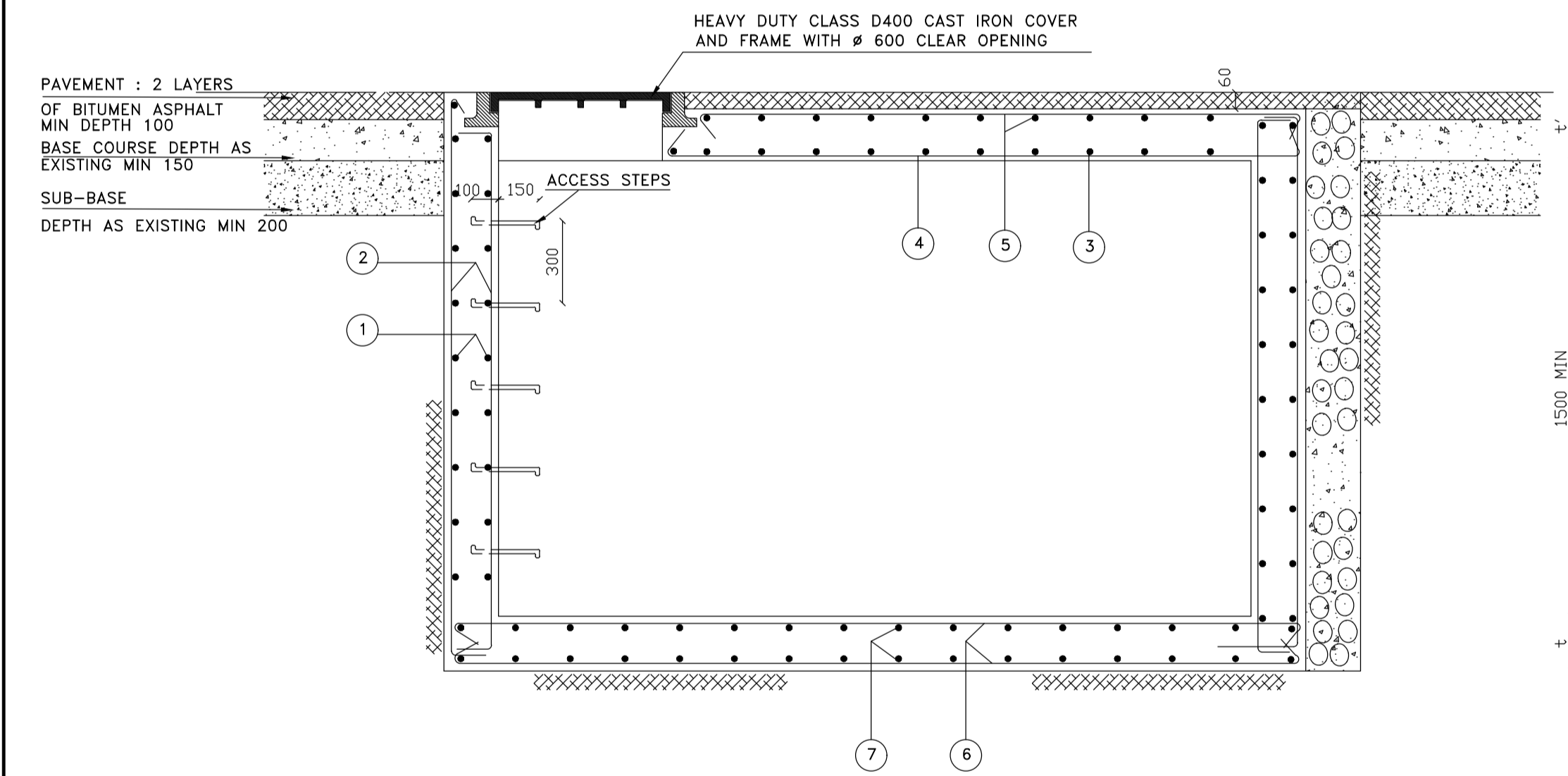
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL VALVE CHAMBER DETAILS
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD15	BTD	BTD	BTD

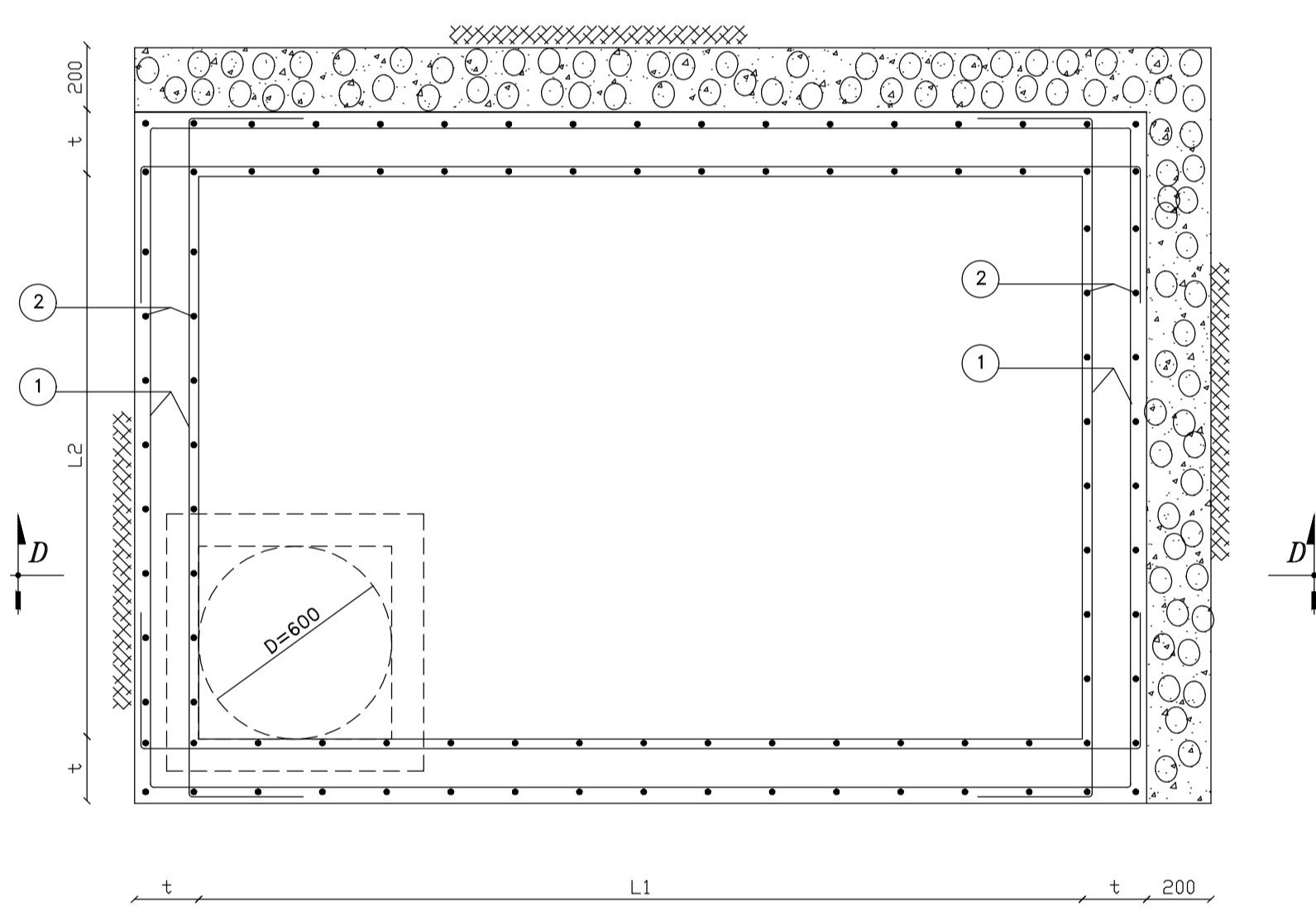
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	15/23	15



SECTION C1-C1



SECTION C-C



VALVE CHAMBER TYPE

BRANCH DIAM NBR OF VALVES		60			80			100			125			150			200			250			300			350			400			450			500			600		
MAIN PIPE		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	-	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	-	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	-	R24	R37	-	R24	R37	-	R24	R37	-	-			
600		-	-	-	-	-	R28	R40	-	R27	R39	-	R29	R41	-	R27	R39	-	R27	R39	R11	R28	R40	R11	R28	R40	R11	R28	R40	R11	R28	R40	R11	R28	R40	R11	R28	R40		

REINFORCEMENT STEEL TABLE

VALVE CHAMBER	THICKNESS		REINFORCEMENT							
	TYPE	t mm	t' mm	1	2	3	4	5	6	7
R1-R5	200	250	T14 Ø200	T14 Ø200	T16 Ø200	T14 Ø200	2xT12 Ø200	T14 Ø200	T14 Ø200	
R6-R11	200	250	T14 Ø165	T14 Ø165	T16 Ø165	T14 Ø165	2xT12 Ø165	T14 Ø165	T14 Ø165	
R11-R23	200	250	T14 Ø150	T14 Ø150	T14 Ø150	T14 Ø150	2xT12 Ø150	T14 Ø150	T14 Ø150	
R23-R38	250	300	T16 Ø200	T16 Ø200	T20 Ø200	T14 Ø200	2xT12 Ø200	T16 Ø200	T16 Ø200	
R39-R42	300	300	T16 Ø165	T16 Ø165	T20 Ø165	T14 Ø165	2xT12 Ø165	T16 Ø165	T16 Ø165	

VALVE CHAMBER DIMENSIONS	
TYPE	LxL2
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	LxL2
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

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
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WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x5Ø.
(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:
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(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
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* 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

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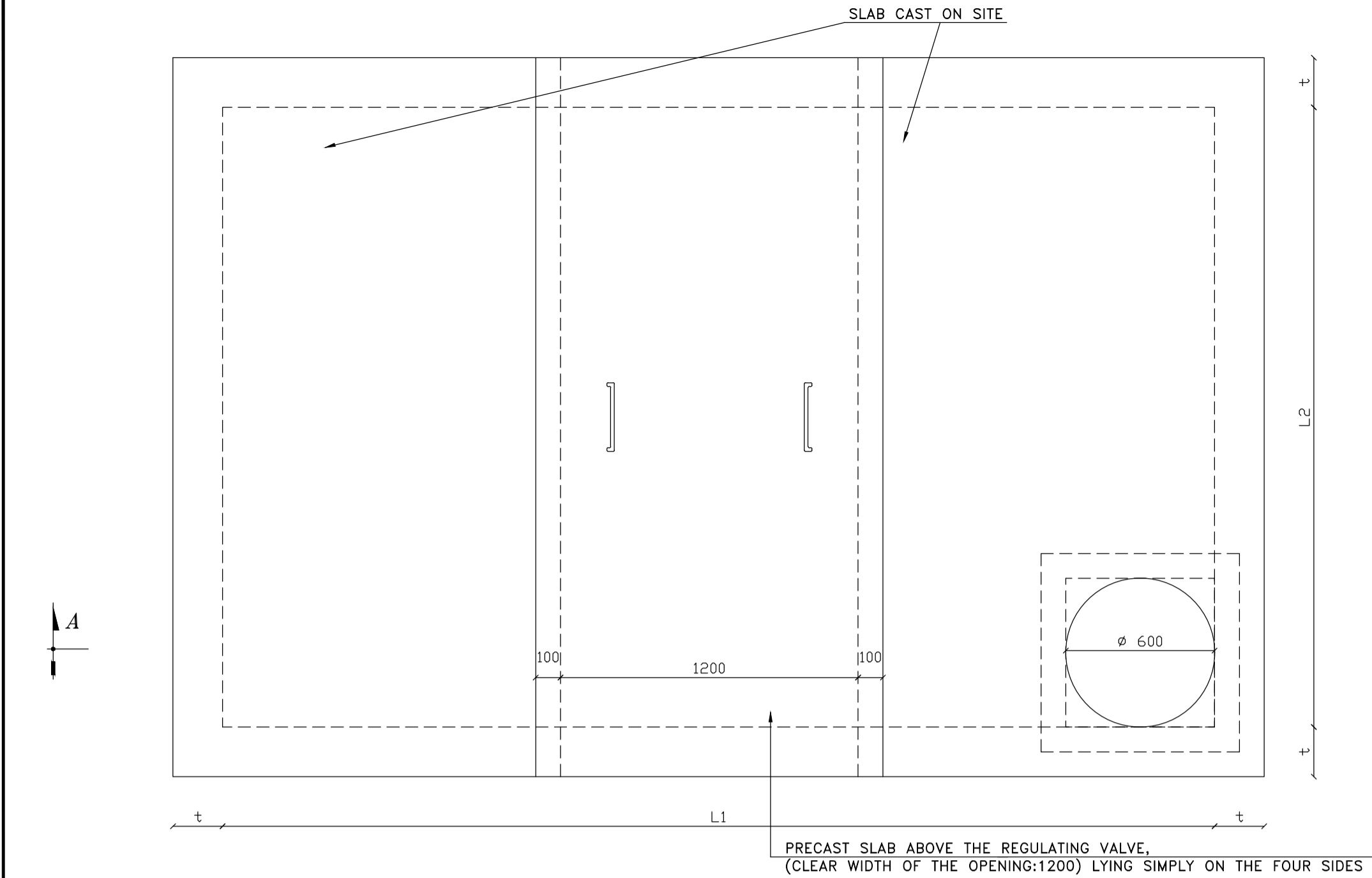
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
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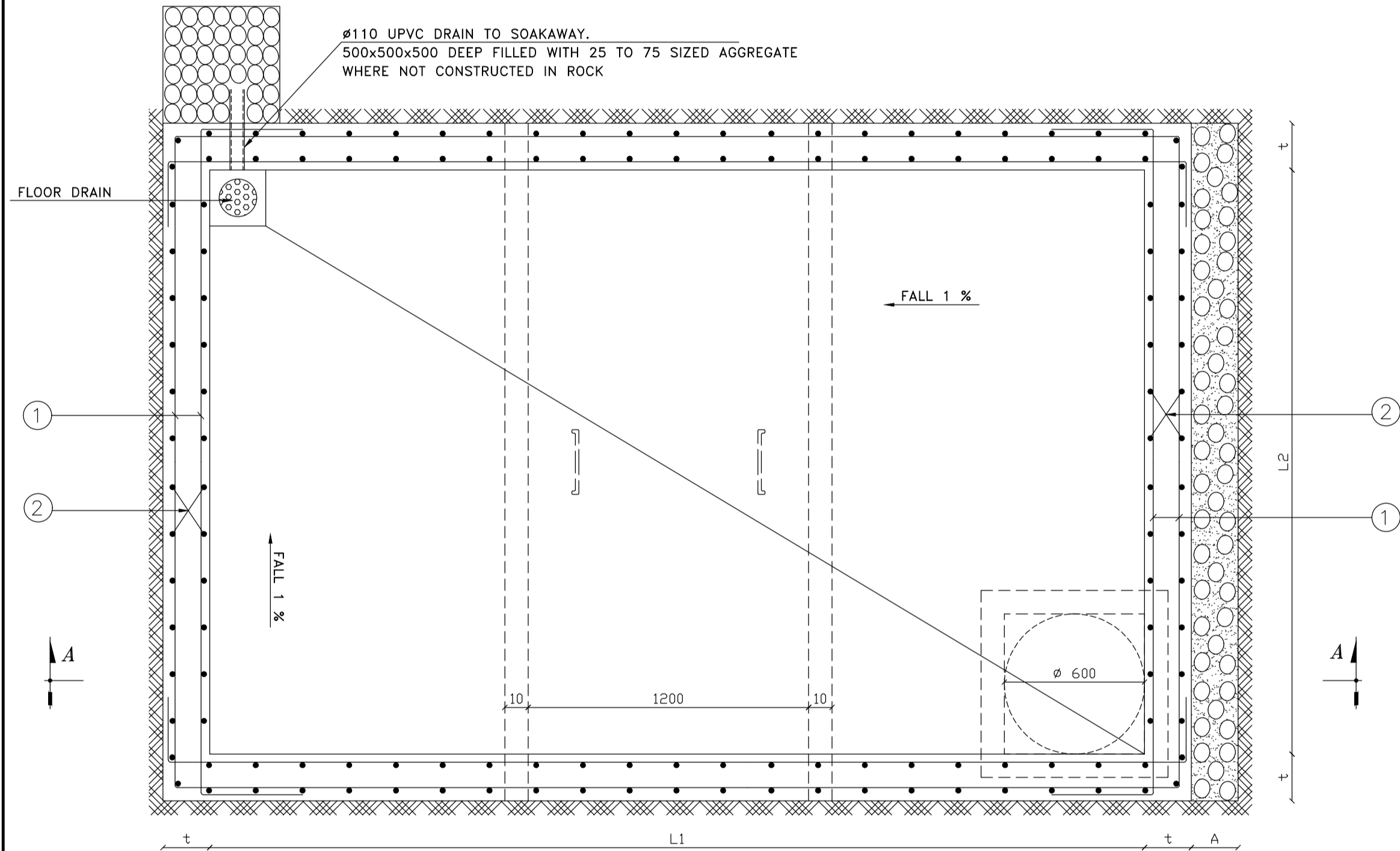
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL VALVE CHAMBER DETAILS
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STDP16	BTD	BTD	BTD

