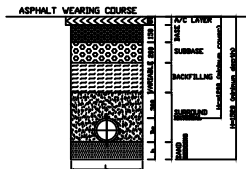


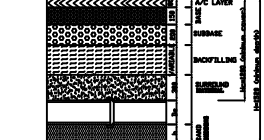
TRENCH IN ASPHALTED ROADS

TYPE -I- ABOVE WATER TABLE
CROSS SECTION

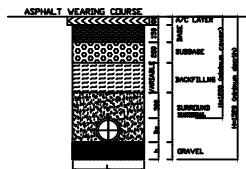


h min = (1/10)De + 100mm (SEE NOTED)
L min = (4/30)De + 450mm (SEE NOTED)
THE SURROUNDING MATERIAL IS AS SPECIFIED
IN THE TECHNICAL SPECIFICATIONS

LONGITUDINAL SECTION
ASPHALT WEARING COURSE

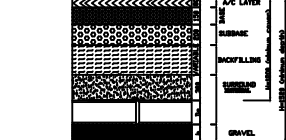


TYPE -II- BELOW WATER TABLE
CROSS SECTION

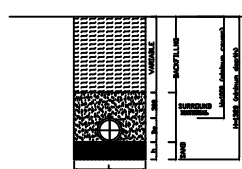


h min = (1/10)De + 100mm (SEE NOTED)
L min = (4/30)De + 450mm (SEE NOTED)
THE SURROUNDING MATERIAL IS AS SPECIFIED
IN THE TECHNICAL SPECIFICATIONS

LONGITUDINAL SECTION
ASPHALT WEARING COURSE

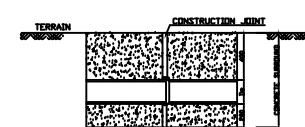


TRENCH IN NATURAL TERRAIN
CROSS SECTION

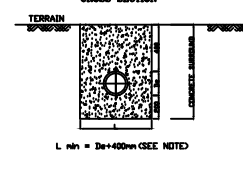


TRENCH IN NATURAL TERRAIN

LONGITUDINAL SECTION



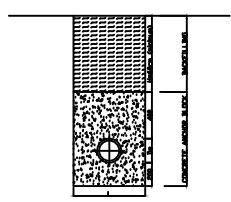
TRENCH IN NATURAL TERRAIN
NEAR OR ACROSS A WATER COURSE
CROSS SECTION



L min = (4/30)De + 450mm (SEE NOTED)

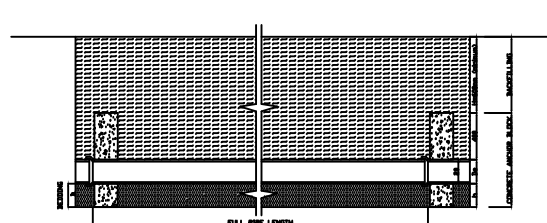
TRENCH IN NATURAL TERRAIN
LAID ON SLOPES > 30%

CROSS SECTION



L min = (4/30)De + 450mm (SEE NOTED)

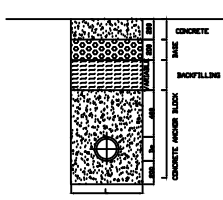
LONGITUDINAL SECTION



h min = (1/10)De + 100mm (SEE NOTED)

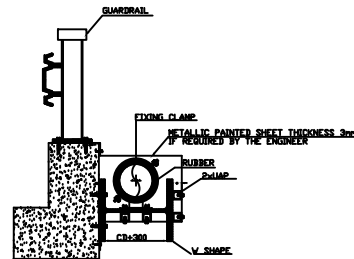
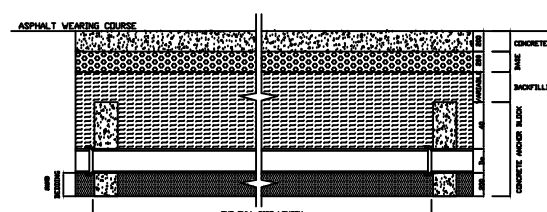
TRENCH IN PAVED ROADS
LAID ON SLOPES > 30%

CROSS SECTION

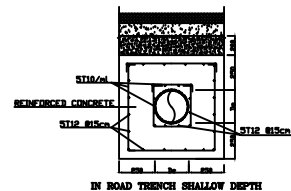
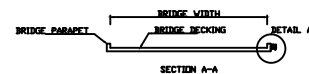


L min = (4/30)De + 450mm (SEE NOTED)

LONGITUDINAL SECTION



DETAIL A
TYPICAL PIPE SUPPORT ON
ROAD BRIDGE CROSSING



IN ROAD TRENCH SHALLOW DEPTH

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.
- IN CASE OF BURIED CHANNEL "De" IN ALL FORMULAS WILL BE REPLACED BY THE CHANNEL WIDTH.

Rev.	Date	Drawn	Checked	Appr'd

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MINISTRY OF ENERGY AND WATER
UNITED NATIONS DEVELOPMENT PROGRAMME

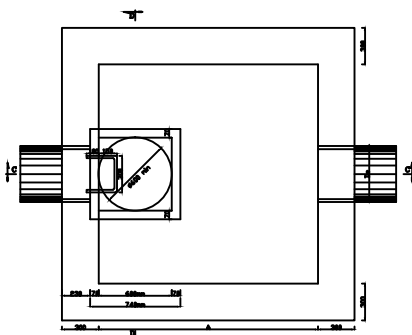
BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
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P.O.BOX:70492 - ANTELJAS FAX: (04) 712159

WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

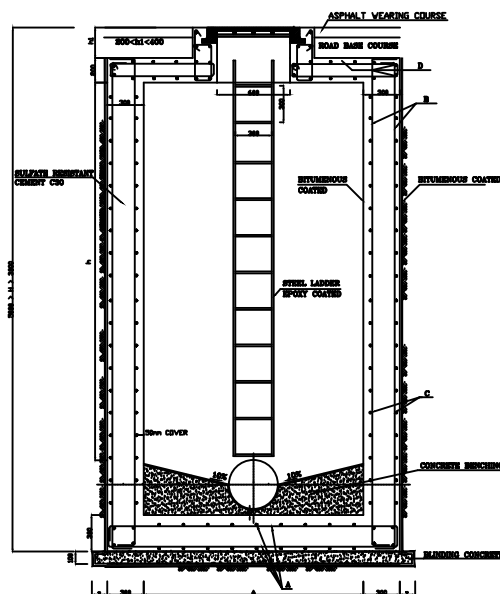
STANDARD DRAWINGS PIPE TRENCH DETAILS
GENERAL DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	BDT	BDT	BDT

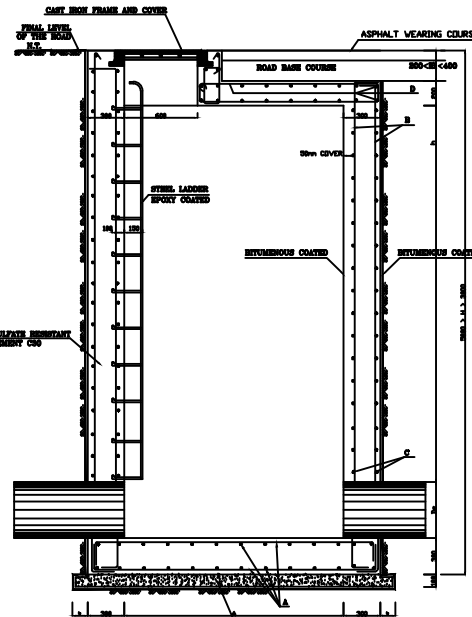
DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	1/8	447WW-S0-01



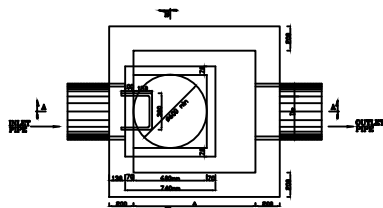
TYPICAL SQUARE MANHOLE
3000mm x 3000mm
PLAN VIEW



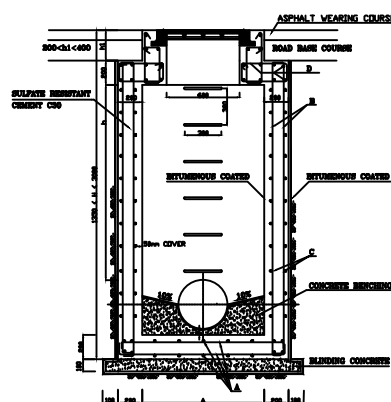
TYPICAL SQUARE MANHOLE
3000mm x 3000mm
SECTION D-D



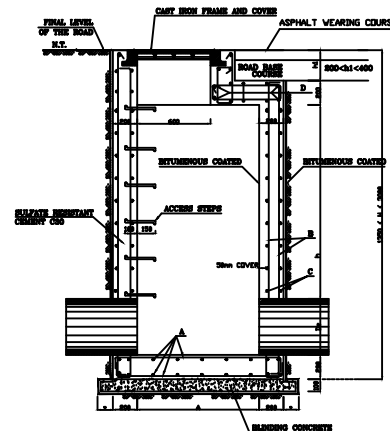
TYPICAL SQUARE MANHOLE
3000mm x 3000mm
SECTION C-C



TYPICAL SQUARE MANHOLE
1500mm x 1500mm
PLAN VIEW



TYPICAL SQUARE MANHOLE
1500mm x 1500mm
SECTION B-B



TYPICAL SQUARE MANHOLE
1500mm x 1500mm
SECTION A-A

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.