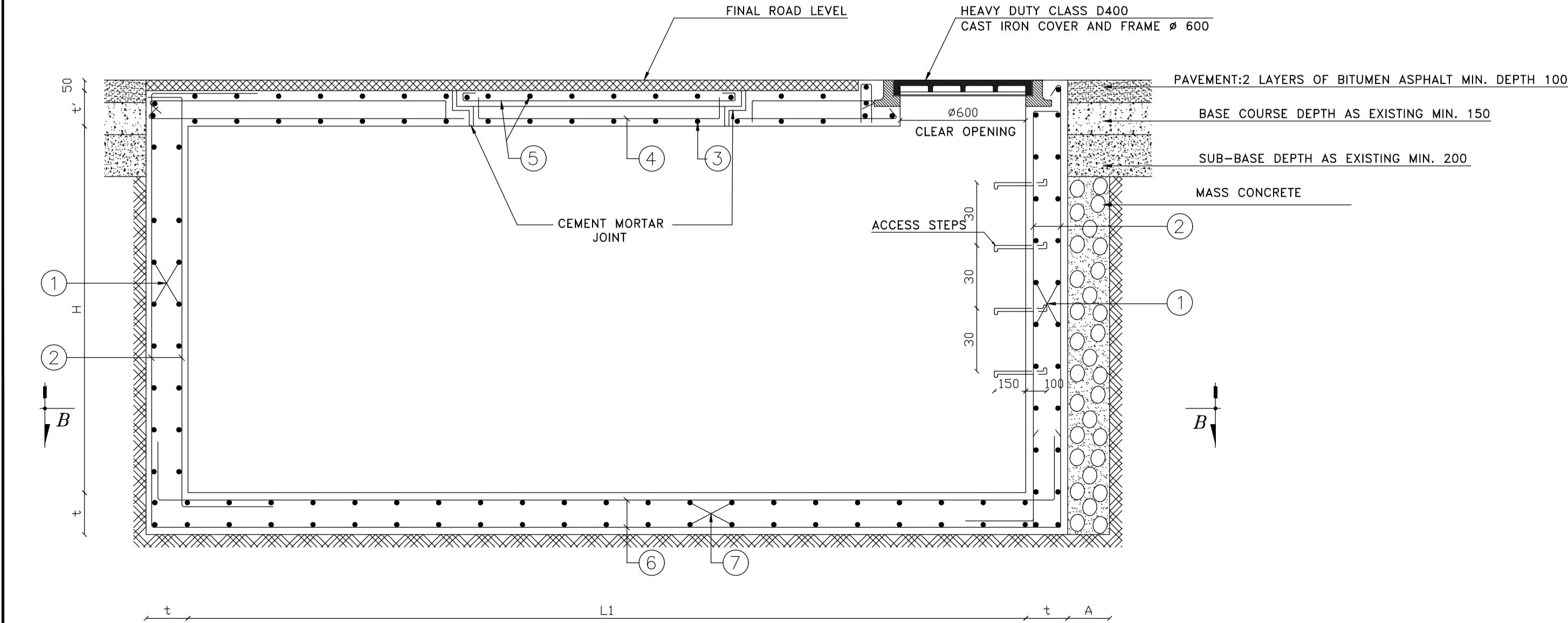
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	16/23	16



PLAN VIEW



SECTION B-B



SECTION A-A

MAIN PIPE DIAMETER	REGULATING PIPE DIAMETER	BY PASS DIAMETER	UPSTREAM PRESSURE-DOWNSTREAM PRESSURE ≤25 BARS				
			AIR RELIEF VALVE DIAMETER	LENGTH	WIDTH	HEIGHT	BLOCK THICKNESS
D mm	dr mm	db mm	dv mm	L1 mm	L2 mm	H mm	A mm
80	80	80	60	2500	1750	2000	200
100	80	80	60	2500	1750	2000	200
150	100	80	60	2500	1750	2000	200
200	150	100	60	3600	2000	2000	200
250	200	150	60	3600	2000	2000	200
300	250	200	80	3600	2000	2000	200
350	300	250	80	4000	2500	2000	200
400	300	250	80	4000	2500	2000	200
450	350	250	100	4000	2500	2000	200
500	400	300	100	4200	2750	2000	200
600	500	400	100	5000	3100	2000	200
700	500	400	150	5000	3100	2000	200
800	600	400	150	5500	3100	2100	200

* UPSTREAM PRESSURE - DOWNSTREAM PRESSURE ≤ 16 BARS.

MAIN PIPE DIAMETER	REGULATING PIPE DIAMETER	BYPASS DIAMETER	UP STREAM PRESSURE-DOWN STREAM PRESSURE ≤ 20 BARS									20 BARS ≤ UPSTREAM PRESSURE- DOWNSTREAM PRESSURE <25 BARS								
			REINFORCEMENT							THICKNESS		REINFORCEMENT							THICKNESS	
			1	2	3	4	5	6	7	t mm	t' mm	1	2	3	4	5	6	7	t mm	t' mm
D mm	dr mm	db mm	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250
80	80	80	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250
100	80	80	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250
150	100	80	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250
200	150	100	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250
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300	250	200	T14Ø165	T14Ø165	T16Ø165	T12Ø165	2xT12Ø165	T14Ø165	T14Ø165	200	250	T16Ø200	T16Ø200	T16Ø165	T12Ø165	2xT12Ø165	T16Ø200	T16Ø200	250	250
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400	300	250	T16Ø200	T16Ø200	T20Ø200	T12Ø200	2xT12Ø200	T16Ø200	T16Ø200	250	300	T16Ø165	T16Ø165	T20Ø165	T12Ø165	2xT12Ø165	T16Ø165	T16Ø165	300	300
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600	500	400	T14Ø200	T14Ø200	T20Ø165	T12Ø165	2xT12Ø165	T14Ø200	T14Ø200	350	300									
700	500	400	T14Ø200	T14Ø200	T20Ø165	T12Ø165	2xT12Ø165	T14Ø200	T14Ø200	400	300									
800*	600	400	T16Ø200	T16Ø200	T20Ø165	T12Ø165	2xT12Ø165	T16Ø200	T16Ø200	400	300									

* UPSTREAM PRESSURE - DOWNSTREAM PRESSURE ≤ 16 BARS.

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: F_y=400 MPa.
MILD STEEL BARS: SYMBOL Ø YIELD STRESS: F_y=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 20°.
• GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 TO 1.
• 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:

- ① PIECE OF PIPE MAX. LENGTH 1000
- ② FLANGED REDUCER
- ③ INTAKE COLLAR
- ④ PRESSURE GAUGE
- ⑤ BUTTERFLY VALVE
- ⑥ FILTER WITH WASHOUT VALVE
- ⑦ PRESSURE REGULATING OR SUSTAINING VALVE
- ⑧ SELF-RESTRAINED DISMANTLING JOINT
- ⑨ AIR RELIEF VALVE+ISOLATING BUTTERFLY VALVE
- ⑩ PUDDLE FLANGE
- ⑪ FLANGE-SPIGOT
- ⑫ FLANGE-SOCKET
- ⑬ PRESSURE REDUCING DIAPHRAGM

Rev. Date Dsgn Drwn Chk'd Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

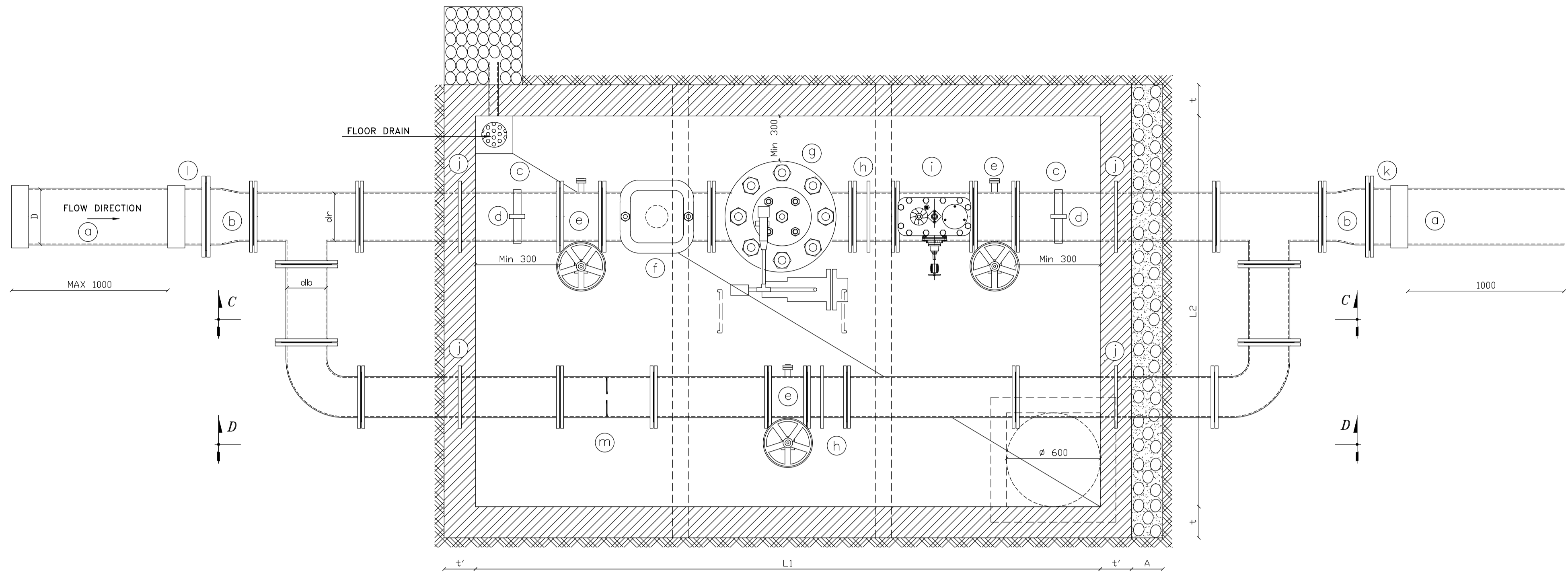
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

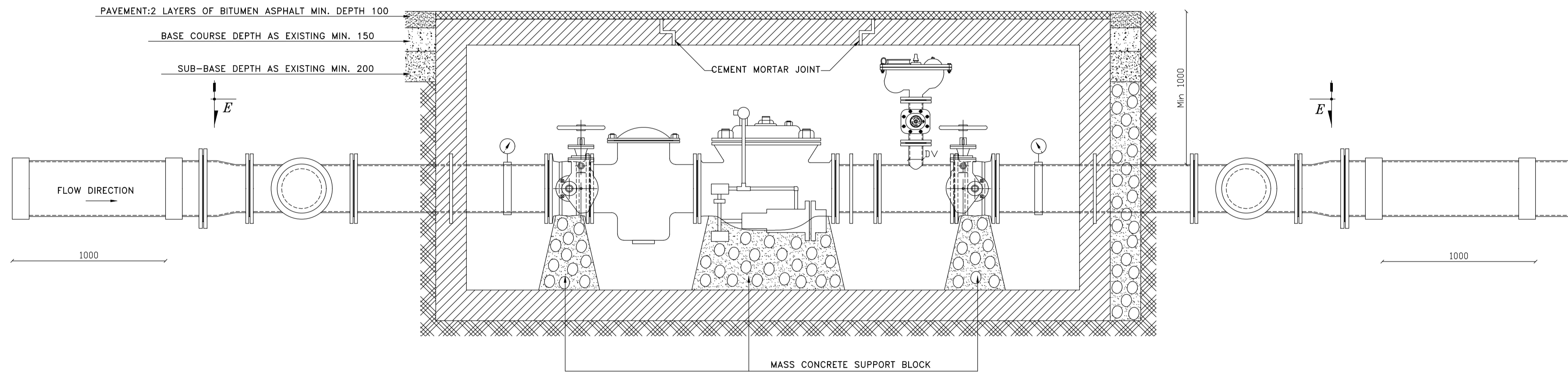
TRANSMISSION AND DISTRIBUTION SYSTEMS	PRESSURE REGULATING VALVE DETAILS OF INSTALLATION AND PROTECTION CHAMBER
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STDPI7	BTD	BTD	BTD

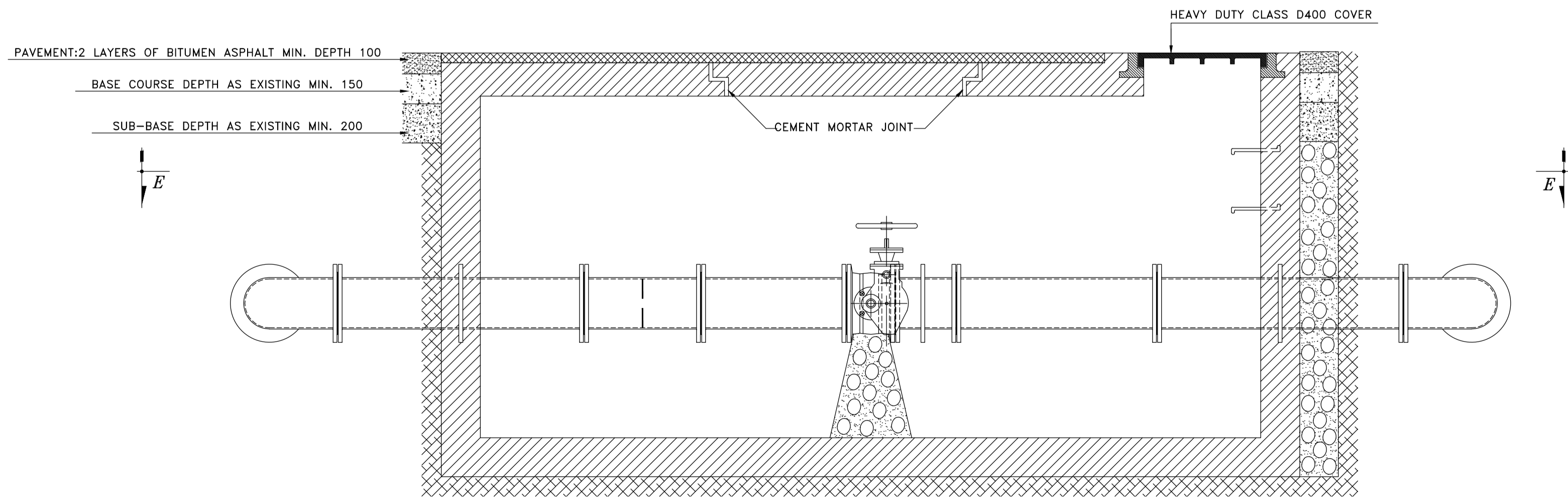
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	17/23	17



SECTION E-E



SECTION C-C



SECTION D-D

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: F_y=400 MPa.
MILD STEEL BARS : SYMBOL # YIELD STRESS: F_y=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 SPICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 2x50φ.
(φ= 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 #8 SHALL BE USED ON EACH LAP
- BENDING:
φ > 12mm MECHANICAL.
φ < 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 20°.
• GROUND/ MANHOLE FRICTION COEFFICIENT SHALL BE 2/3 TO 1/4
• 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) PIECE OF PIPE MAX. LENGTH 1000
(b) FLANGED REDUCER
(c) INTAKE COLLAR
(d) PRESSURE GAUGE
(e) BUTTERFLY VALVE
(f) FILTER WITH WASHOUT VALVE
(g) PRESSURE REGULATING OR SUSTAINING VALVE
(h) SELF-RESTRAINED DISMANTLING JOINT
(i) AIR RELIEF VALVE+ISOLATING BUTTERFLY VALVE
(j) PUDDLE FLANGE
(k) FLANGE-SPIGOT
(l) FLANGE-SOCKET
(m) PRESSURE REDUCING DIAPHRAGM

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

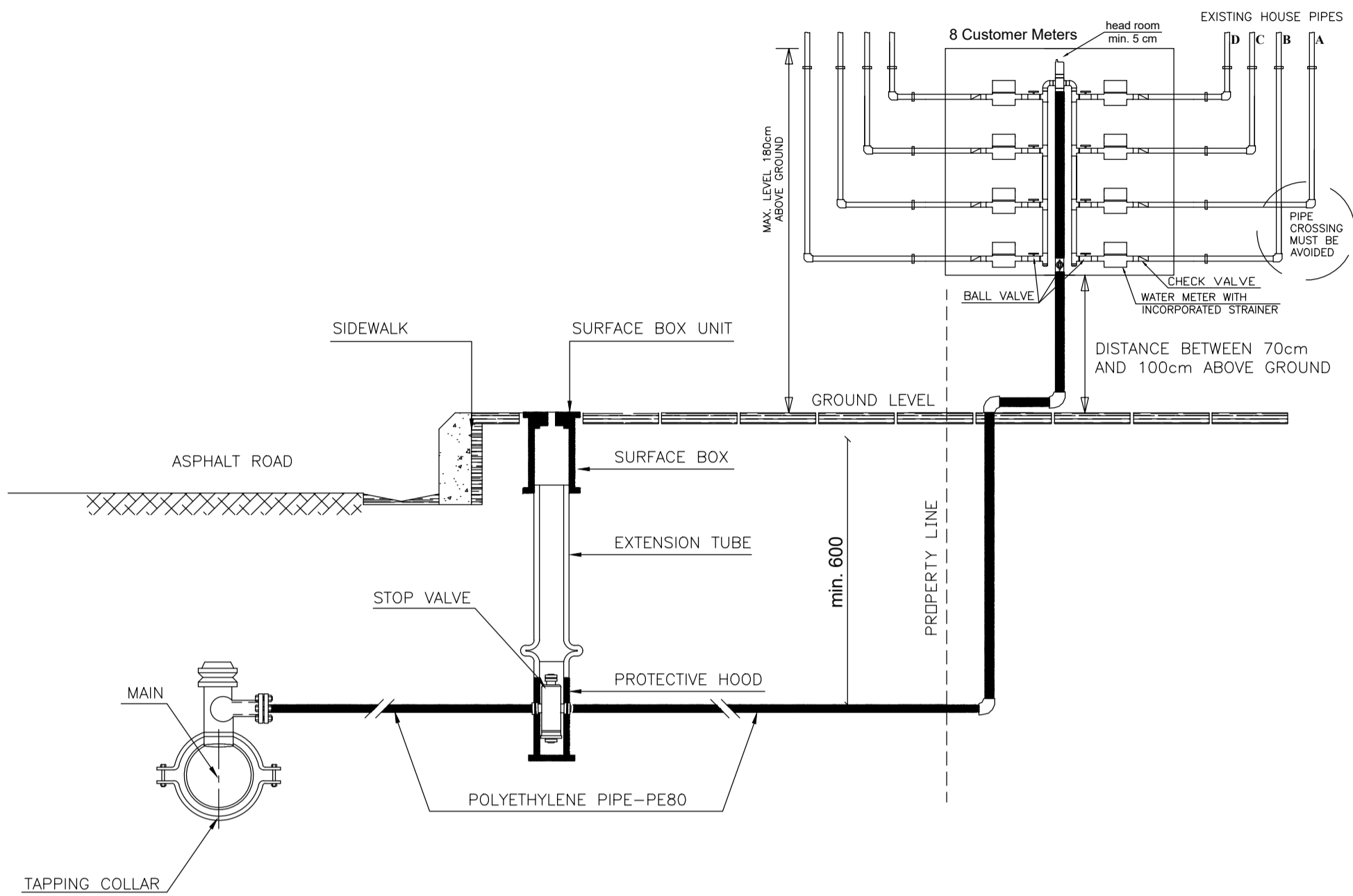
JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

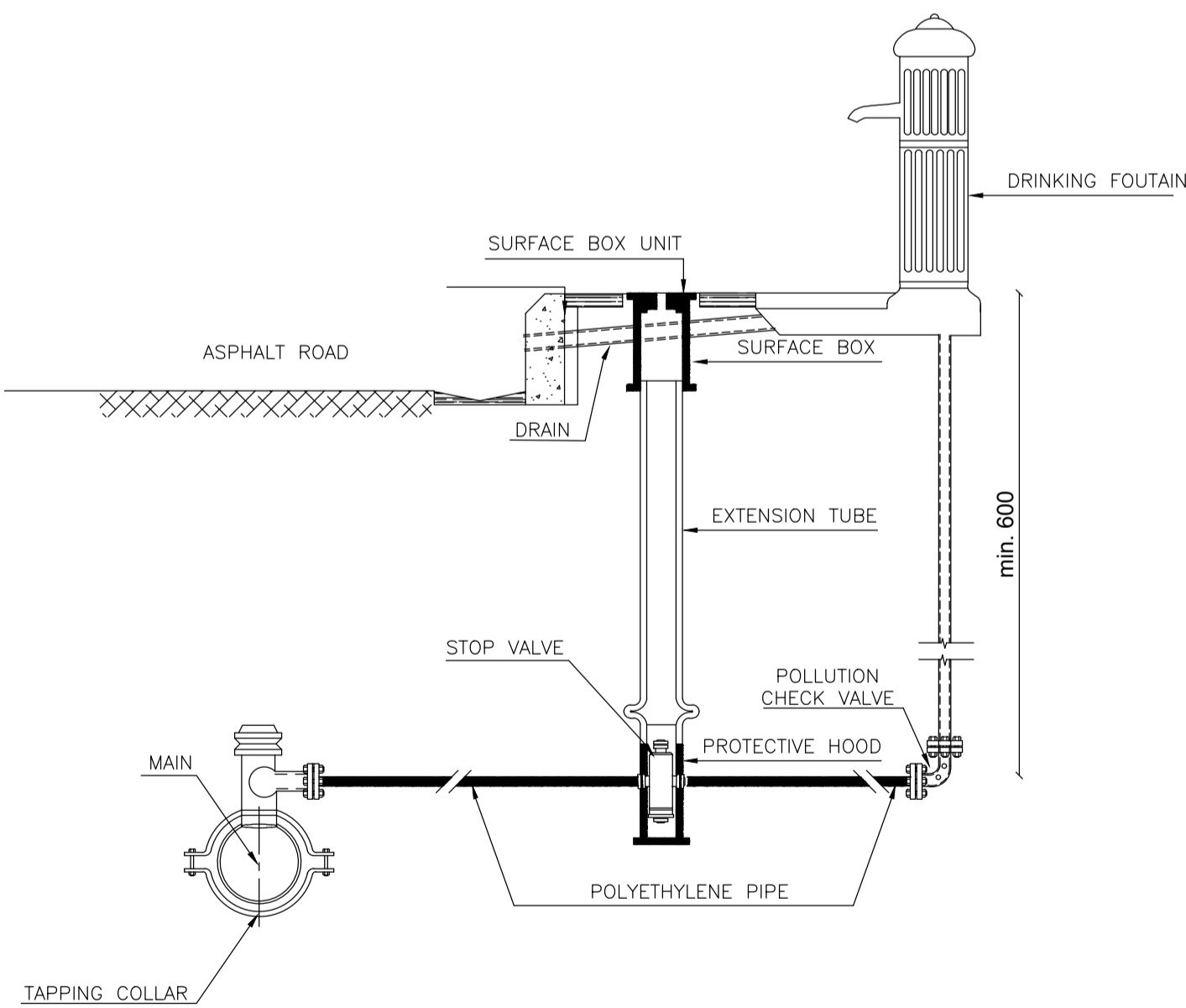
TRANSMISSION AND DISTRIBUTION SYSTEMS	PRESSURE REGULATING VALVE DETAILS OF INSTALLATION AND PROTECTION CHAMBER
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DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STDP18	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	18/23	18



SERVICE CONNECTION

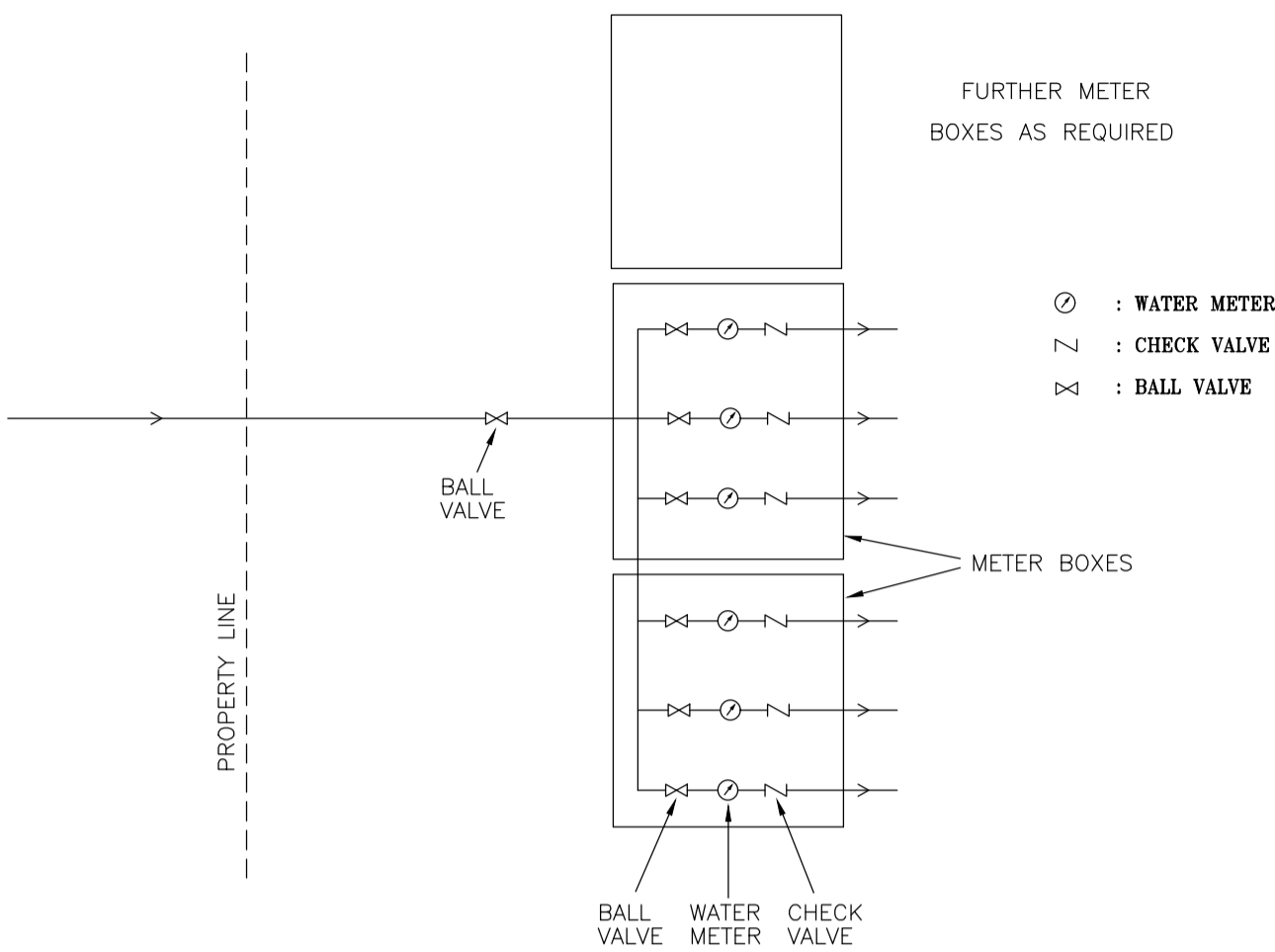


TYPICAL DRINKING FOUNTAIN INSTALLATION

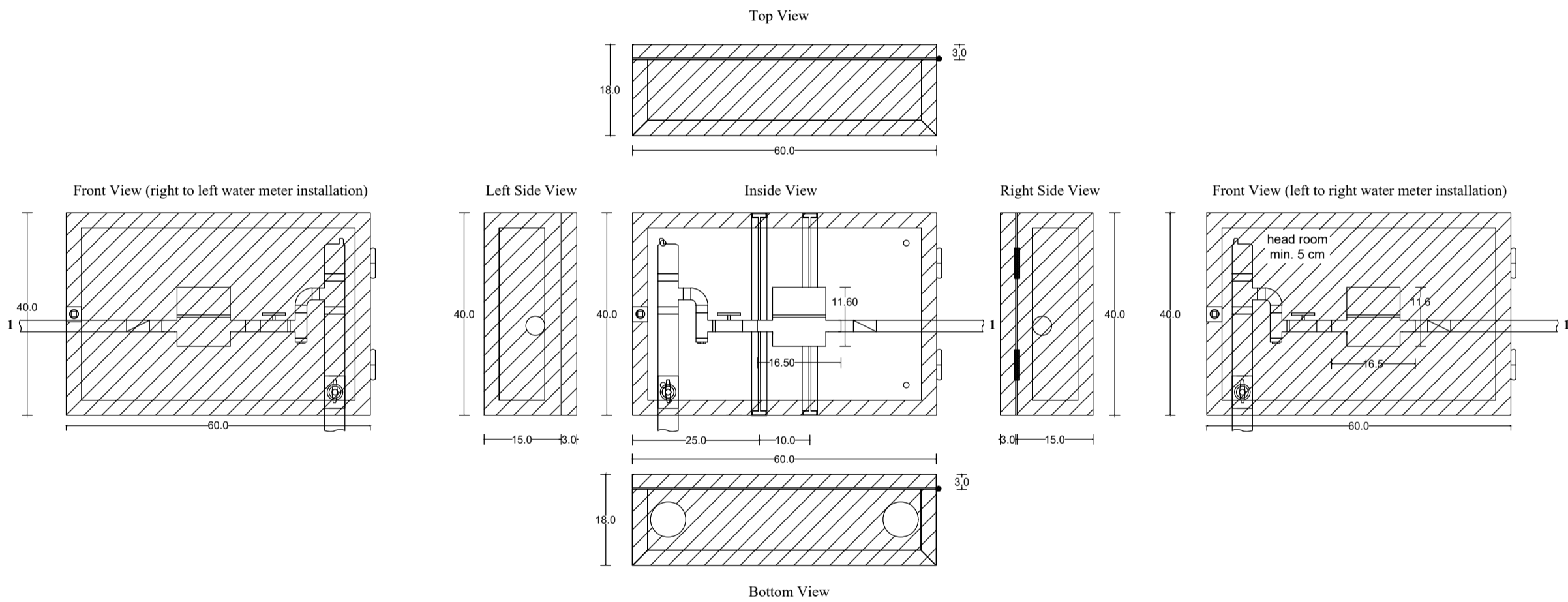
NUMBER OF CONSUMERS	SERVICE PIPE OUTER DIAMETER
1-2	16 mm
3-6	20 mm
7-16	25 mm
17-26	32 mm
>27 OR BIG CONSUMERS	40 mm

Note:

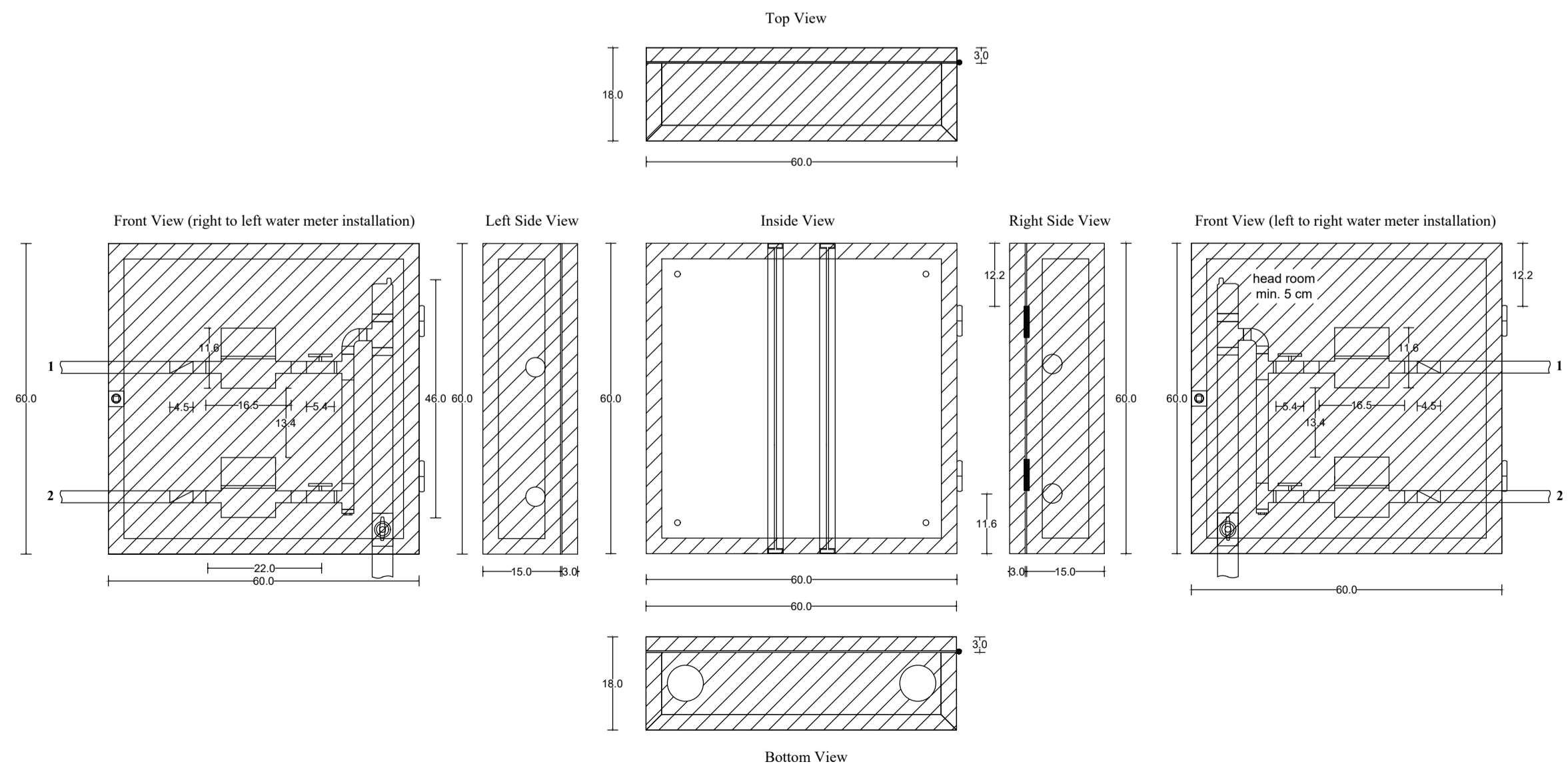
- Protection box shall be installed at a level that allows easy reading and opening for maintenance reasons.
- Minimum level above ground shall be not less than 70 cm.
- Maximum level above ground shall not be more than 180 cm.
- Pipe crossings as shown for connections A and B must to be avoided.
- Pipes 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 WATER METER