SEWER DIAMETER (mm)	SQUARE MANHOLES			CIRCULAR MANHOLES		
	MANHOLES TYPE	A x A (mm)		MANHOLES TYPE	DIAMETER D (mm)	
< 350	M1	1200 x 1200		C1	1200	
350 - 450	M2	1350 x 1350		C2	1350	
500 - 700	M3	1500 x 1500		C3	1500	
750 - 900	M4	1800 x 1800		C4	1800	
1000 - 1200	M5	2000 x 2000		C5	2000	
1300 - 1600	M6	2400 x 2400		C6	2400	
1800 - 2000	M7	3000 x 3000		C7	3000	

MANHOLE TYPE M1	A	B	C	D
1m-Cl-Clm	T12	T12	T12	T14
2m-Cl-Clm	T12	T12	T12	T14
3m-Cl-Clm	T12	T12	T12	T14
4m-Cl-Clm	T12	T12	T12	T14

MANHOLE TYPE M2	A	B	C	D
1m-Cl-Clm	T12	T12	T12	T14
2m-Cl-Clm	T12	T12	T12	T14
3m-Cl-Clm	T12	T12	T12	T14
4m-Cl-Clm	T12	T12	T12	T14

MANHOLE TYPE M3	A	B	C	D
1m-Cl-Clm	T12	T12	T12	T14
2m-Cl-Clm	T12	T12	T12	T14
3m-Cl-Clm	T12	T12	T12	T14
4m-Cl-Clm	T12	T12	T12	T14

MANHOLE TYPE M4	A	B	C	D
1m-Cl-Clm	T12	T12	T12	T14
2m-Cl-Clm	T12	T12	T12	T14
3m-Cl-Clm	T12	T12	T12	T14
4m-Cl-Clm	T12	T12	T12	T14

MANHOLE TYPE M5	A	B	C	D
1m-Cl-Clm	T12	T12	T12	T14
2m-Cl-Clm	T12	T12	T12	T14
3m-Cl-Clm	T12	T12	T12	T14
4m-Cl-Clm	T12	T12	T12	T14

MANHOLE TYPE M6	A	B	C	D
1m-Cl-Clm	T12	T12	T12	T14
2m-Cl-Clm	T12	T12	T12	T14
3m-Cl-Clm	T12	T12	T12	T14
4m-Cl-Clm	T12	T12	T12	T14

MANHOLE TYPE M7	A	B	C	D
1m-Cl-Clm	T14	T14	T14	T14
2m-Cl-Clm	T14	T14	T14	T14
3m-Cl-Clm	T14	T14	T14	T14
4m-Cl-Clm	T14	T14	T14	T14

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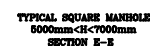
WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

STANDARD DRAWINGS

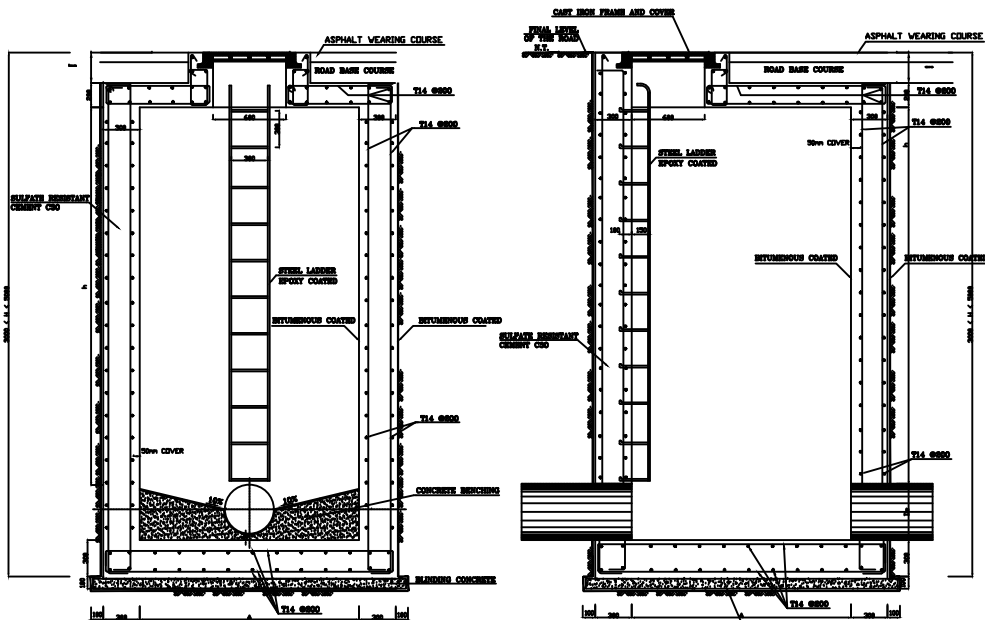
MANHOLES
GENERAL DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	BDT	BDT	BDT

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	2/8	447WW-S0-02

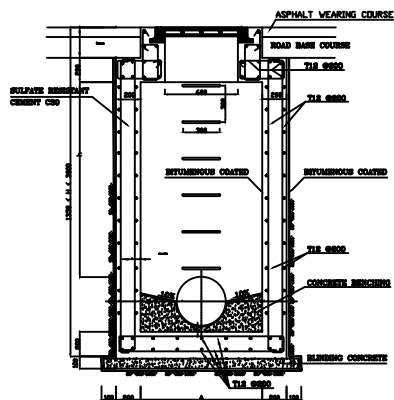


DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	3/8	447WW-SD-03

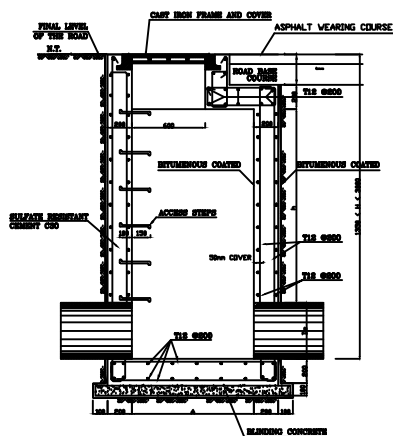


TYPICAL CIRCULAR MANHOLE
3000mm < H < 5000mm
SECTION B-B

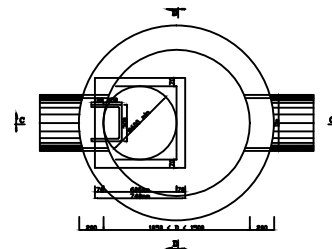
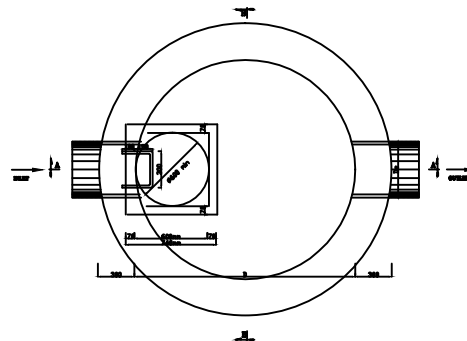
TYPICAL CIRCULAR MANHOLE
3000mm < H < 5000mm
SECTION A-A



TYPICAL CIRCULAR MANHOLE
1300mm < H < 3000mm
SECTION D-D



TYPICAL CIRCULAR MANHOLE
1300mm < H < 3000mm
SECTION C-C



NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.
- THE REINFORCEMENT AND WALL THICKNESS FOR EACH SETTLING MANHOLES TYPES ARE SIMILAR TO EACH NORMAL MANHOLE TYPE.
- EACH NORMAL MANHOLE TYPE SHELL HAVE A CORRESPONDING SETTLING MANHOLE HAVING 2,5A X A AS DIMENSIONS

SEWER DIAMETER (mm)	SQUARE MANHOLES		CIRCULAR MANHOLES	
	MANHOLES TYPE	A x A (mm)	MANHOLES TYPE	DIAMETER D (mm)
< 350	M1	1200 x 1200	C1	1200
350 - 450	M2	1350 x 1350	C2	1350
500 - 700	M3	1500 x 1500	C3	1500
750 - 900	M4	1800 x 1800	C4	1800
1000 - 1200	M5	2000 x 2000	C5	2000
1300 - 1600	M6	2400 x 2400	C6	2400
1800 - 2000	M7	3000 x 3000	C7	3000

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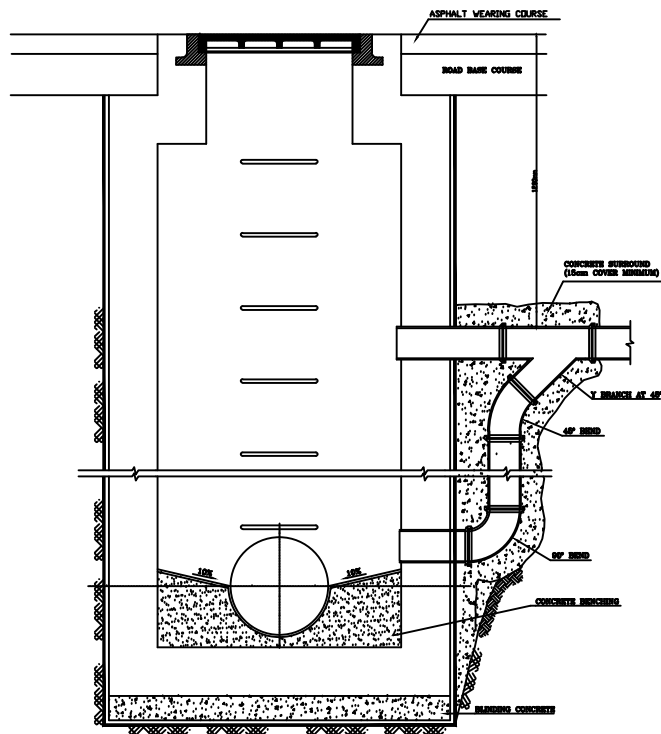
WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