TYPICAL PROTECTION BOX FOR 2 WATER METERS

NOTES:

- MULTIPLE HOUSE CONNECTIONS MAY INVOLVE SEVERAL WATER METER BOXES OF TYPICAL SIZE
- ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
- ALL EXPOSED PIPING SHALL BE GALVANIZED IRON AND SHALL BE TAMPER PROOF
- 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
- 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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MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX:70492 - ANTELIAS FAX: (04) 712159

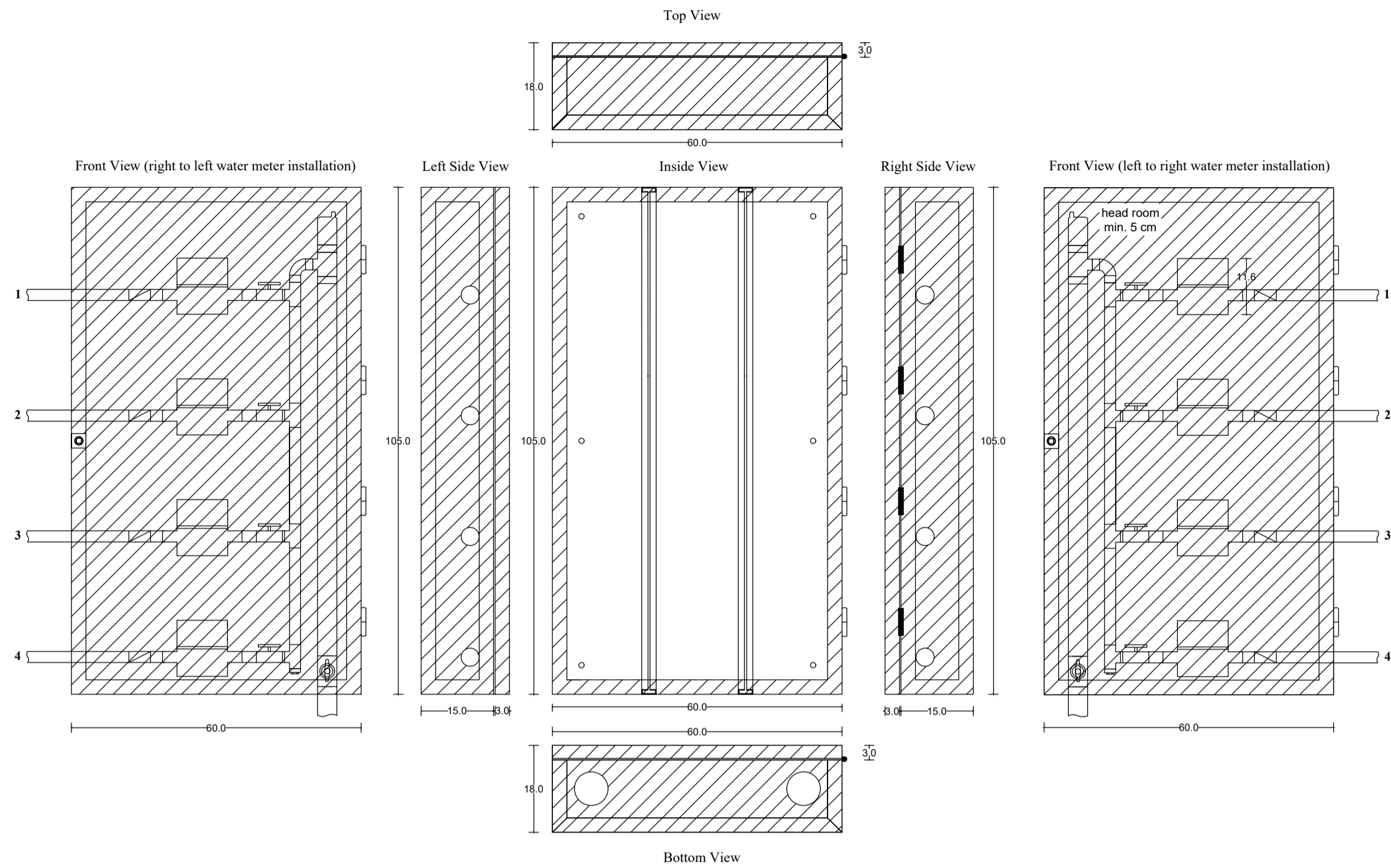
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND
DISTRIBUTION SYSTEMS

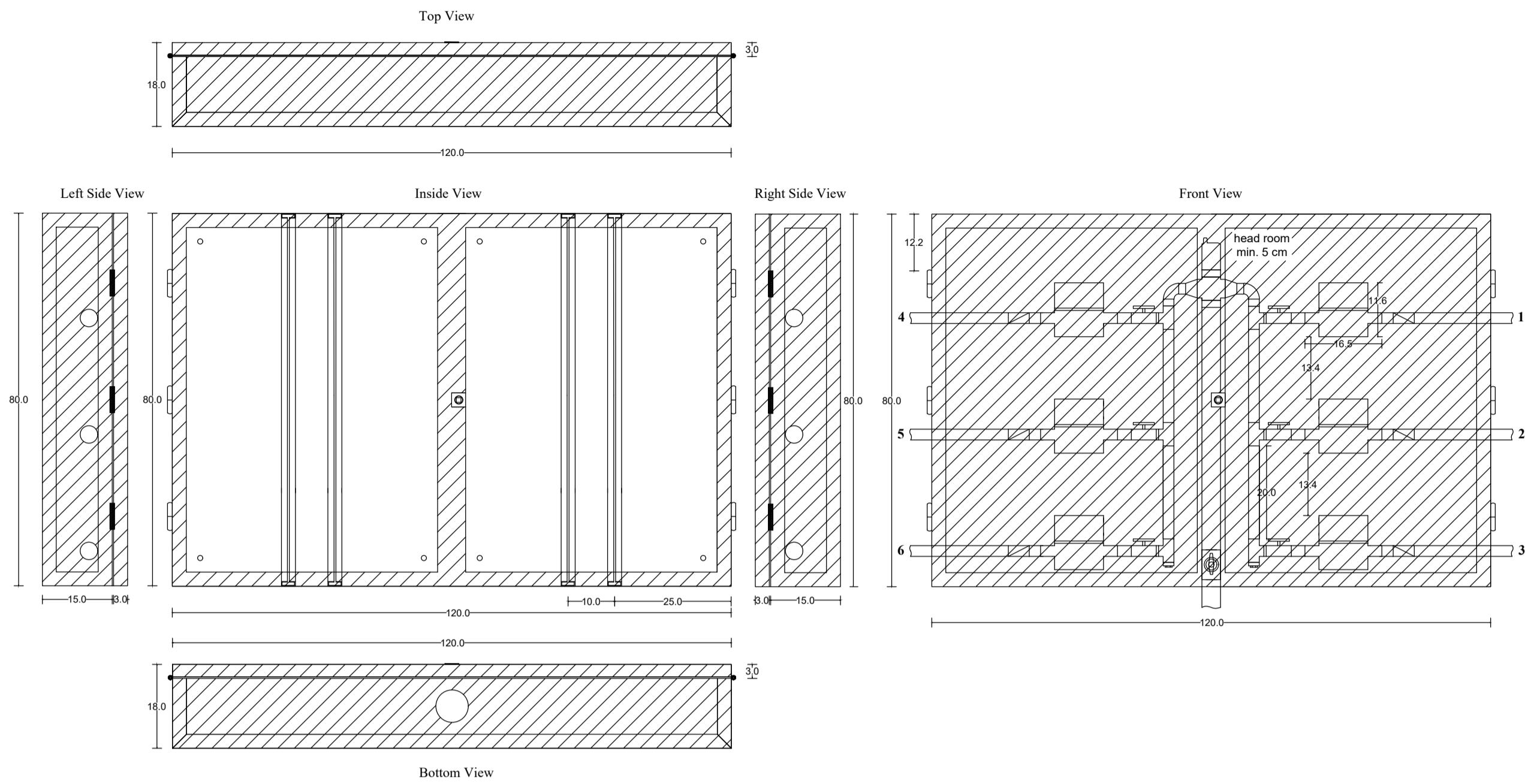
TYPICAL SERVICE AND
HOUSE CONNECTIONS
AND DRINKING FOUNTAIN

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STDP19	BTD	BTD	BTD

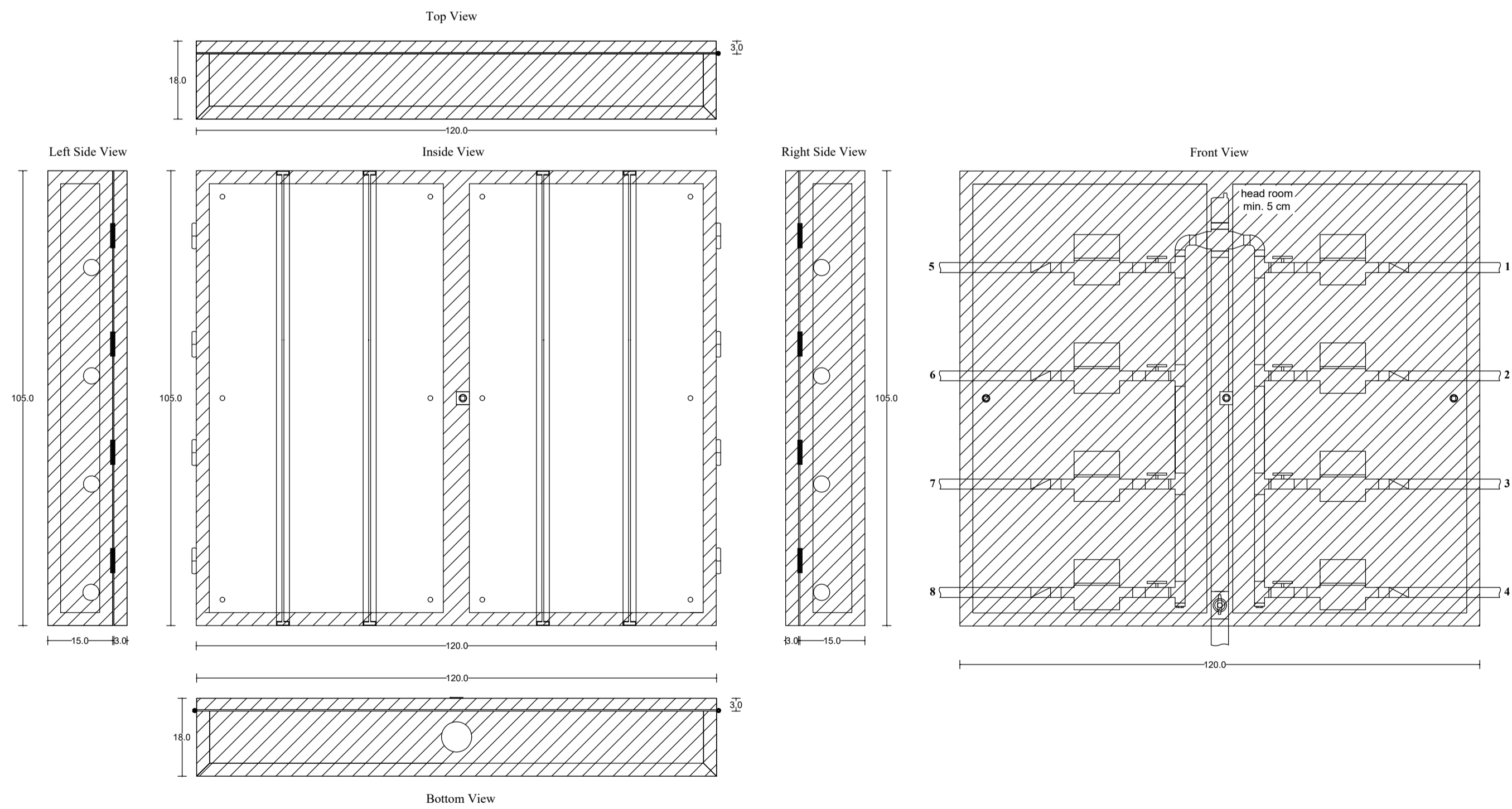
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	19/23	19



TYPICAL PROTECTION BOX FOR 4 WATER METERS



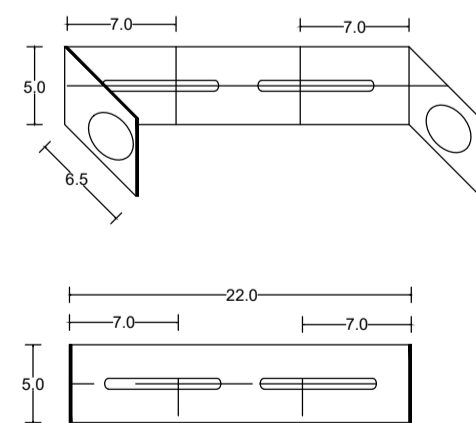
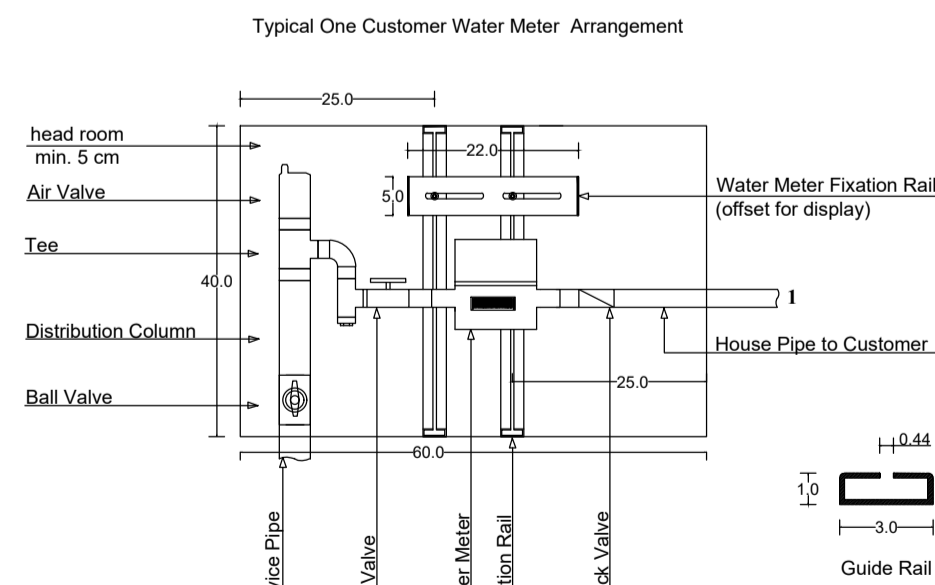
TYPICAL PROTECTION BOX FOR 6 WATER METERS



TYPICAL PROTECTION BOX FOR 8 WATER METERS

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

WATER METER 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

Rev. Date Dsgn Drwn Chk'd Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB - HAJAL Bldg PHONE:(04) 712157/712158 (03) 291016
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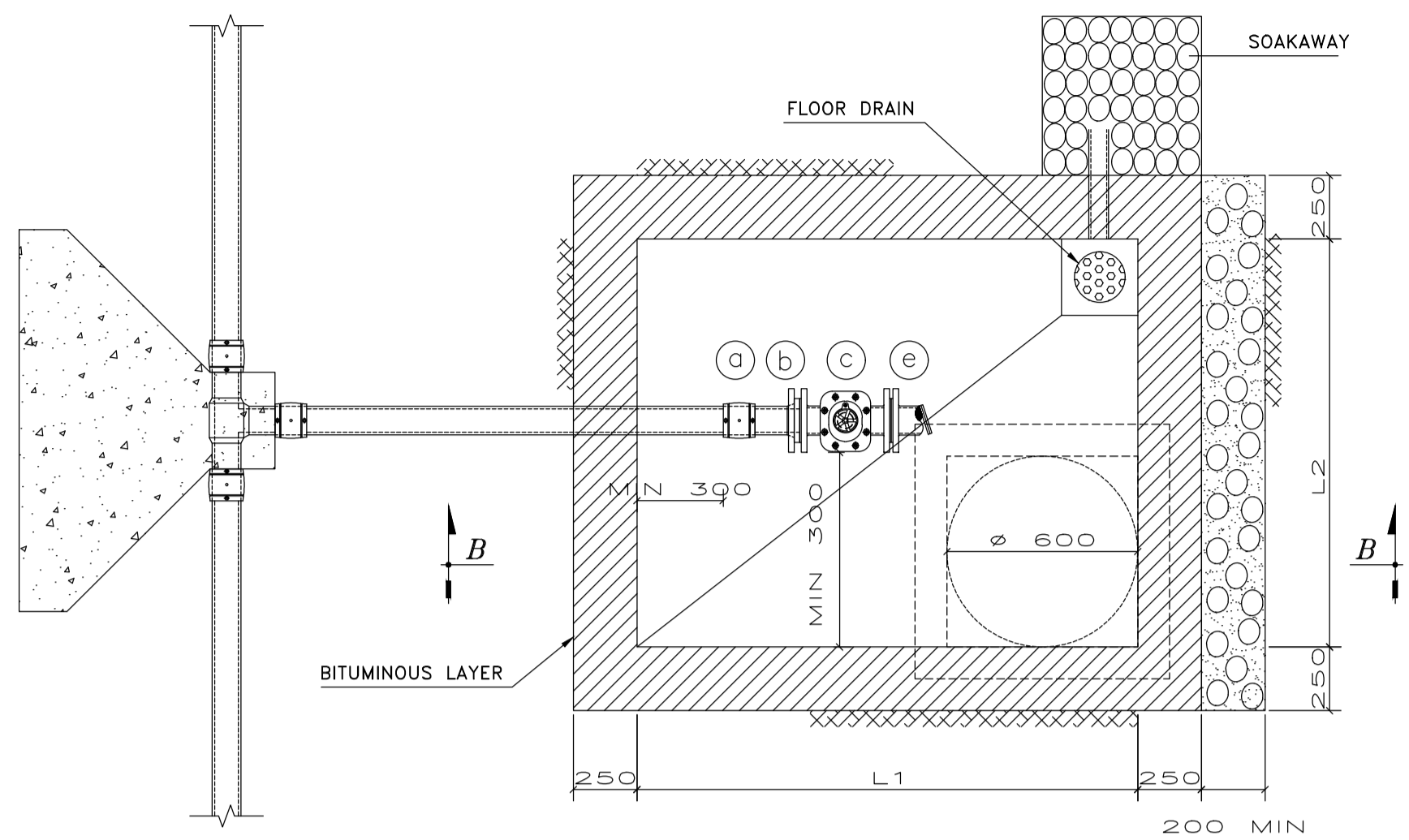
UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND DISTRIBUTION SYSTEMS TYPICAL WATER METER PROTECTION BOXES

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD20	BTD	BTD	BTD

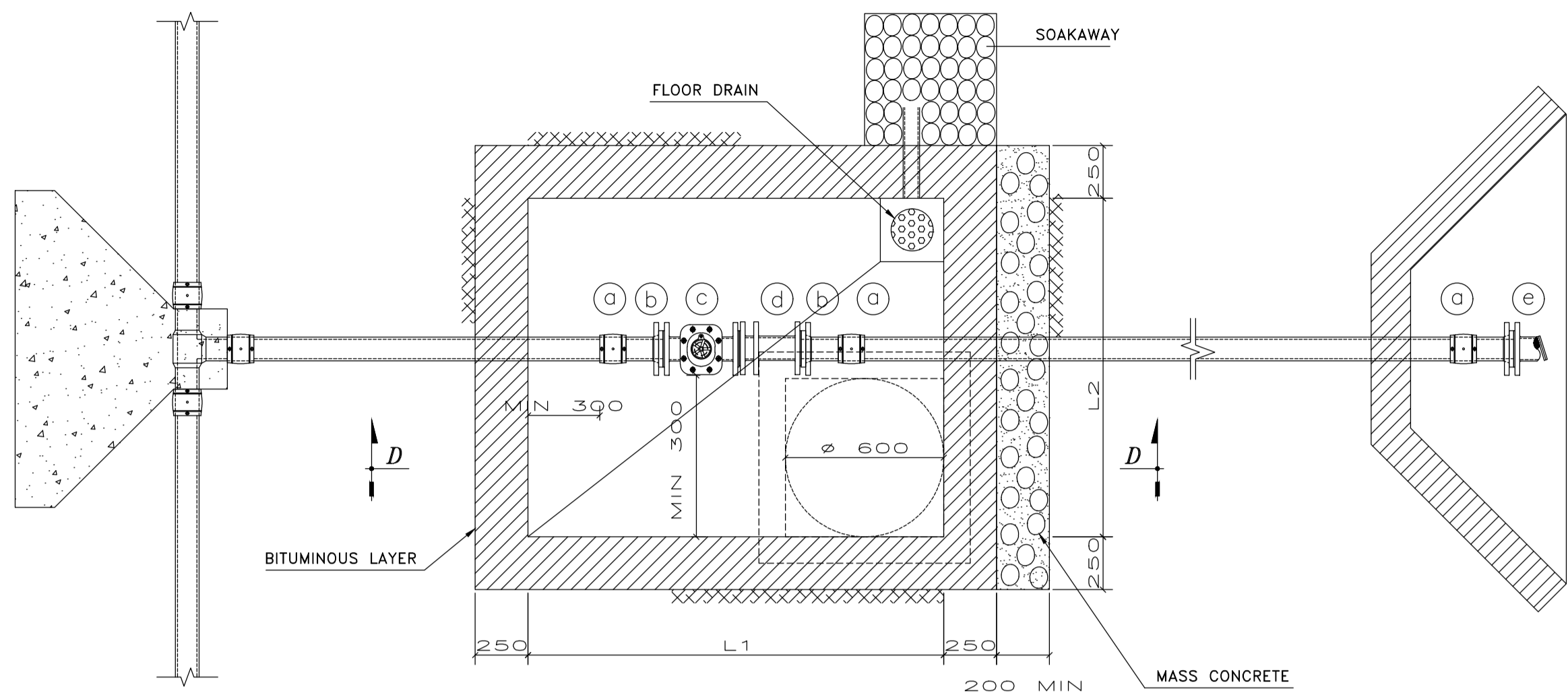
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	20/23	20