STANDARD DRAWINGS

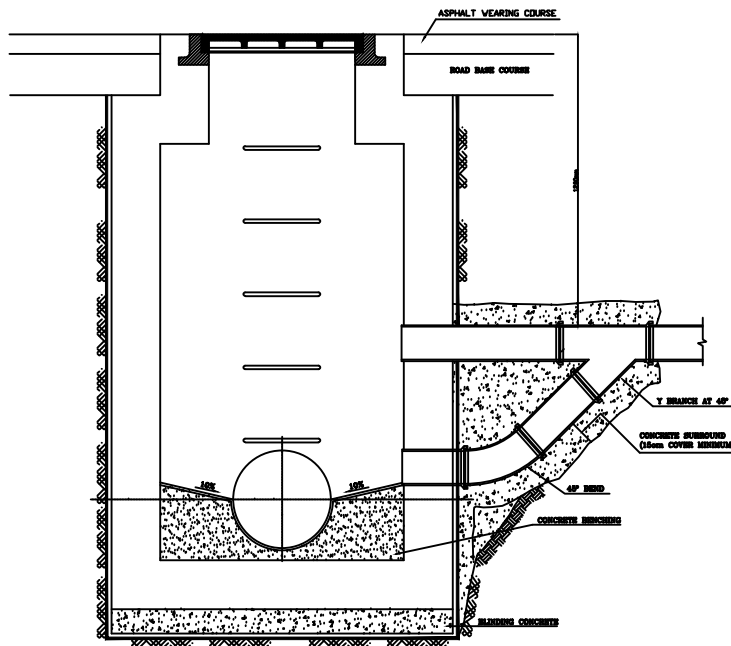
MANHOLES
GENERAL DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	BDT	BDT	BDT

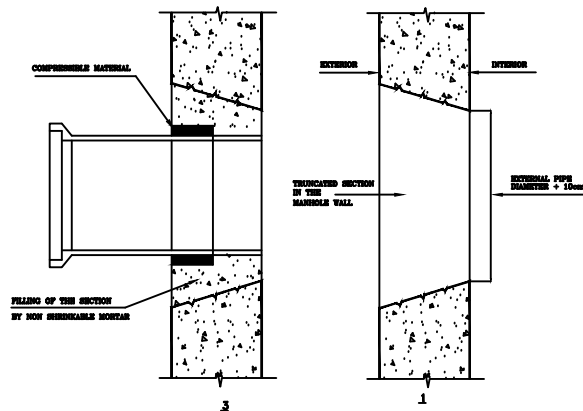
DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	4/8	447WW-S0-04



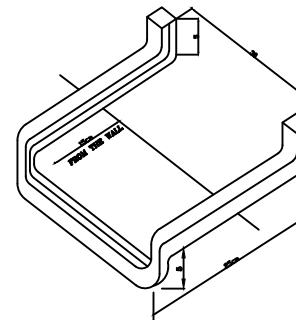
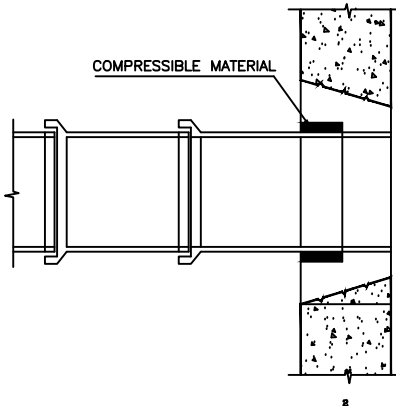
DROP MANHOLE
EXCESSIVE DROP > 2000mm



DROP MANHOLE
1000mm MODERATE DROP $\leq$ 2000mm
N.B: NO EXTERNAL DROP NEEDED FOR DROP < 1000mm



DETAILS FOR THE CONNECTION
OF A PIPE TO A MANHOLE
FOR OTHER PIPES



DETAIL OF AN
ACCESS STEP

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.

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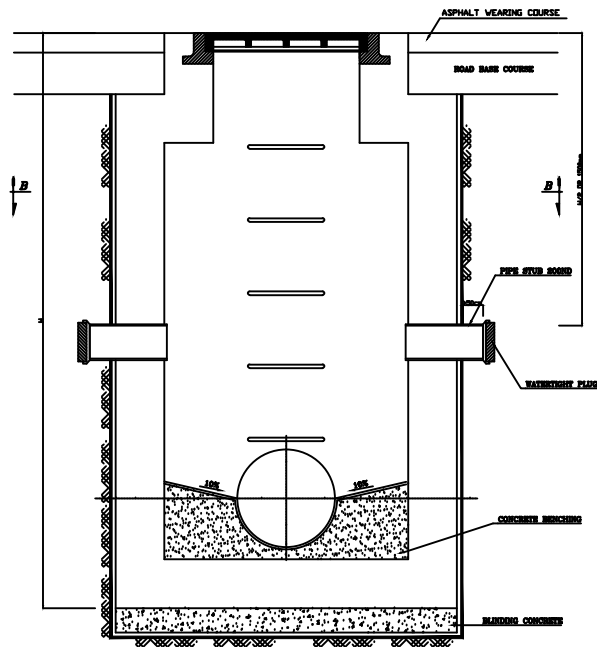
WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

STANDARD DRAWINGS

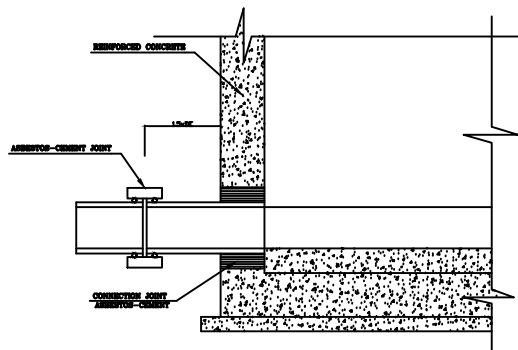
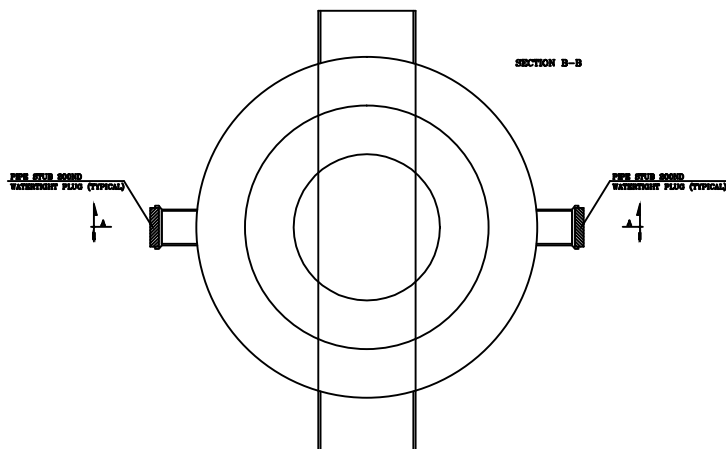
MANHOLES
GENERAL DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	BD	BD	BD

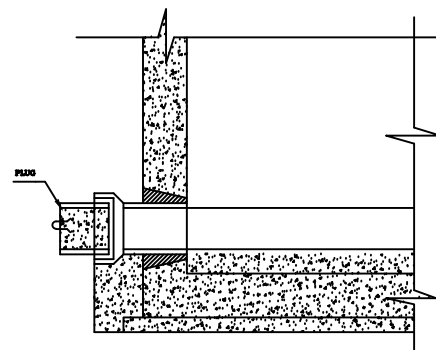
DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	5/8	447WW-S0-05



STUBS FOR FUTURE CONNECTIONS
FOR ALL TYPES OF MANHOLES
CROSS SECTION A-A



DETAILS FOR THE CONNECTION
OF A PIPE TO A MANHOLE
FOR ASBESTOS-CEMENT PIPES



SECTION
PLAN FOR FUTURE CONNECTION
FOR THE UPPER MOUNT MANHOLE

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.

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WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

STANDARD DRAWINGS

MANHOLES
GENERAL DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	STD	STD	STD

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	6/6	447WW-S0-06

ANCHOR BLOCKS FOR BURIED SLOPED PIPES

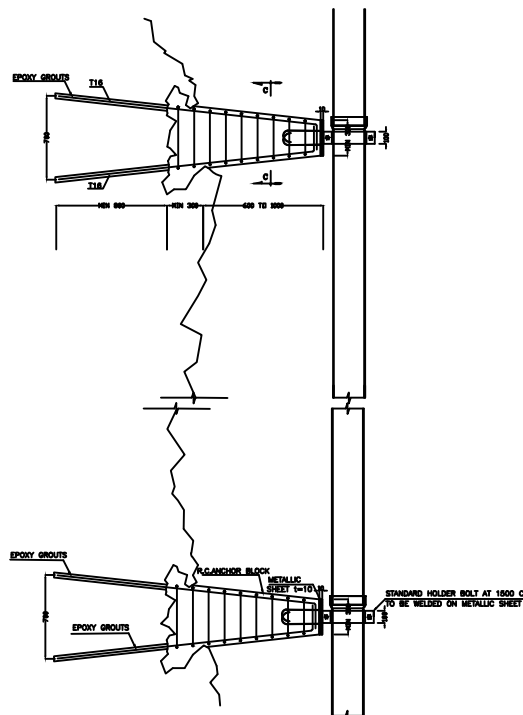
Dim (mm)	25%			30%			35%			40%			45%			50%		
	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)
1000	-	-	-	0.300	1.700	1.000	0.300	1.700	1.000	0.300	1.700	1.000	0.300	1.700	1.000	0.300	1.700	1.000
800	-	-	-	0.300	1.600	0.900	0.300	1.600	0.900	0.300	1.600	0.900	0.300	1.600	0.900	0.300	1.600	0.900
600	-	-	-	0.300	1.500	0.800	0.300	1.500	0.800	0.300	1.500	0.800	0.300	1.500	0.800	0.300	1.500	0.800
400	-	-	-	0.300	1.400	0.700	0.300	1.400	0.700	0.300	1.400	0.700	0.300	1.400	0.700	0.300	1.400	0.700
300	-	-	-	0.300	1.300	0.600	0.300	1.300	0.600	0.300	1.300	0.600	0.300	1.300	0.600	0.300	1.300	0.600
200	-	-	-	0.300	1.200	0.500	0.300	1.200	0.500	0.300	1.200	0.500	0.300	1.200	0.500	0.300	1.200	0.500
150	-	-	-	0.300	1.100	0.400	0.300	1.100	0.400	0.300	1.100	0.400	0.300	1.100	0.400	0.300	1.100	0.400
100	-	-	-	0.300	1.000	0.300	0.300	1.000	0.300	0.300	1.000	0.300	0.300	1.000	0.300	0.300	1.000	0.300
50	-	-	-	0.300	0.900	0.200	0.300	0.900	0.200	0.300	0.900	0.200	0.300	0.900	0.200	0.300	0.900	0.200