TYPICAL WASHOUT CHAMBER DETAIL
TYPE I

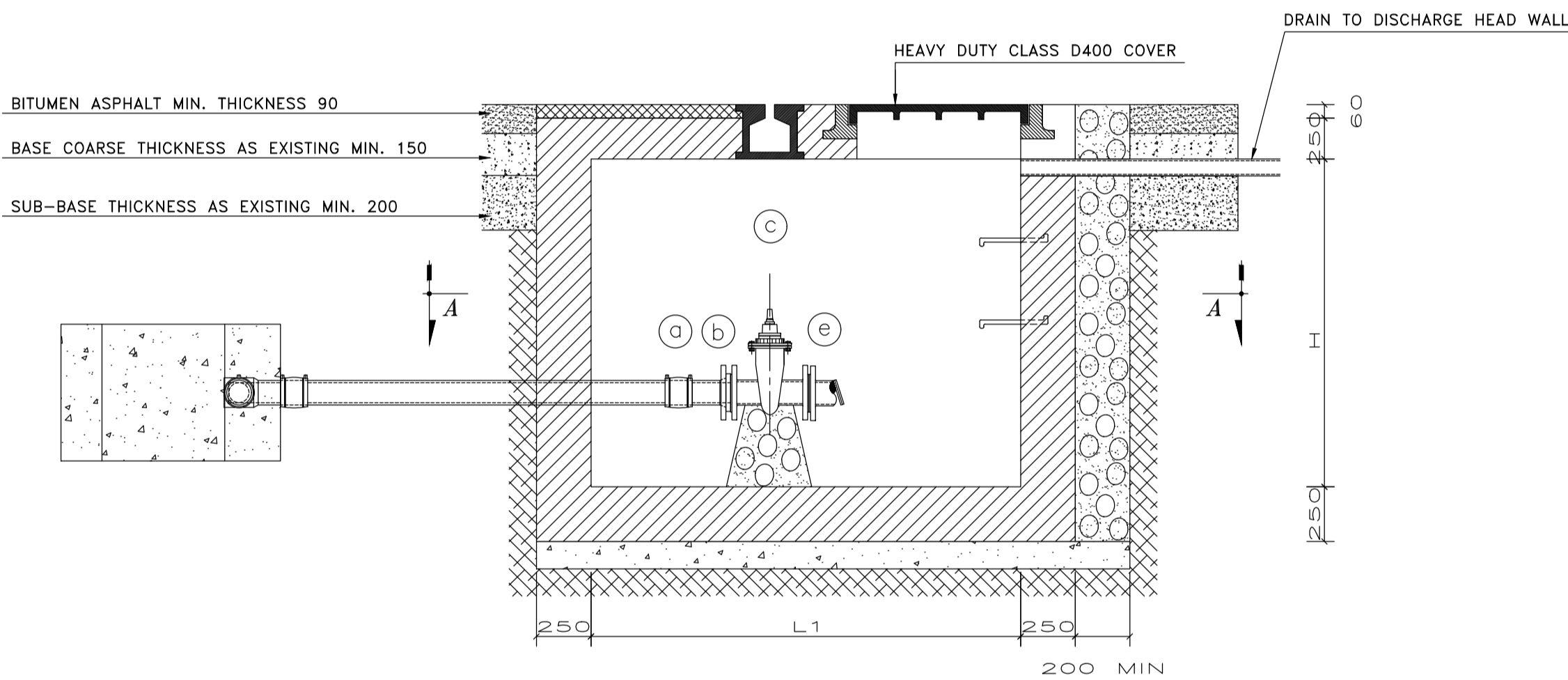


SECTION A-A

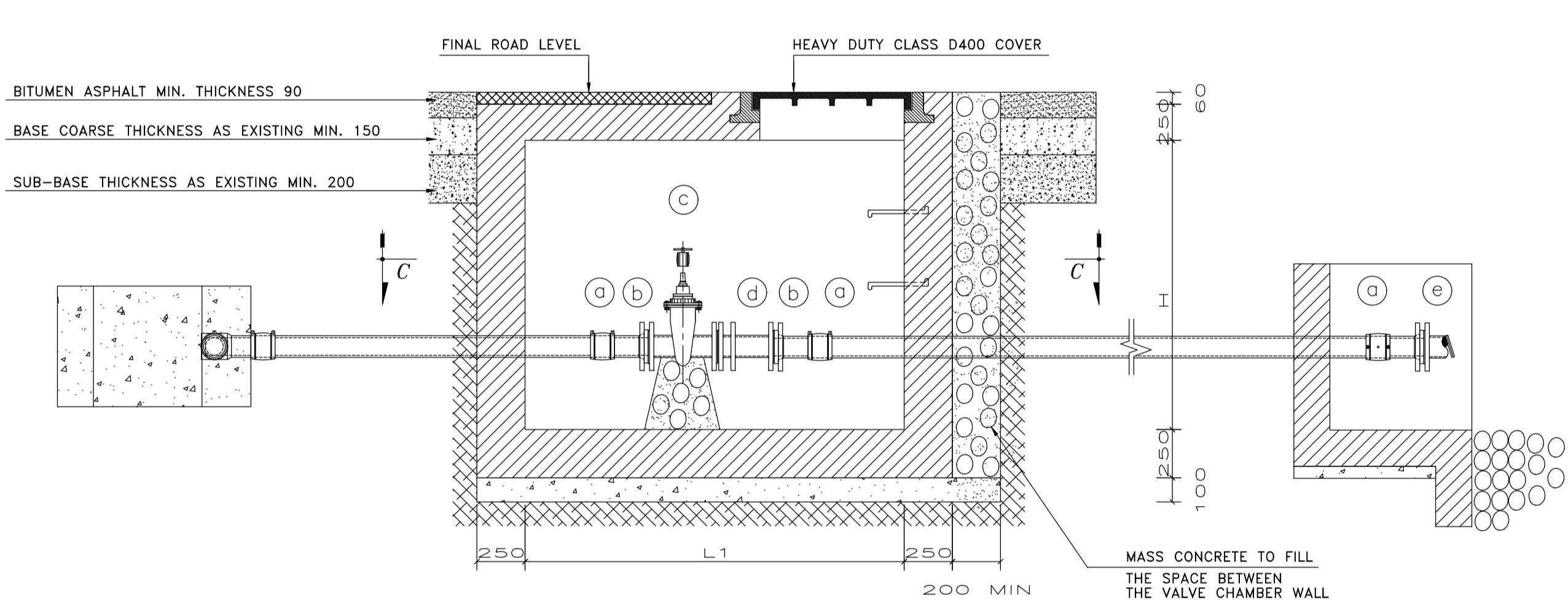
TYPICAL WASHOUT CHAMBER DETAIL
TYPE II



SECTION C-C

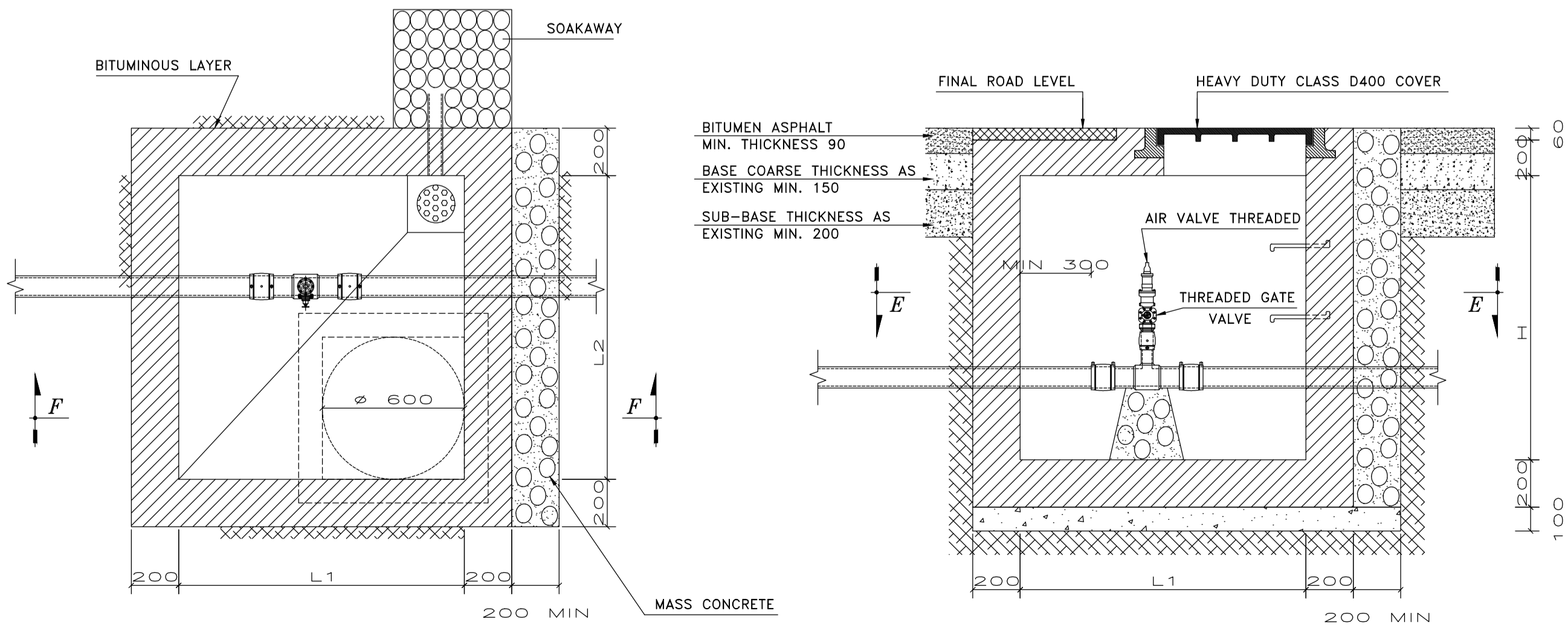


SECTION B-B

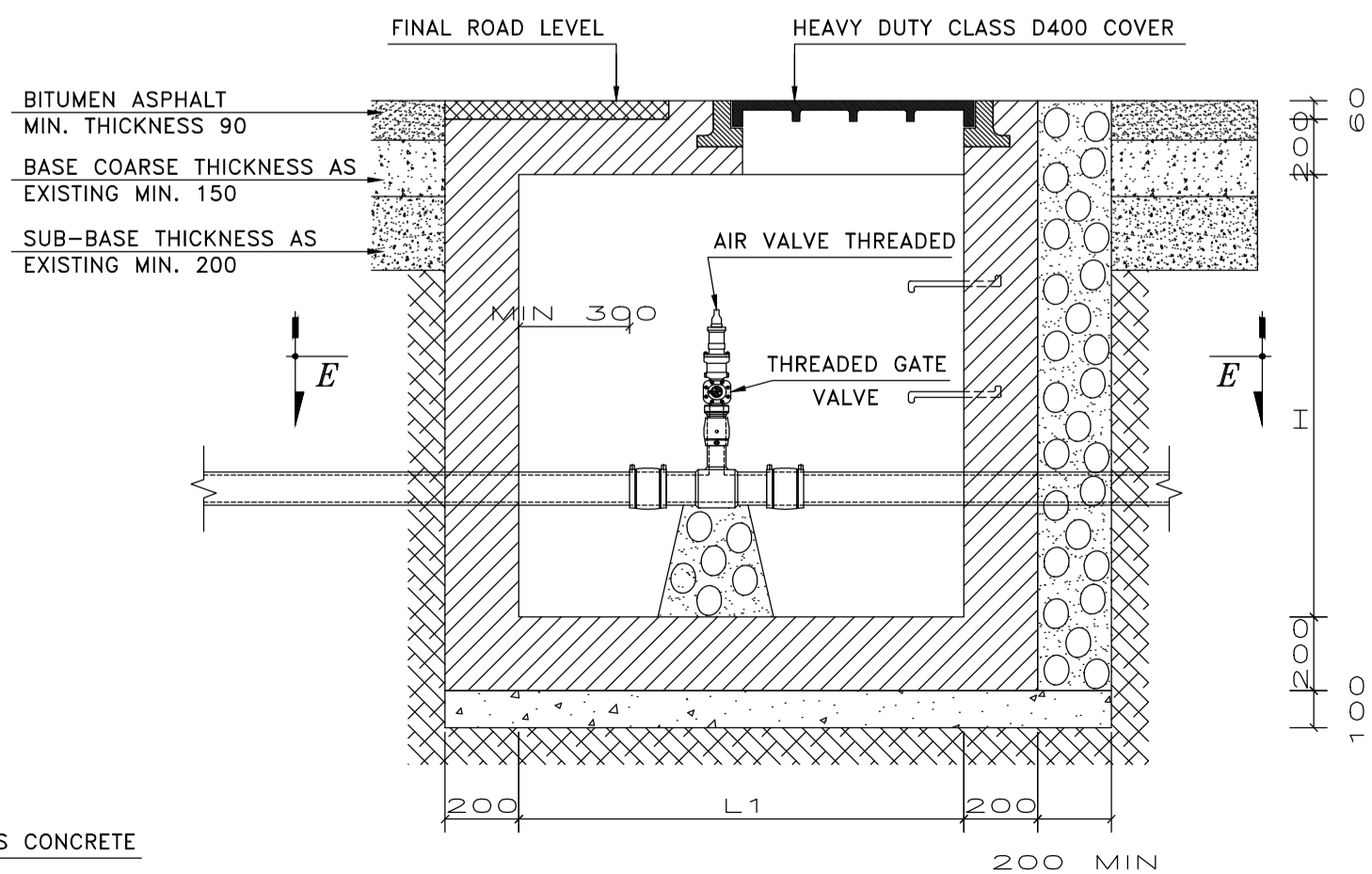


SECTION D-D

TYPICAL AIR VALVE CHAMBER DETAIL
TYPE I

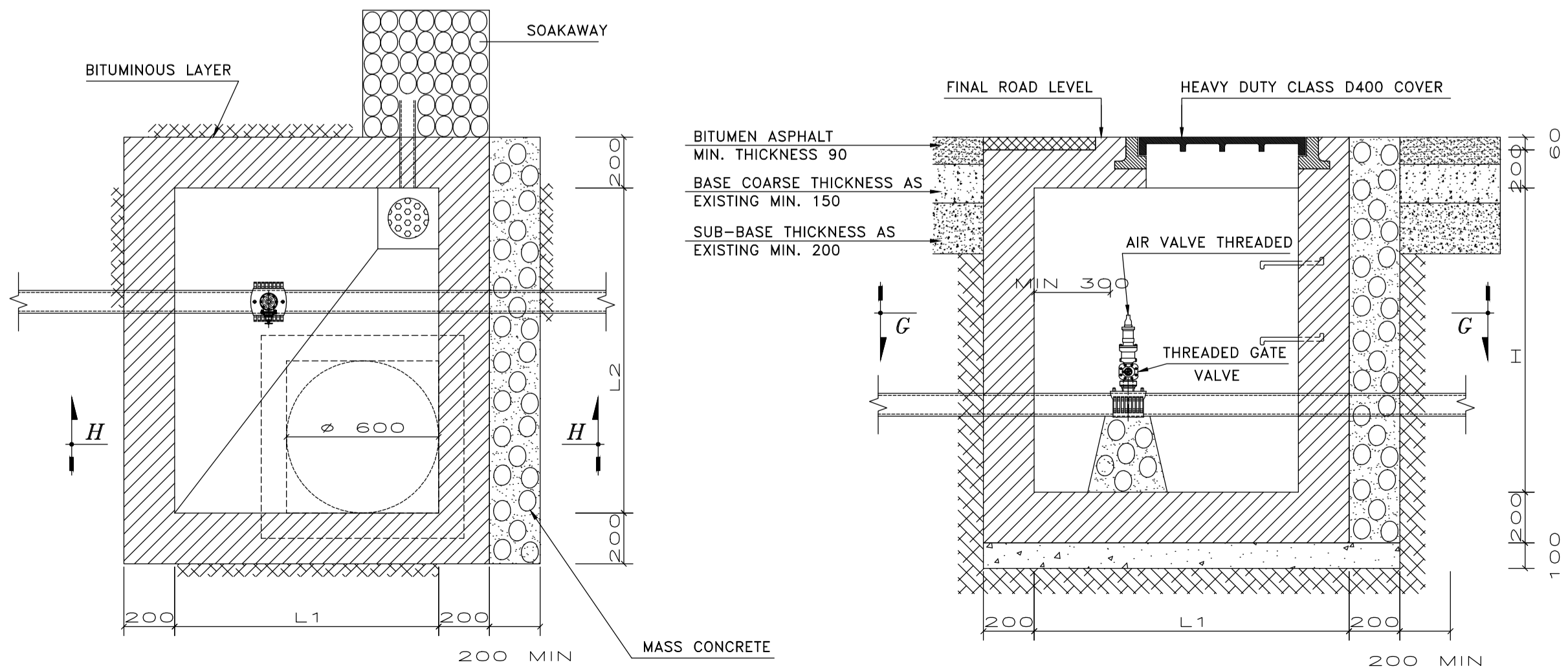


SECTION E-E

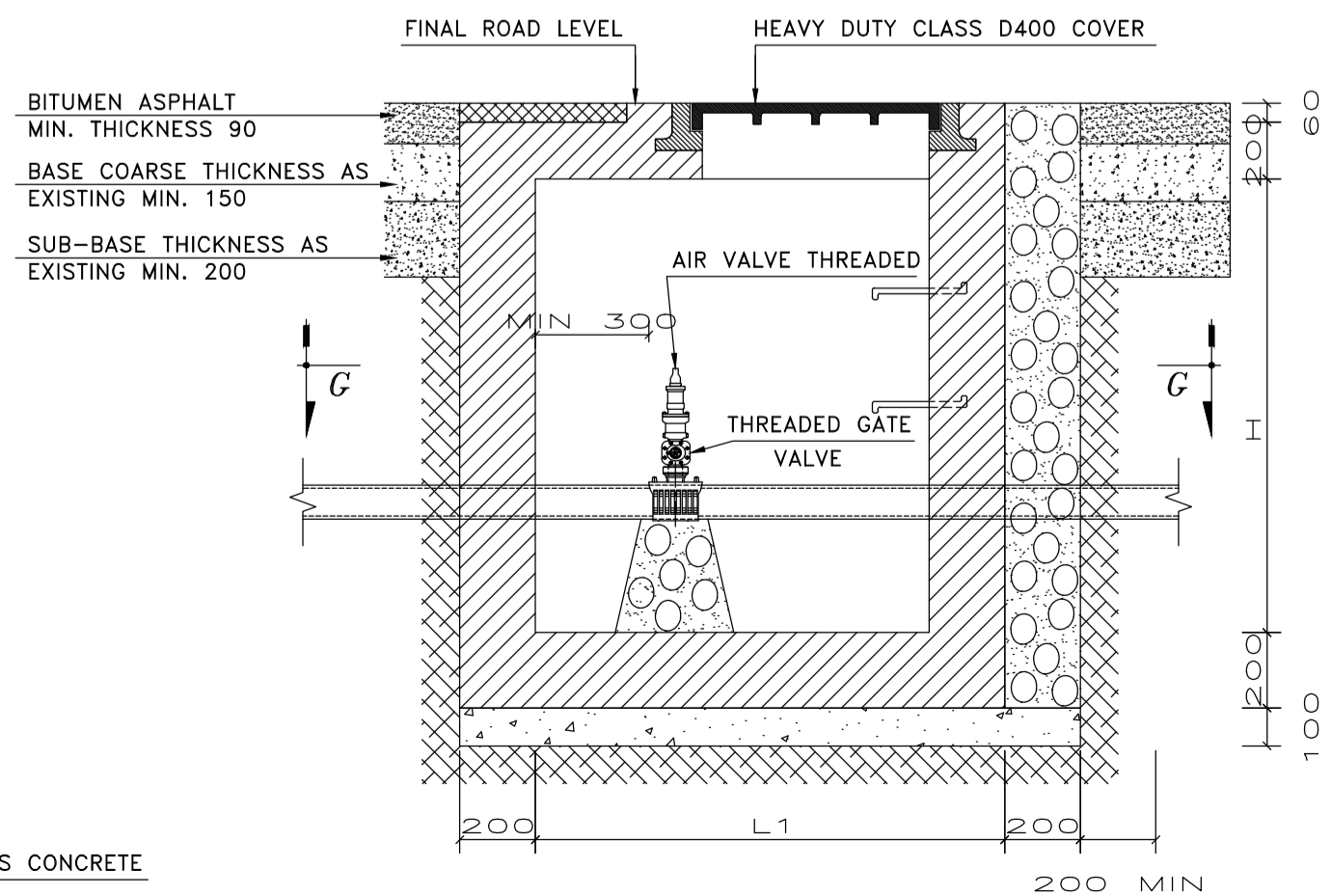


SECTION F-F

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

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REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

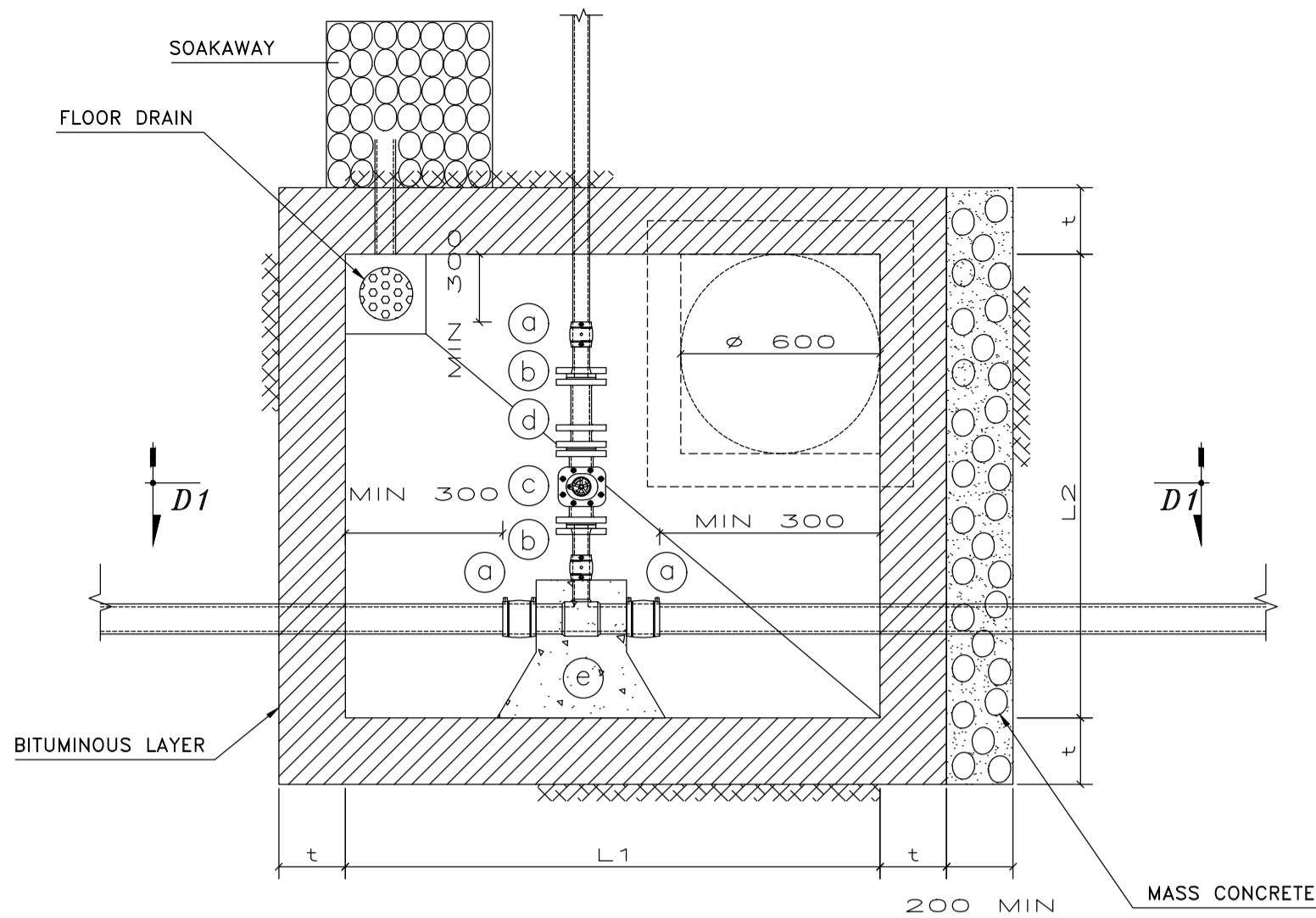
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