- FOR SLOPE > 60% SEE NOTE
- FOR DIAMETER > 1000mm ALL THE TRENCH WILL BE FILLED BY MASSE CONCRETE (REINFORCED CONCRETE FOR SLOPES > 35%)

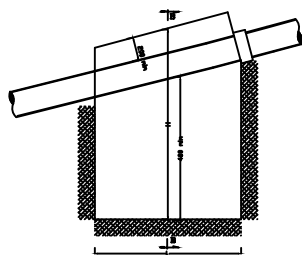
ANCHOR BLOCKS FOR UNCOVERED SLOPED PIPES.

Dim (mm)	25%			30%			35%			40%			45%			50%		
	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)	L (m)	H (m)	B (m)
1000	1.200	1.800	1.000	1.300	1.900	1.000	1.400	2.000	1.000	1.500	2.100	1.000	1.600	2.200	1.000	1.700	2.300	1.000
800	1.100	1.700	0.900	1.200	1.800	0.900	1.300	1.900	0.900	1.400	2.000	0.900	1.500	2.100	0.900	1.600	2.200	0.900
600	1.000	1.600	0.800	1.100	1.700	0.800	1.200	1.800	0.800	1.300	1.900	0.800	1.400	2.000	0.800	1.500	2.100	0.800
400	0.900	1.500	0.700	1.000	1.600	0.700	1.100	1.700	0.700	1.200	1.800	0.700	1.300	1.900	0.700	1.400	2.000	0.700
300	0.800	1.400	0.600	0.900	1.500	0.600	1.000	1.600	0.600	1.100	1.700	0.600	1.200	1.800	0.600	1.300	1.900	0.600
200	0.700	1.300	0.500	0.800	1.400	0.500	0.900	1.500	0.500	1.000	1.600	0.500	1.100	1.700	0.500	1.200	1.800	0.500
150	0.600	1.200	0.400	0.700	1.300	0.400	0.800	1.400	0.400	0.900	1.500	0.400	1.000	1.600	0.400	1.100	1.700	0.400
100	0.500	1.100	0.300	0.600	1.200	0.300	0.700	1.300	0.300	0.800	1.400	0.300	0.900	1.500	0.300	1.000	1.600	0.300
50	0.400	1.000	0.200	0.500	1.100	0.200	0.600	1.200	0.200	0.700	1.300	0.200	0.800	1.400	0.200	0.900	1.500	0.200

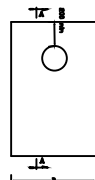
- FOR DIAMETER > 1000mm THE PIPE SHOULD BE BURIED WITH A MINIMUM COVER > 800mm AND ALL THE TRENCH WILL BE FILLED BY MASSE CONCRETE (REINFORCED CONCRETE FOR SLOPES > 35%)



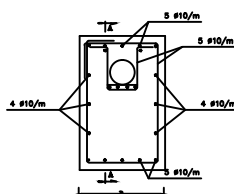
VERTICAL ANCHORS ON ROCK
FOR SLOPE > 60 % AND FOR UNCOVERED PIPES



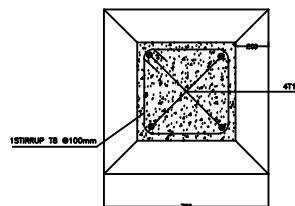
SECTION A-A
ANCHOR BLOCK FOR BURIED
OR UNCOVERED GROUND PIPES
SLOPE < 60%



SECTION B-B
ANCHOR BLOCK FOR BURIED
OR UNCOVERED GROUND PIPES
SLOPE < 60%



SECTION B-B
ANCHOR BLOCK FOR BURIED PIPES
TYPICAL REINFORCEMENT DETAIL
SLOPE < 60%



SECTION C-C
NOT TO SCALE

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS.
- WHEN THE SLOPE IS MORE THEN 50 % ALL THE PIPELINE TRENCH WILL BE FILLED BY A MASSE CONCRETE.

BASIC DATA :

SOIL DENSITY	1800	kg/m3
PIPE MATERIAL DENSITY	7000	kg/m3
WATER DENSITY	1000	kg/m3
CONCRETE DENSITY	2300	kg/m3
SOIL INTERNAL FRICTION ANGLE	25°	
SECURITY FACTOR	1.2	
SOIL BEHAVING CAPACITY	3	kg/cm2
PIPE THICKNESS	0.008	mm
SOIL-CONCRETE FRICTION	2/3 * 25°	

Rev.	Date	Drawn	Drawn	Chk'd	Appr'd
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WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

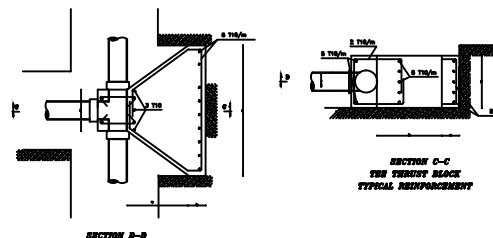
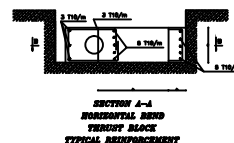
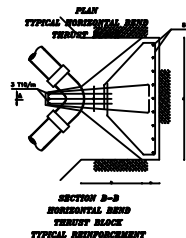
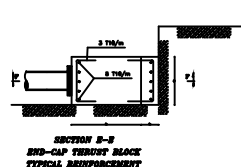
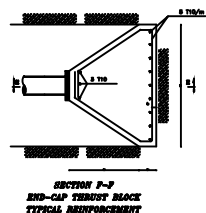
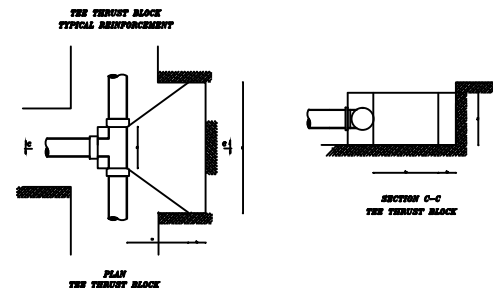
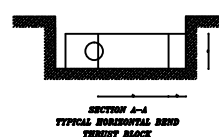
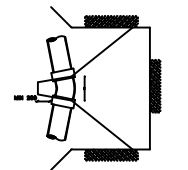
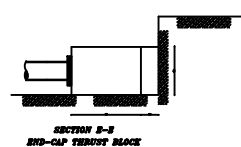
STANDARD DRAWINGS
SEWER NETWORKS
PIPELINE ANCHOR BLOCKS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447W	BTB	BTB	BTB

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	7/8	447W-S0-07

[illegible]

PLAN
END-CLIP THRUST BLOCK



Est. Year	Est. 17			Est. 18			Est. 19			Est. 20			Est. Days	
	1	2	3	1	2	3	1	2	3	1	2	3		
1995	200	252	365	100	100	105	100	100	105	40	35	40	400	247
1996	263	365	365	100	100	105	100	100	105	45	40	45	400	258
1997	324	365	365	100	100	105	100	100	105	50	45	50	400	269
1998	385	365	365	100	100	105	100	100	105	55	50	55	400	280
1999	446	365	365	100	100	105	100	100	105	60	55	60	400	291
2000	507	365	365	100	100	105	100	100	105	65	60	65	400	302
2001	568	365	365	100	100	105	100	100	105	70	65	70	400	313
2002	629	365	365	100	100	105	100	100	105	75	70	75	400	324
2003	690	365	365	100	100	105	100	100	105	80	75	80	400	335
2004	751	365	365	100	100	105	100	100	105	85	80	85	400	346
2005	812	365	365	100	100	105	100	100	105	90	85	90	400	357
2006	873	365	365	100	100	105	100	100	105	95	90	95	400	368
2007	934	365	365	100	100	105	100	100	105	100	95	100	400	379
2008	995	365	365	100	100	105	100	100	105	105	100	105	400	390
2009	1056	365	365	100	100	105	100	100	105	110	105	110	400	401
2010	1117	365	365	100	100	105	100	100	105	115	110	115	400	412
2011	1178	365	365	100	100	105	100	100	105	120	115	120	400	423
2012	1239	365	365	100	100	105	100	100	105	125	120	125	400	434
2013	1300	365	365	100	100	105	100	100	105	130	125	130	400	445
2014	1361	365	365	100	100	105	100	100	105	135	130	135	400	456
2015	1422	365	365	100	100	105	100	100	105	140	135	140	400	467
2016	1483	365	365	100	100	105	100	100	105	145	140	145	400	478
2017	1544	365	365	100	100	105	100	100	105	150	145	150	400	489
2018	1605	365	365	100	100	105	100	100	105	155	150	155	400	500
2019	1666	365	365	100	100	105	100	100	105	160	155	160	400	511
2020	1727	365	365	100	100	105	100	100	105	165	160	165	400	522
2021	1788	365	365	100	100	105	100	100	105	170	165	170	400	533
2022	1849	365	365	100	100	105</								

Year	12-00	12-01	12-02	12-03	12-04	12-05	12-06
1	1.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1.00	0.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	0.00	0.00	0.00
5	1.00	0.00	0.00	0.00	0.00	0.00	0.00
6	1.00	0.00	0.00	0.00	0.00	0.00	0.00
7	1.00	0.00	0.00	0.00	0.00	0.00	0.00
8	1.00	0.00	0.00	0.00	0.00	0.00	0.00
9	1.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.00	0.00	0.00	0.00	0.00	0.00	0.00
13	1.00	0.00	0.00	0.00	0.00	0.00	0.00
14	1.00	0.00	0.00	0.00	0.00	0.00	0.00
15	1.00	0.00	0.00	0.00	0.00	0.00	0.00
16	1.00	0.00	0.00	0.00	0.00	0.00	0.00
17	1.00	0.00	0.00	0.00	0.00	0.00	0.00
18	1.00	0.00	0.00	0.00	0.00	0.00	0.00
19	1.00	0.00	0.00	0.00	0.00	0.00	0.00
20	1.00	0.00	0.00	0.00	0.00	0.00	0.00

SOIL DENSITY	1000	kg/m ³
PIPE MATERIAL DENSITY (DUCTILE IRON)	7000	kg/m ³
WATER SPECIFIC WEIGHT	1000	kg/m ³
CONCRETE SPECIFIC WEIGHT	2300	kg/m ³
SOIL INTERNAL FRICTION ANGLE	0°	
SECURITY FACTOR	1.2	
SOIL BEARING CAPACITY	3	kg/cm ²
SOIL-CONCRETE FRICTION ANGLE	2/3° = 0°	

Ann	Aut	Nov	Dec	Jan	Feb

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
UNITED NATIONS DEVELOPMENT PROGRAMME

BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

JALL ED 018 - MAJAL 014g
P.D.BOK/70482 - ANTELAS

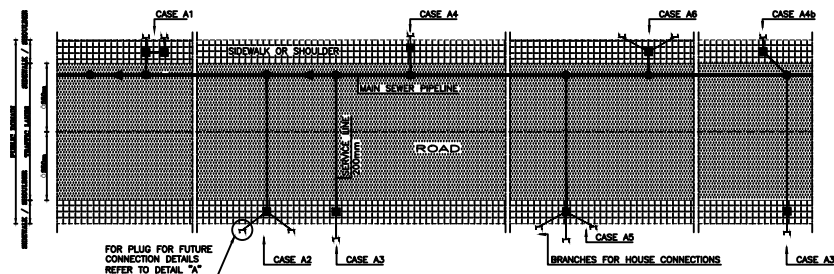
PHONE(04) 712187/712188 (03) 291016
FAX (04) 712189

**WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA**

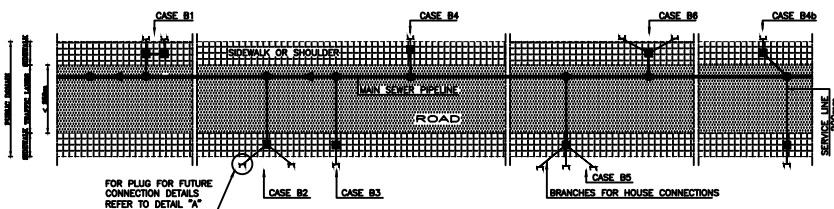
STANDARD DRAWING	THRUST BLOCKS
------------------	---------------

<u>FILE</u>	<u>INITIATED BY</u>	<u>DRIVEN BY</u>	<u>CHECKED BY</u>
447WW	A. ANIS	M. HAYEK	M. RASSI
<u>FILE</u>	<u>FILE</u>	<u>FILE</u>	<u>FILE</u>
APRIL 2016	-	8/8	447WW-S0-08

HOUSE CONNECTIONS AND SERVICE LINES CONFIGURATION PLAN

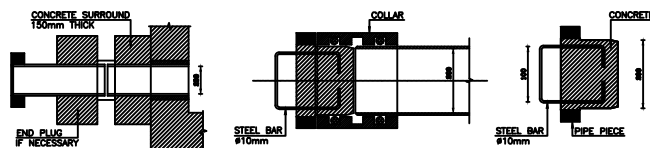


TYPICAL INSTALLATION & CONNECTION PLAN DETAILS FOR LARGE ROADS
N.T.S.



TYPICAL INSTALLATION & CONNECTION PLAN DETAILS FOR NARROW ROADS
N.T.S.

DETAIL "A" - SEALING OF THE UPPER END OF THE HOUSE CONNECTION
N.T.S.



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. THE CHOICE BETWEEN THE DIFFERENT METHODS OF INSTALLATION OF HOUSE BRANCHES, SERVICE LINES AND THEIR CONNECTION TYPES TO THE MAIN COLLECTION, WILL BE DECIDED DURING DISCUSSION, CASE BY CASE ACCORDING TO THE SITE CONDITIONS. THIS DECISION WILL BE MADE BY THE ENGINEER.
3. THE UPPER END OF THE HOUSE CONNECTION SHALL BE SEALED AS DESCRIBED IN DETAIL "A" OR BY INSTALLING A CAP AND SEALING THE CAP WITH 50mm THICK MORTAR AROUND CIRCUMFERENCE OF THE CAP.

- SIDE MANHOLES DIMENSIONS:

SEWER DIAMETER (mm)	SQUARE MANHOLES		CIRCULAR MANHOLES	
	MANHOLES TYPE	L x L (mm)	MANHOLES TYPE	DIAMETER D (mm)
200	M1	1200 x 1200	C1	1200

- SIDE MANHOLES REINFORCEMENT:

MANHOLE TYPE M1	P1	P2	P3	P4
1200x1200	713	713	713	713
1200x1200	0200	0200	0200	0200

- FOR OTHER MANHOLES TYPES AND DIMENSIONS REFER TO THE STANDARD DRAWINGS "MANHOLES GENERAL DETAILS".

Rev. Date Design Drawn Chk'd App'd

REPUBLIC OF LEBANON

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

WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

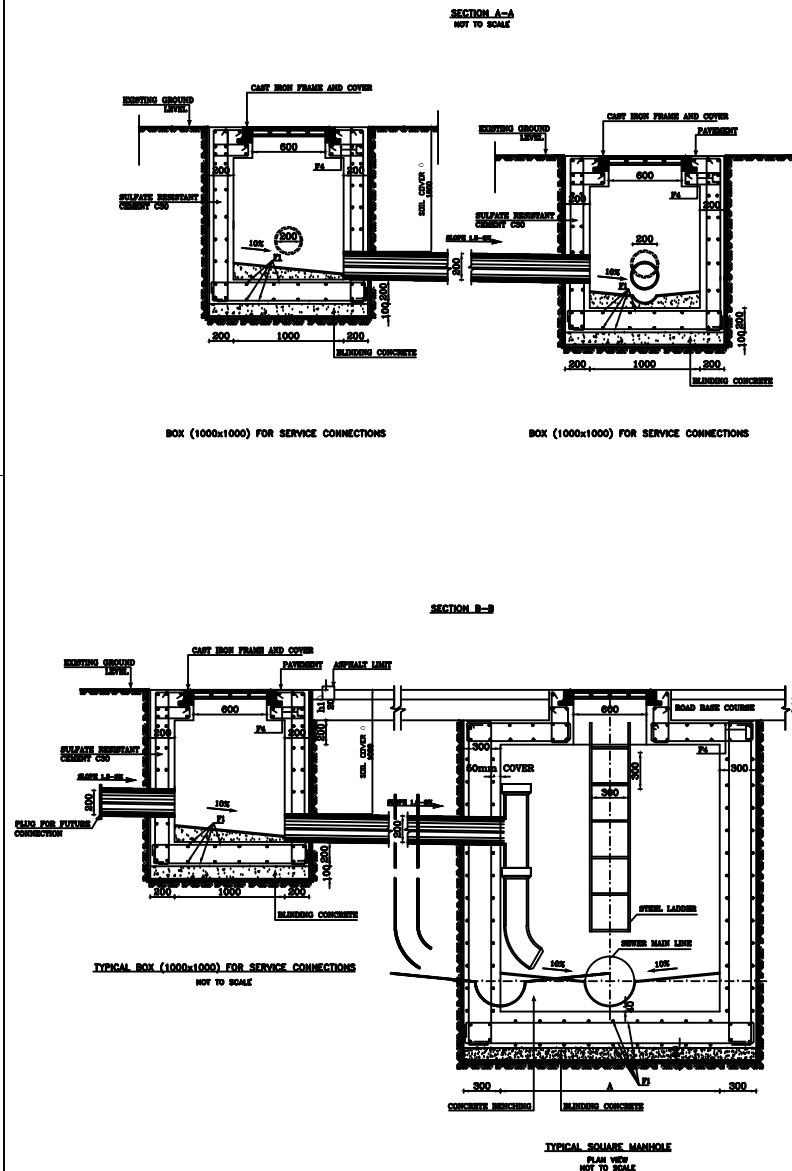
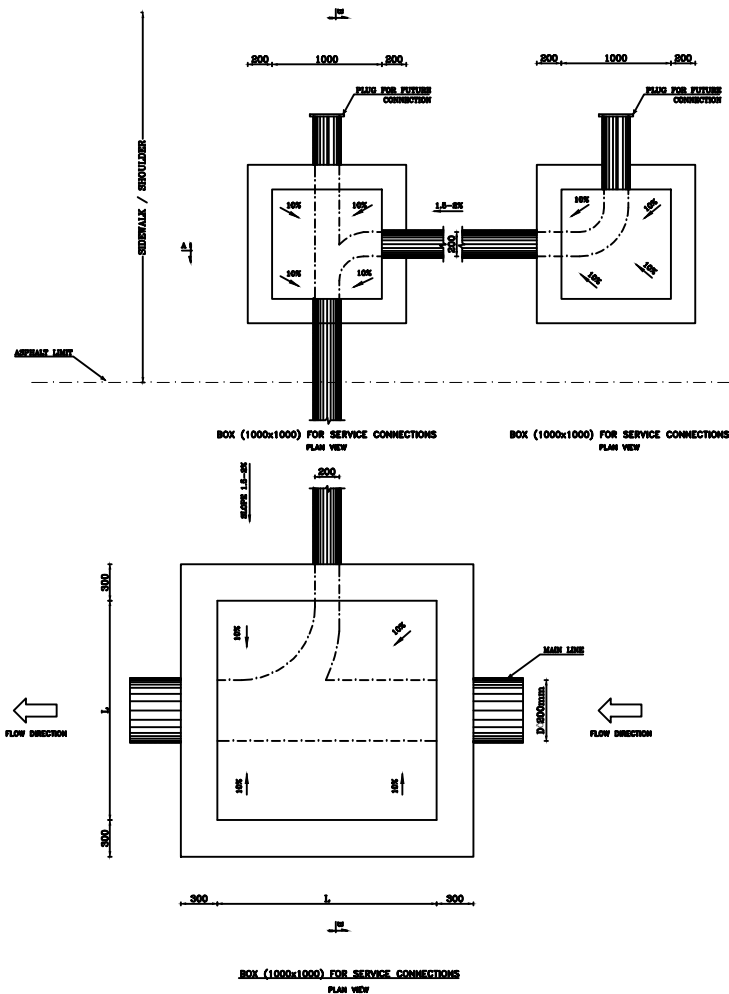
STANDARD DRAWINGS