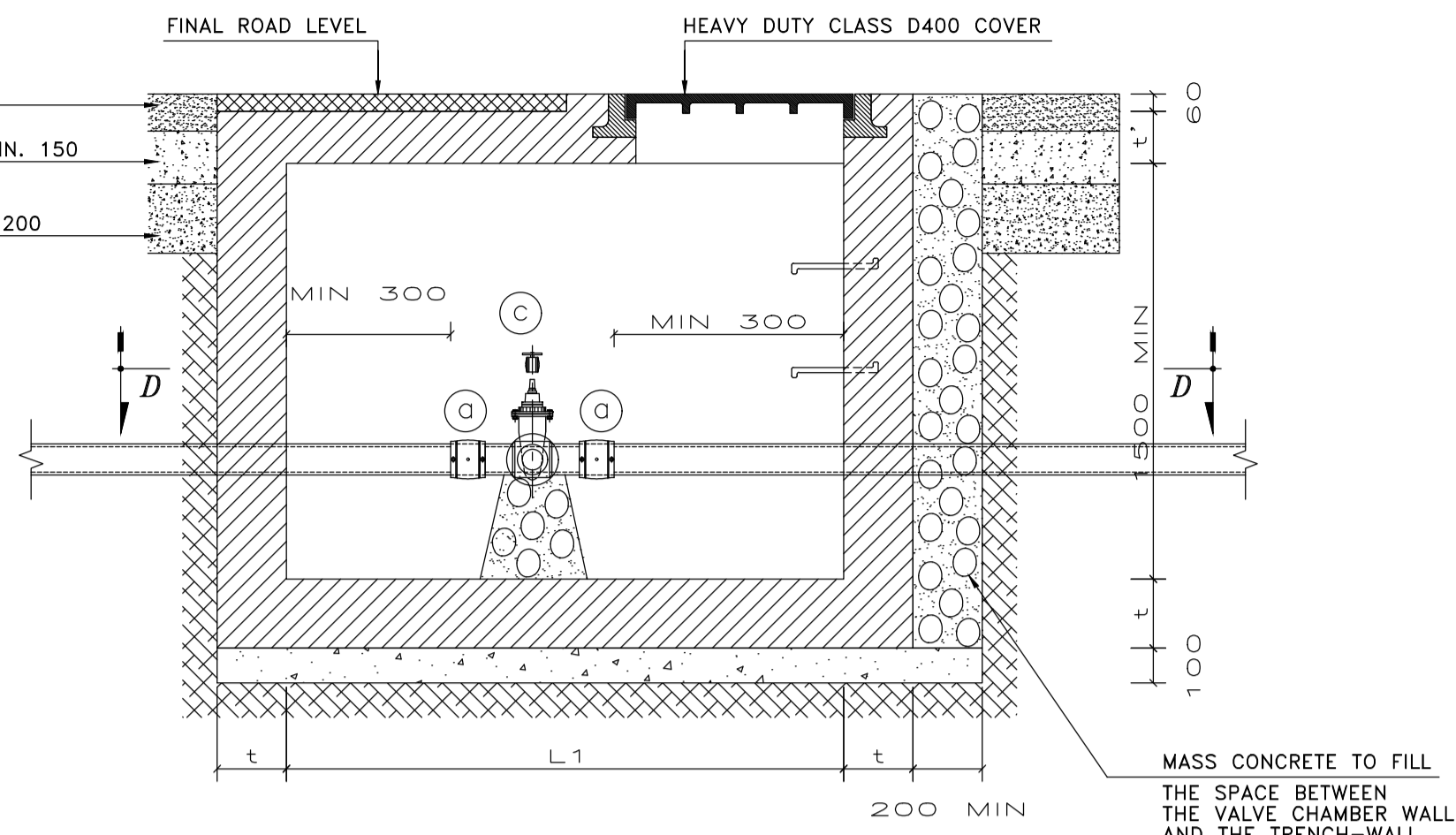
TRANSMISSION AND DISTRIBUTION SYSTEMS	WASHOUT AND AIR VALVE CHAMBER DETAILS FOR HDPE PIPES

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562SDP21	BTD	BTD	BTD

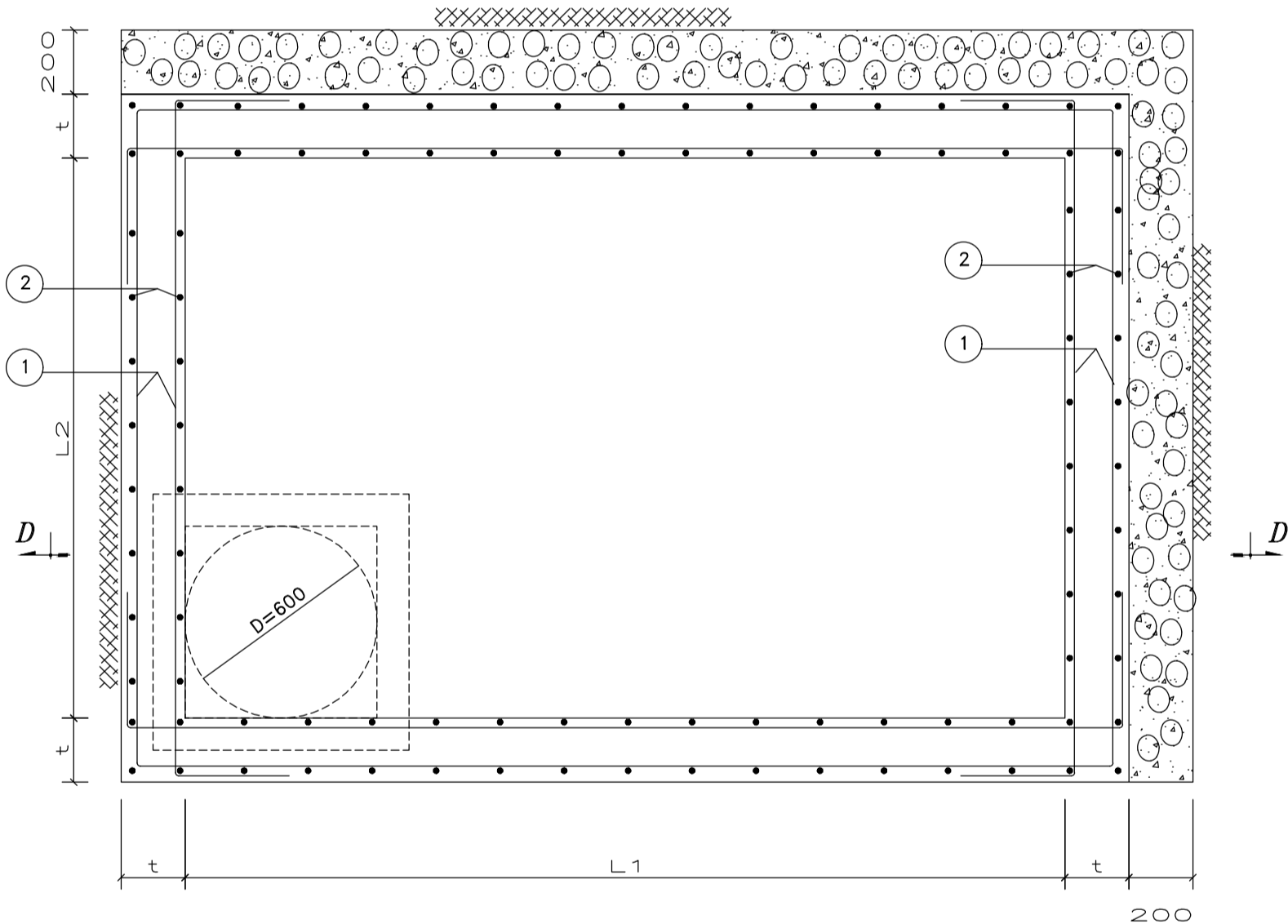
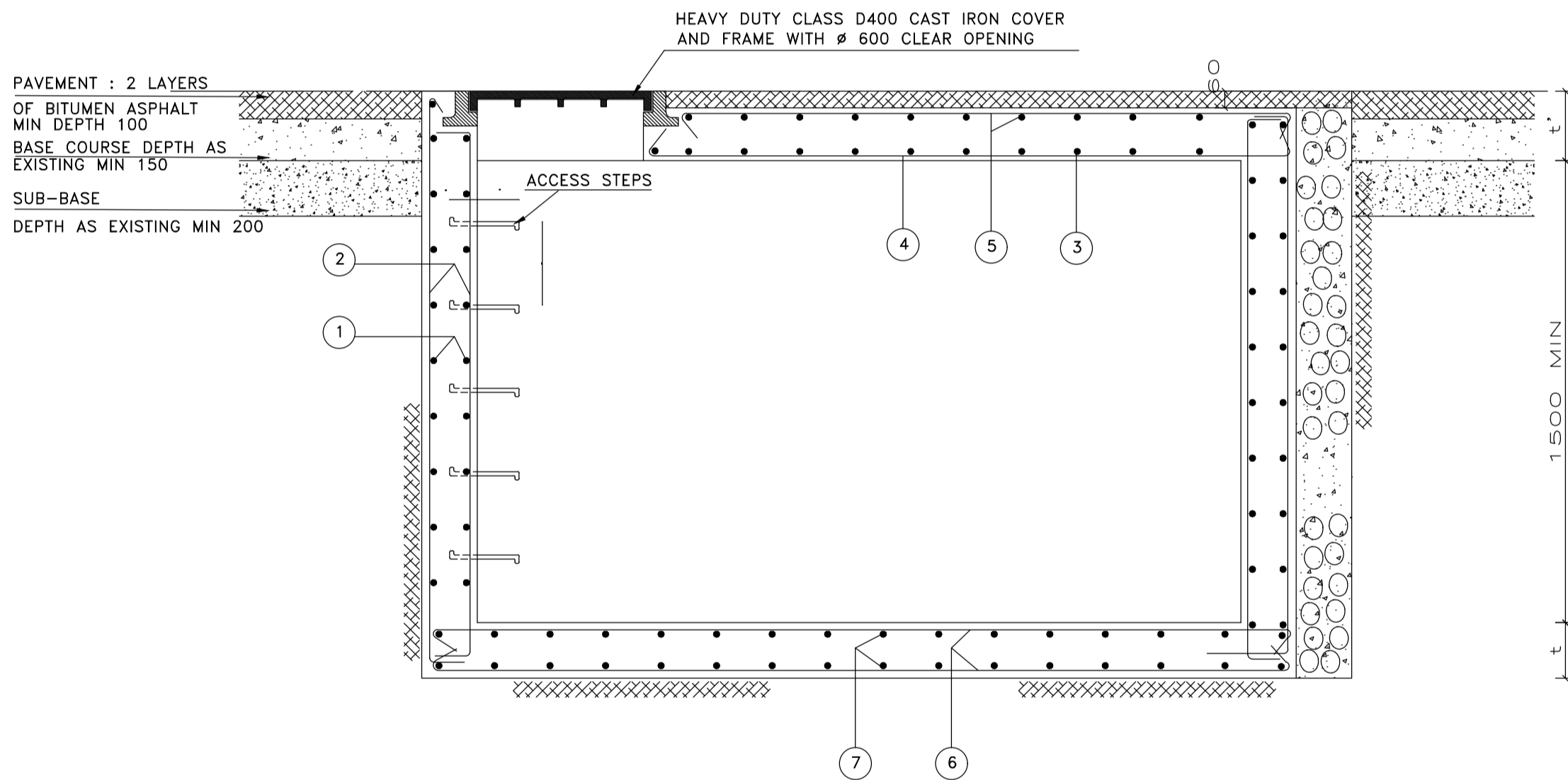
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	21/23	21



SECTION D-D



SECTION D1-D1



VALVE CHAMBER DIMENSIONS	
TYPE	LxL2
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	LxL2
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		63			75			90			110			125			140		
BRANCH DIAM	NBR OF VALVES	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		THICKNESS		REINFORCEMENT							
VALVE CHAMBER	TYPE	t	t'	1	2	3	4	5	6	7	
		mm	mm								
R1-R5	200	250		T14 Ø200	T14 Ø200	T16 Ø200	T14 Ø200	2xT12 Ø200	T14 Ø200	T14 Ø200	
R6-R11	200	250		T14 Ø165	T14 Ø165	T16 Ø165	T14 Ø165	2xT12 Ø165	T14 Ø165	T14 Ø165	
R11-R23	200	250		T14 Ø150	T14 Ø150	T14 Ø150	T14 Ø150	2xT12 Ø150	T14 Ø150	T14 Ø150	
R23-R38	250	300		T16 Ø200	T16 Ø200	T20 Ø200	T14 Ø200	2xT12 Ø200	T16 Ø200	T16 Ø200	
R39-R42	300	300		T16 Ø165	T16 Ø165	T20 Ø165	T14 Ø165	2xT12 Ø165	T16 Ø165	T16 Ø165	

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:

- Ø ELECTROFUSION COUPLING
- Ø PE-FLANGE ADAPTOR WITH BACKING FLANGE
- Ø GATE VALVE
- Ø SELF-RESTRAINED DISMANTLING JOINT
- Ø REDUCED PE TEE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON

MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

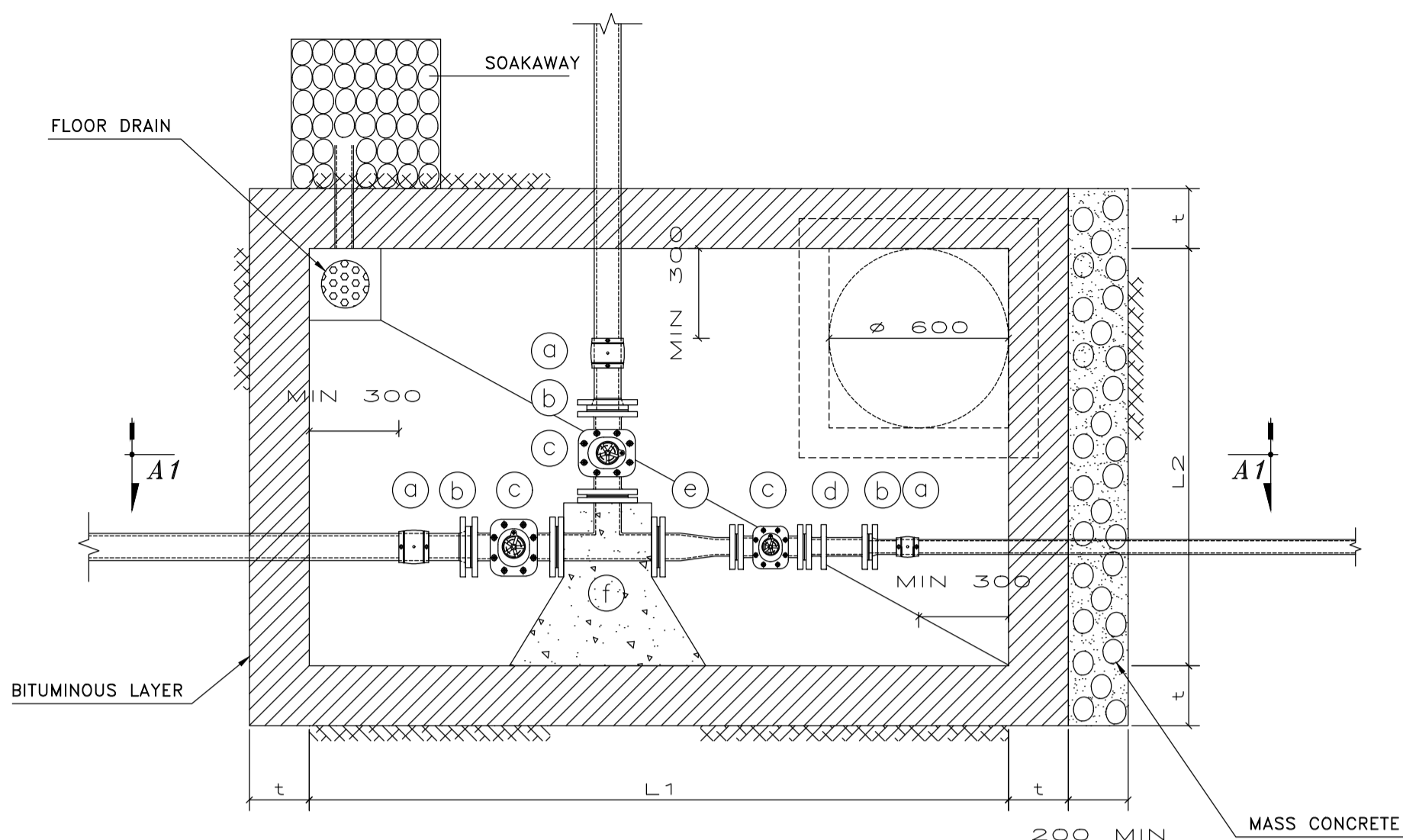
JALL ED DIB - HAJAL Bldg TEL:(04) 712157 / 712158
P.O.BOX:70492 - ANTELIAS (03)291016 - FAX:(04) 712159