LATERAL CONNECTIONS
SECTIONS AND DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	C. SAWAYA	C. SAWAYA	N. HOUSNI

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	1/4	447WW-S0-09

CASE A1-B1:



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. THE CHOICE BETWEEN THE DIFFERENT METHODS OF INSTALLATION OF HOUSE BRANCHES, SERVICE LINES AND THEIR CONNECTION TYPES TO THE MAIN COLLECTION, WILL BE DECIDED DURING DESIGN, CASE BY CASE ACCORDING TO THE SITE CONDITIONS. THIS DECISION WILL BE MADE BY THE ENGINEER.
3. THE UPPER END OF THE HOUSE CONNECTION SHALL BE SEALED AS DESCRIBED IN DETAIL "A" OR BY INSTALLING A CAP AND SEALING THE CAP WITH 50mm THICK MORTAR AROUND CIRCUMFERENCE OF THE CAP.

- SIDE MANHOLES DIMENSIONS:

SEWER DIAMETER (mm)	SQUARE MANHOLES MANHOLES TYPE	L x L (mm)	CIRCULAR MANHOLES MANHOLES TYPE	DIAMETER D (mm)
200	M1	1200 x 1200	C1	1200

- SIDE MANHOLES REINFORCEMENT:

MANHOLE TYPE M1	F1	F2	F3	F4
100-150-200	115	115	115	115
200-250-300	200	200	200	200

- FOR OTHER MANHOLES TYPES AND DIMENSIONS REFER TO THE STANDARD DRAWINGS "MANHOLES GENERAL DETAILS".

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WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

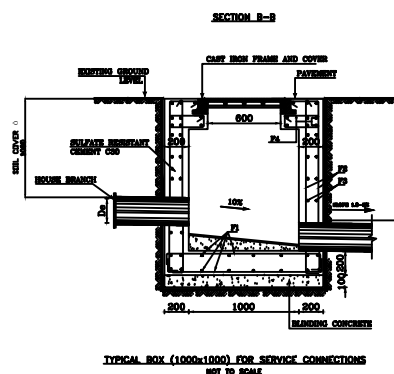
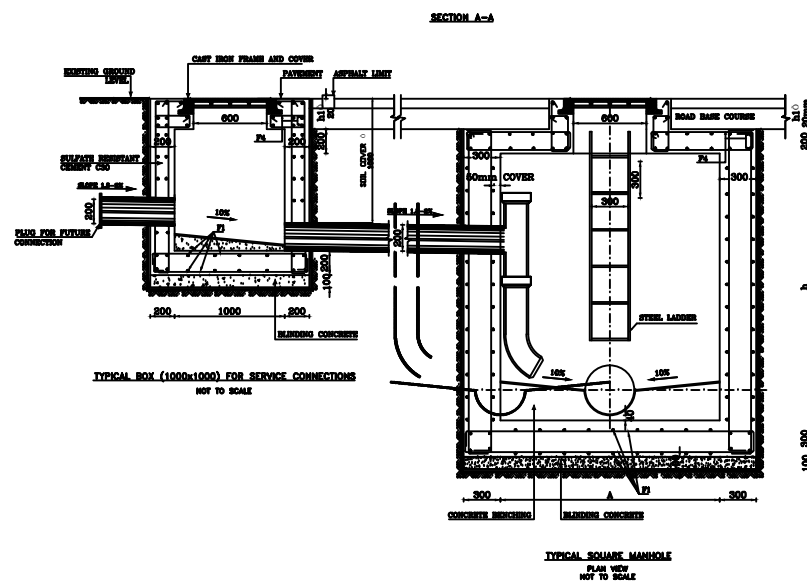
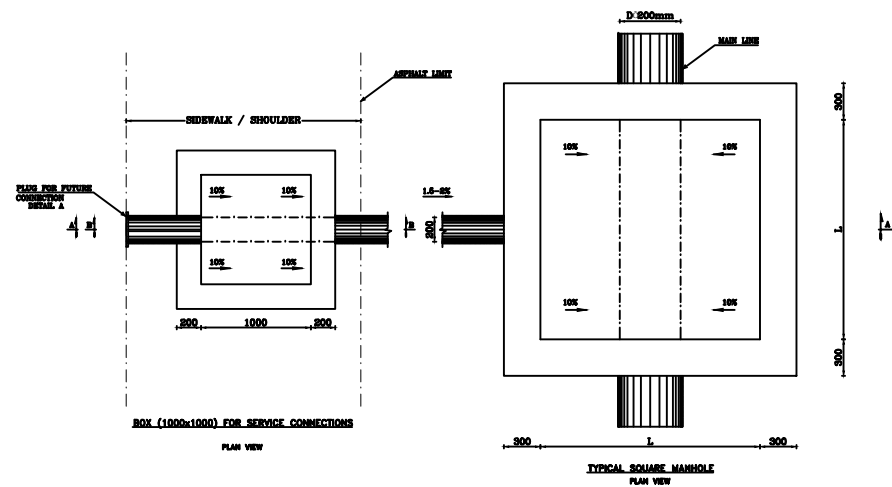
STANDARD DRAWINGS

LATERAL CONNECTIONS
SECTIONS AND DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447W	C. SAWAYA	C. SAWAYA	N. HOUSNI

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	2/4	447W-SD-10

CASE A3-A3b-B3-B3b-A4-A4b-B4-B4b:



NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETERS**
- 2. THE CHOICE BETWEEN THE DIFFERENT METHODS OF INSTALLATION OF HOUSE BRANCHES, SERVICE LINES AND THEIR CONNECTION TYPES TO THE MAIN COLLECTOR, WILL BE DECIDED DURING EXECUTION, CASE BY CASE ACCORDING TO THE SITE CONDITIONS. THIS DECISION WILL BE MADE BY THE ENGINEER.**
- 3. THE UPPER END OF THE HOUSE CONNECTION SHALL BE SEALED AS DESCRIBED IN DETAIL "A" OR BY INSTALLING A CAP AND SEALING THE CAP WITH 50mm THICK MORTAR AROUND CIRCUMFERENCE OF THE CAP.**

- SIDE MANHOLES DIMENSIONS:

SEWER DIAMETER (mm)	SQUARE MANHOLES		CIRCULAR MANHOLES	
	MANHOLES TYPE	L x L (mm)	MANHOLES TYPE	DIAMETER D (mm)
200	M1	1200 x 1200	C1	1200

- SIDE MANHOLES REINFORCEMENT:

MANHOLES TYPE M1	F1	F2	F3	F
1m<H<3m	T12 G200	T12 G200	T12 G200	T12 G200

- FOR OTHER MANHOLES TYPES AND DIMENSIONS REFER TO THE STANDARD DRAWINGS "MANHOLES GENERAL DETAILS".

Basis	Date	Debit	Credit	Total	Balance

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UNITED NATIONS DEVELOPMENT PROGRAMME

ED BUREAU TECHNIQUE POUR LE DEVELOPPEMENT

JALL ED DB - HAJAL Bdg PHONE:(04) 712157/712158 (03) 291016
P.O.BOX 70492 - ANELIAS FAX : (04) 712159

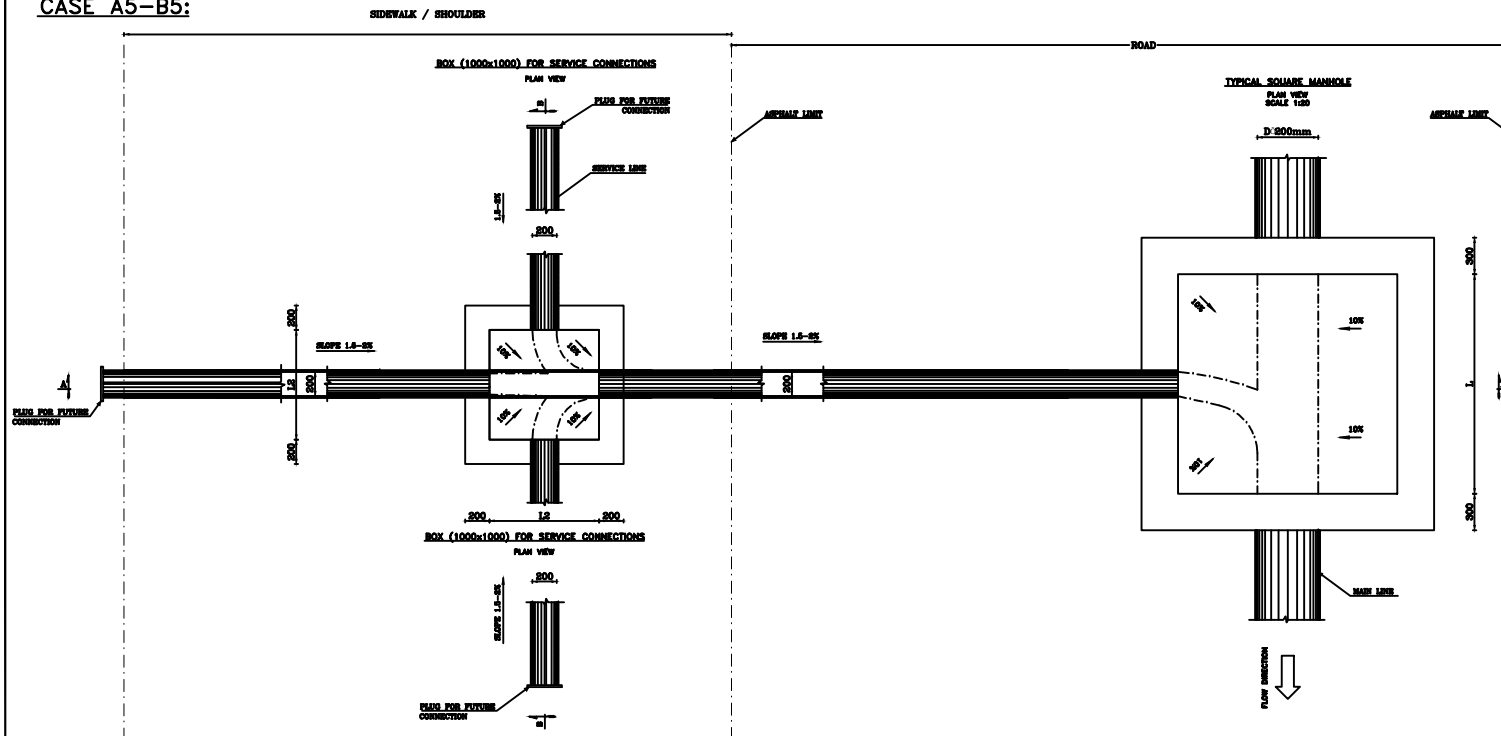
**WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA**

STANDARD DRAWINGS	LATERAL CONNECTIONS SECTIONS AND DETAILS
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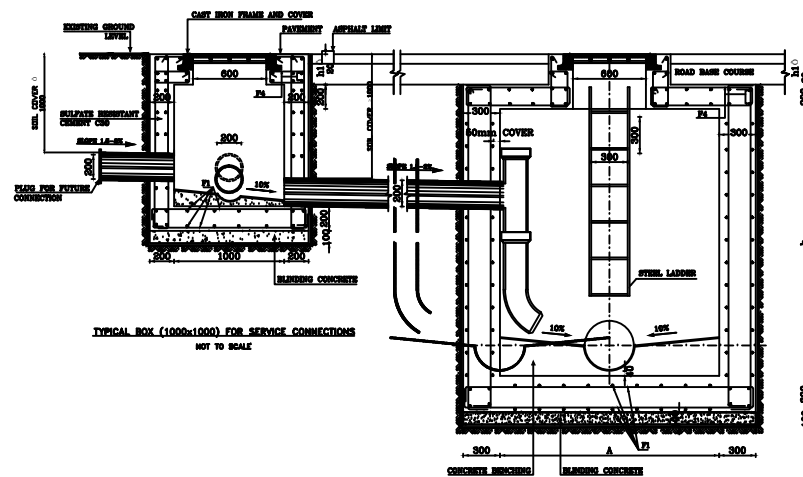
FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	C. SAWAYA	C. SAWAYA	N. HOUSNI

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	3/4	447NW-SD-11

CASE A5-B5:

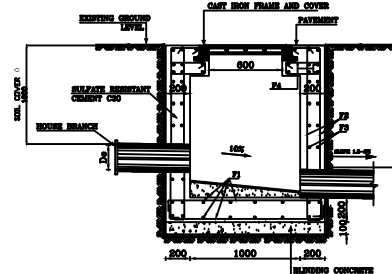


SECTION A-A



TYPICAL SQUARE MANHOLE
PLAN VIEW
NOT TO SCALE

SECTION B-B



TYPICAL BOX (1000x1000) FOR SERVICE CONNECTIONS
NOT TO SCALE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. THE CHOICE BETWEEN THE DIFFERENT METHODS OF INSTALLATION OF HOUSE BRANCHES, SERVICE LINES AND THEIR CONNECTION TYPES TO THE MAIN COLLECTION, WILL BE DECIDED DURING DESIGN, CASE BY CASE ACCORDING TO THE SITE CONDITIONS. THIS DECISION WILL BE MADE BY THE ENGINEER.
3. THE UPPER END OF THE HOUSE CONNECTION SHALL BE SEALED AS DESCRIBED IN DETAIL "H" OR BY INSTALLING A CAP AND SEALING THE CAP WITH 50mm THICK MORTAR AROUND CIRCUMFERENCE OF THE CAP.

- SIDE MANHOLES DIMENSIONS:

SEWER DIAMETER (mm)	SQUARE MANHOLES MANHOLES TYPE	L x L (mm)	CIRCULAR MANHOLES MANHOLES TYPE	DIAMETER D (mm)
200	M1	1200 x 1200	C1	1200

- SIDE MANHOLES REINFORCEMENT:

MANHOLE TYPE M1	F1	F2	F3	F4
1200x1200	713	713	713	713

- FOR OTHER MANHOLES TYPES AND DIMENSIONS REFER TO THE STANDARD DRAWINGS "MANHOLES GENERAL DETAILS".

Rev. Date Desg. Drawn Chk'd App'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
UNITED NATIONS DEVELOPMENT PROGRAMME

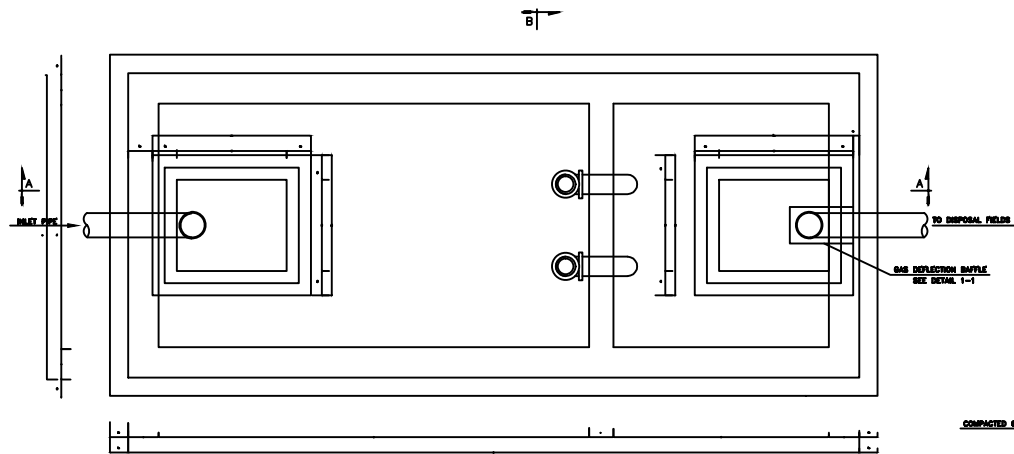
BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DB - HAJL Bdg PHONE(04) 712157/712158 (03) 291016
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WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISSE-QARHA

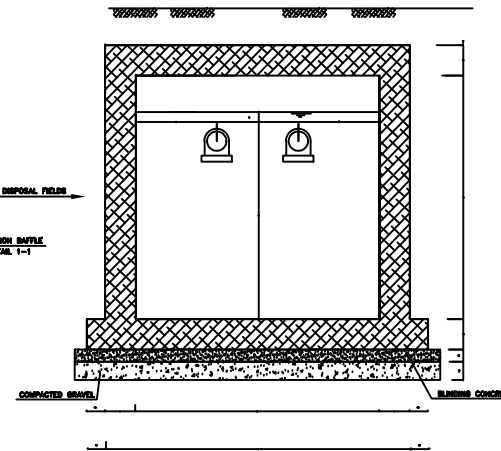
STANDARD DRAWINGS LATERAL CONNECTIONS
SECTIONS AND DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447W	C. SAWAYA	C. SAWAYA	N. HOUSNI

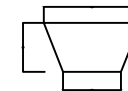
DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S.	4/4	447W-S0-12