UPGRADING OF WATER SUPPLY IN THE VILLAGES OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

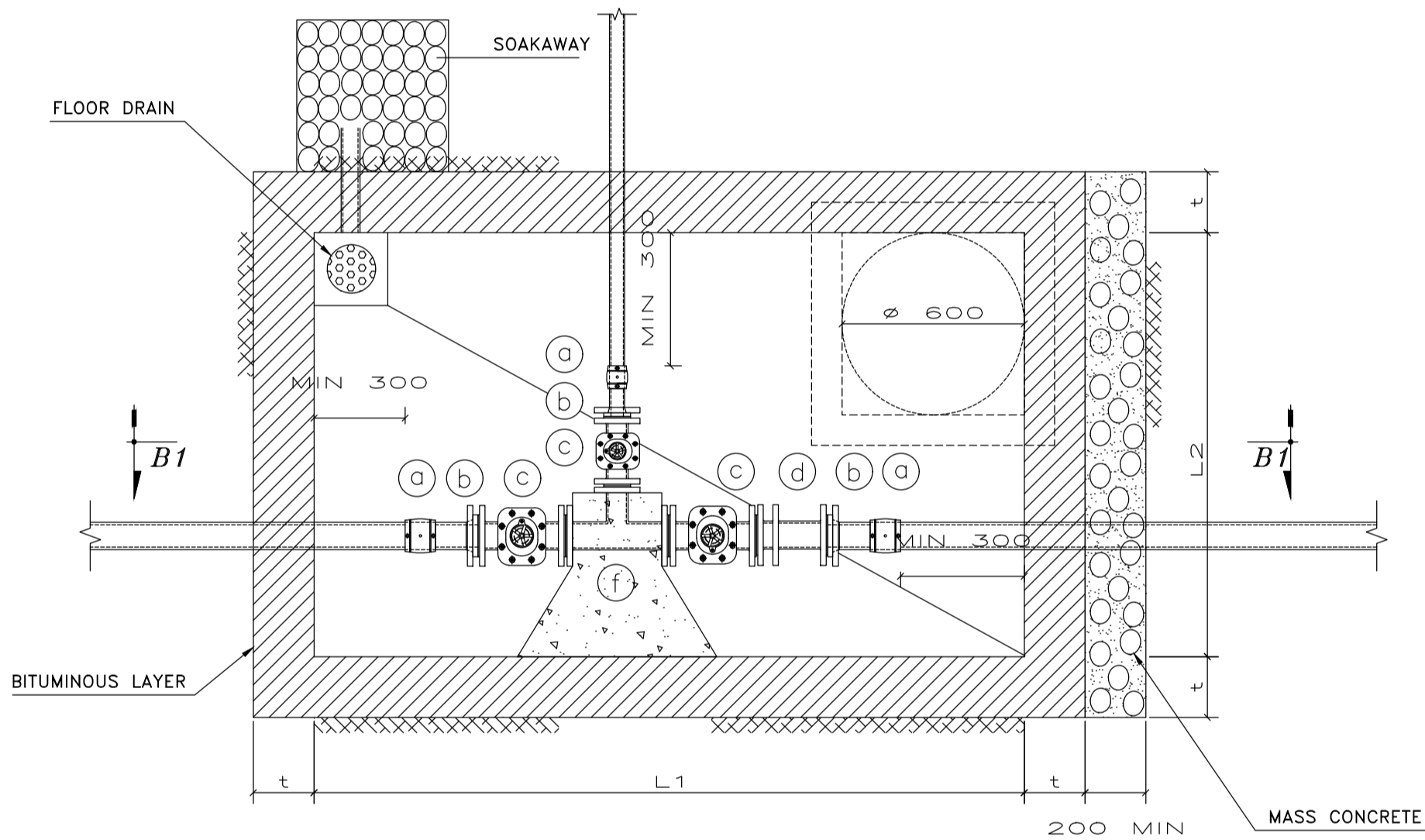
TRANSMISSION AND DISTRIBUTION SYSTEMS	TYPICAL VALVE CHAMBER DETAILS FOR HDPE PIPES

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562SDP22	BTD	BTD	BTD

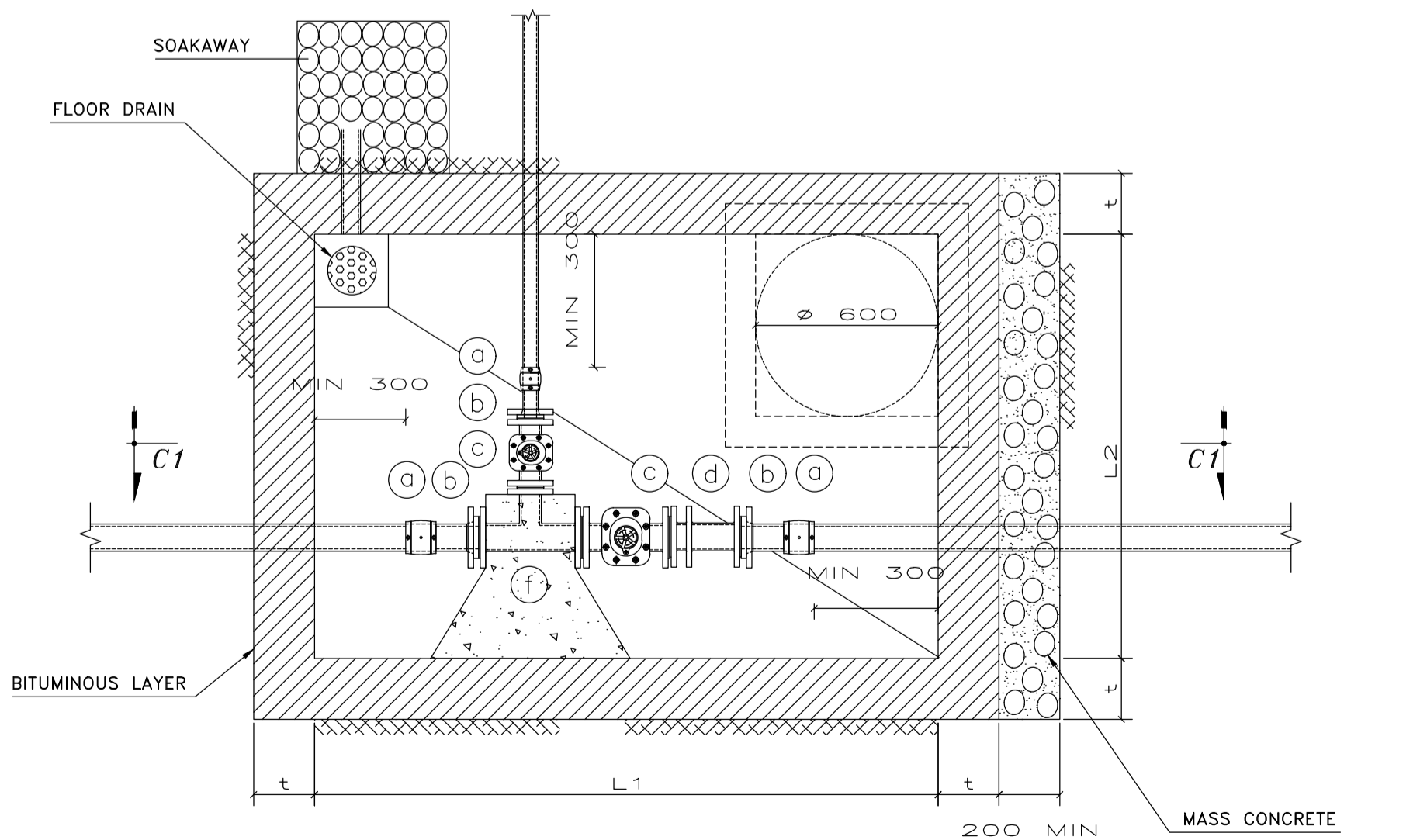
DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	22/23	22



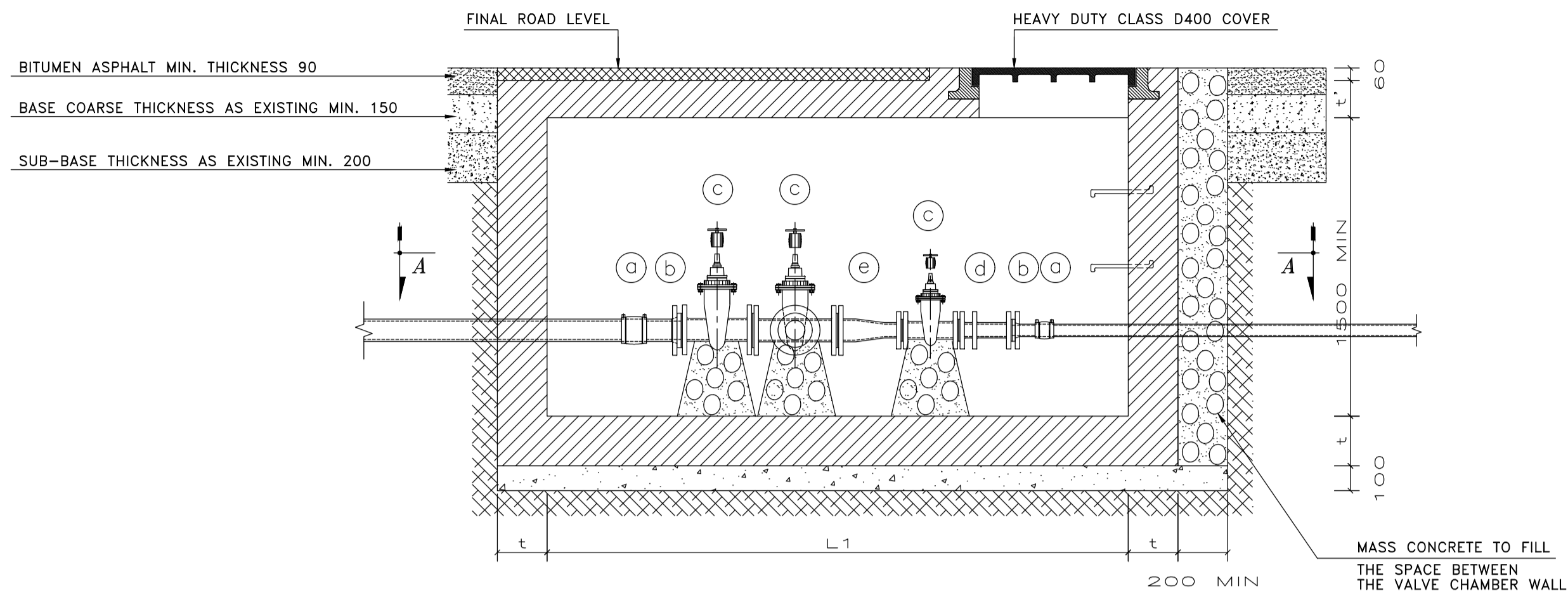
SECTION A-A



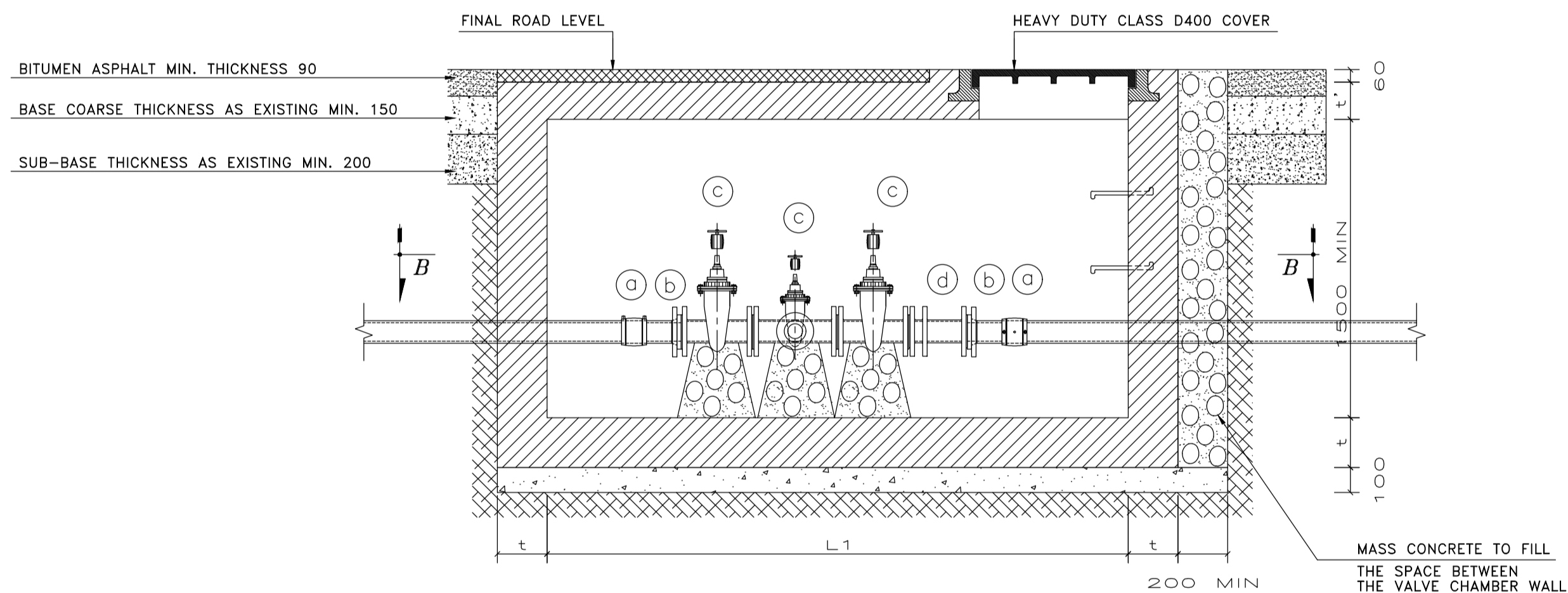
SECTION B-B



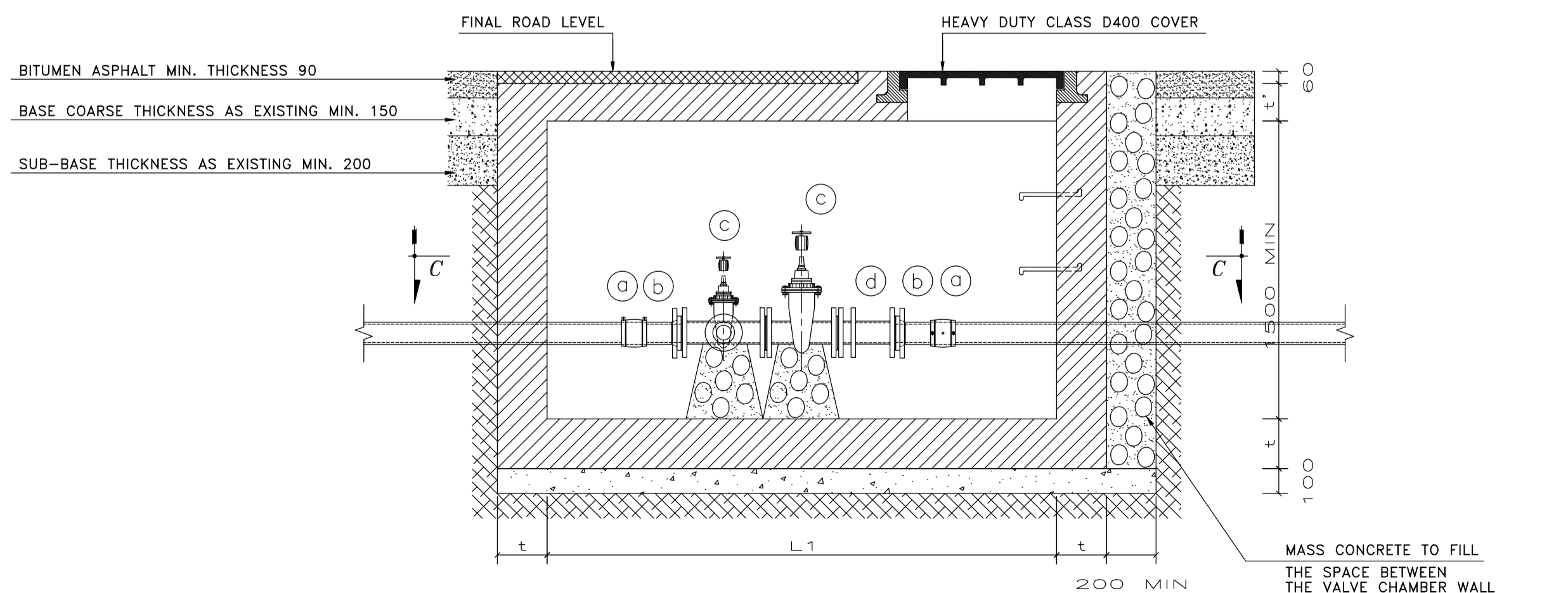
SECTION C-C



SECTION A1-A1



SECTION B1-B1



SECTION C1-C1

NOTES:

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BLINDING AND MASS CONCRETE:
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SOAKAWAY
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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) REDUCER
- (f) ALL FLANGED TEE

Rev.	Date	Dsgn	Drwn	Chk'd	Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

Bureau Technique pour le Développement
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UPGRADING OF WATER SUPPLY IN THE VILLAGES
OF QARQAF, BERQAYEL AND BEIT EL HAOUCH (AKKAR CAZA)

TRANSMISSION AND
DISTRIBUTION SYSTEMS

TYPICAL VALVE CHAMBER DETAILS
FOR HDPE PIPES

DRAWING No.	DESIGNED BY	DRAWN BY	CHECKED BY
562STD23	BTD	BTD	BTD

DATE	SCALE	SHEET No.	SEQ No.
MAY 2020	NOT TO SCALE	23/23	23