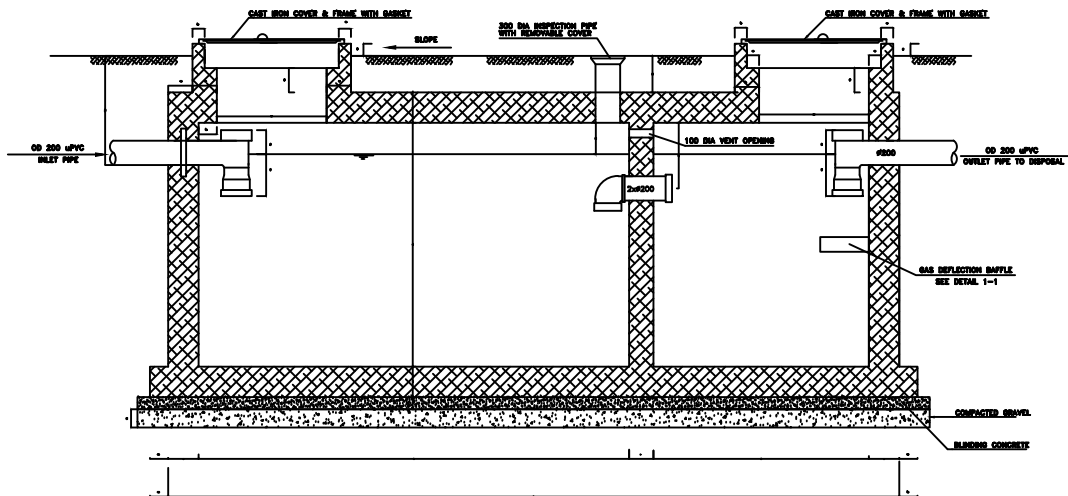
TOP VIEW
NOT TO SCALE



SECTION B-B
NOT TO SCALE



DETAIL 1-1
NOT TO SCALE



SECTION A-A
NOT TO SCALE

SEPTIC TANK DIMENSIONS										
TYPE	NUMBER OF	DIMENSIONS (mm)								
	WAYS	A	B	C	D	E	F	G	H	I
1	200	11000	8200	8500	3100	7100	2800	3100	10100	300

NOTES:

Rev.	Date	Design	Drawn	Chk'd	Appr'd

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
UNITED NATIONS DEVELOPMENT PROGRAMME

BD BUREAU TECHNIQUE POUR LE DEVELOPPEMENT
JALL ED DIB - HAMM RAYE PHONE: (01) 403017/417014 (03) 291016
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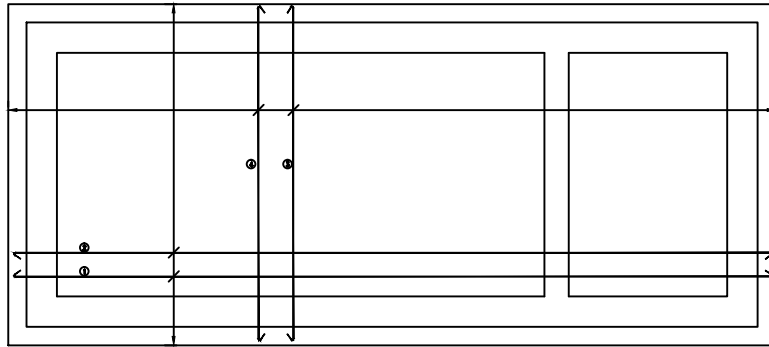
WASTEWATER MANAGEMENT SYSTEM
IN AL AMAYER-WADI KHALED
HNAIDER-KNAISE-QARHA

WASTEWATER TREATMENT PLANTS

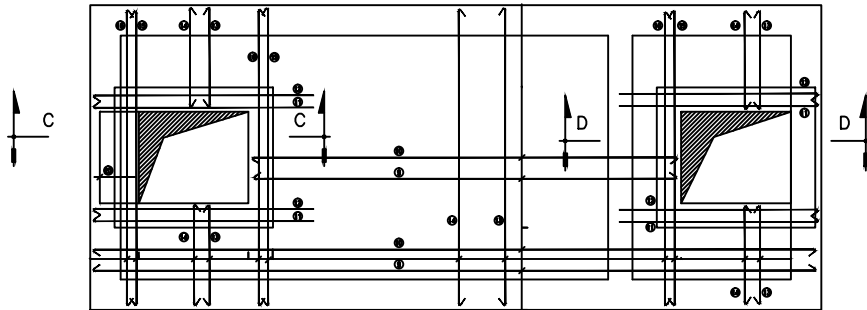
SEPTIC TANKS
GENERAL ARRANGEMENT
& STRUCTURAL DETAILS

FILE	DESIGNED BY	DRAWN BY	CHECKED BY
447WW	N. HADDAD	E. DINA	E. KHOURY N. GHANNEM

DATE	SCALE	SHEET No.	DRAWING No.
APRIL 2016	N.T.S	1/2	447WW-S0-13



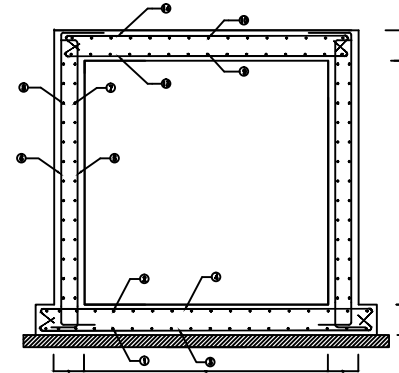
MAT REINFORCEMENT



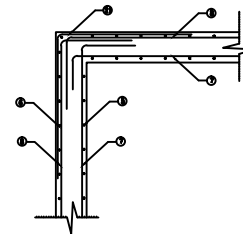
TOP SLAB REINFORCEMENT



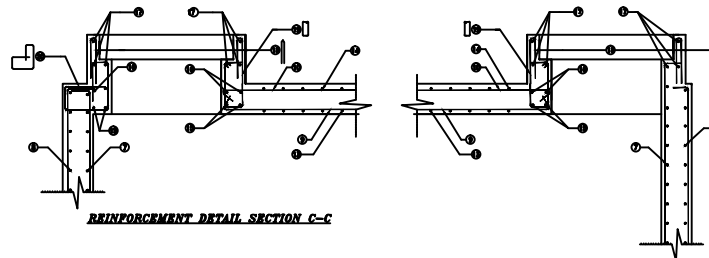
SEPTIC TANK REINFORCEMENT	
BAR DES.	TYPE I
1	T12 Ø140
2	T20 Ø140
3	T12 Ø180
4	T16 Ø180
5	T16 Ø180
6	T12 Ø180
7	T12 Ø180
8	T14 Ø200
9	T16 Ø200
10	T14 Ø200
11	Ø14
12	Ø14
13	T20 Ø200
14	T14 Ø200
15	Ø14
16	Ø14
17	Ø10
18	T10 Ø180
19	Ø6 Ø180
20	Ø6 Ø180
21	T12 Ø200



REINFORCEMENT SECTION B-B



WALL CORNER REINFORCEMENT DETAIL



REINFORCEMENT DETAIL SECTION C-C

REINFORCEMENT DETAIL SECTION D-D

NOTES:

A. REINFORCED CONCRETE

CONCRETE SHALL BE GRADE C30 FOR ALL STRUCTURES

MINING ELEMENTS: SULFATE RESISTANT CEMENT, 400kg/m³, SHALL COMPLY WITH BS12. AGGREGATES (SAND AND GRAVELS) FROM APPROVED QUARRIES, SHALL COMPLY WITH BS8. WATER SHALL COMPLY WITH THE REQUIREMENTS OF BS 6338

STRENGTHS : CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS
 - ON A CUBE, $\phi = 150\text{mm}$: 30N/mm²
 - ON A CYLINDER $\phi 150\text{mm}$, $h=300\text{mm}$: 25N/mm²
 CONCRETE TENSILE STRENGTH AT 28 DAYS: 2.1N/mm²
 MAXIMUM POURING HEIGHT: 1.50meter

REINFORCEMENT COVER: MINIMUM 40mm FOR THE FLOOR SLAB, WALLS AND ROOF
 30mm ELSEWHERE.

B. REINFORCEMENT

MIX MADE WITH ORDINARY PORTLAND CEMENT, 250kg/m³

B. REINFORCEMENT

DEFORMED HIGH STRENGTH STEEL BARS: SYMBOL: T YIELD STRESS: $f_y = 430\text{N/mm}^2$
 MILD STEEL BARS : SYMBOL: S YIELD STRESS: $f_y = 250\text{N/mm}^2$

OVERLAP

LAPS SHALL NOT BE LESS THAN FIFTY TIMES THE BAR DIAMETER WHERE SPLICE BARS ARE USED, THEIR LENGTH SHALL NOT BE LESS THAN 25Ø (Ø = BAR NOMINAL DIAMETER)
 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 #8 SHALL BE USED ON EACH LAP.

REMARKS: FOR $\phi > 12\text{mm}$ SHALL BE MECHANICALLY BONDED
 $\phi \leq 12\text{mm}$ MANUAL BENDING IS PERMISSIBLE
 STRAIGHTENING OF BONDED BARS IS NOT ALLOWED.

C. CONSTRUCTION JOINTS

PROHIBITED IN SEPTIC TANK WALLS
 REDUCED TO THE STRICT MINIMUM IN OTHER ELEMENTS PROVIDED THAT NECESSARY PRECAUTIONS ARE TAKEN SETTING RETARDERS, BONDING MATERIALS, WATER-STOPS JOINTS SHALL BE USED IN EACH CONSTRUCTION JOINT CONTINUOUSLY (IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.)

D. ADMIXTURES

SETTING RETARDERS (CONSTRUCTION JOINTS).
 WATERPROOFING ADMIXTURE (TO IMPROVE WATERPROOFNESS OF WALLS, FLOOR AND COVER SLAB) BOND (WALL - MAT FOUNDATION CONNECTION, USE OF POLYVINYL ACETATE BASED CONCRETE)
 THE USE OF CHLORINE BASED ADMIXTURES IS NOT ALLOWED.

E. FORMWORK

ALL EXPOSED CONCRETE SHALL BE FAIR FACED CONCRETE.
 DOUBLE WINDOOD WATERPROOF CONNECTION BLEEDS SHALL BE USED FOR SEPTIC TANK FORMWORKS
 HOLES MADE BY THE TE-RODS SHALL BE SUITABLY FILLED WITH A NON SHRINK GROUT.

REMARKS:

- NO LIVE LOAD ON THE SEPTIC TANK IS ALLOWED
 - ALL MATERIALS AND CONSTRUCTION METHODS SHALL COMPLY WITH BRITISH STANDARDS
 - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

LEGEND:

===== BOTTOM BARS
 ===== TOP BARS

Rev. Date Drawn Drawn Chk'd App'd

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