

**EXPANSION AND REINFORCEMENT OF ZARQA WASTEWATER SYSTEMS
COST BASIS**

Table 1: Recently Awarded Contracts Used For RCP and DI Pipes Cost Estimation

Collection Network																	
Pipe Diameter	Pipe Type	Setting	Unit	Project A: Mu'ta PS		Project B: Adnaniyah		Project C: Central Region (from PDF)		Project D: South Amman, Khureibet Alsuk		Project E: South Amman, Jawa		Average Rate	Low	High	Used Rate
				Quantity	Rate (JD)	Quantity	Rate (JD)	Quantity	Rate (JD)	Quantity	Rate (JD)	Quantity	Rate (JD)				
150 mm	150 mm CP	Various	M.R.	14400	69	6200	100	3050	65					78	65	100	80
	150 mm DI	Various	M.R.	45	138	220	150							144	138	150	160
200 mm CP	200 mm CP	Asphalt	M.R.	64500	97	34000	110	11350	81					96	81	110	100
	200 mm CP	Seal Coat	M.R.	350	90	780	105	850	79					91	79	105	
	200 mm CP	Natural Ground	M.R.	3850	69	3200	100	1920	73					81	69	100	
	200 mm CP	Basecourse	M.R.					100	75					75	75	75	
	200 mm CP	MC	M.R.					50	77					77	77	77	
200 mm DI	200 mm DI	Asphalt	M.R.					30	135	1150	244	1793	235	205	135	244	210
	200 mm DI	Natural Ground	M.R.					110	124			138	209	167	124	209	
	200 mm DI	Wadi	M.R.	200	207	600	110							159	110	207	
	200 mm DI	Concrete	M.R.							39	276		276	276	276	276	
300 mm RCP	300 mm RCP	Asphalt	M.R.	5700	124	2000	220	100	102					149	102	220	130
	300 mm RCP	Seal Coat	M.R.			150	210	50	95					153	95	210	
	300 mm RCP	Natural Ground	M.R.					50	90					90	90	90	
	300 mm RCP	Several Surfaces	M.R.					50	97					97	97	97	
300 DI	300 mm DI	Asphalt	M.R.									645	363	363	363	363	350
400 mm RCP	400 mm RCP	Asphalt	M.R.	1700	159							271	198	178	159	198	167
	400 mm RCP	Natural Ground	M.R.									1112	155	155	155	155	
500 mm RCP	500 mm RCP	Asphalt	M.R.	200	182	700	200			366	227	366	227	209	182	227	220
	500 mm RCP	Natural Ground	M.R.			1150	180							180	180	180	
	500 mm RCP	Wadi	M.R.	400	259									259	259	259	
500 mm DI	500 mm DI	Asphalt	M.R.			350	700					71	548	624	548	700	570
	500 mm DI	Natural Ground	M.R.			170	650							650	650	650	
600 mm RCP	600 mm RCP	Asphalt	M.R.			1300	300			486	297			299	297	300	265
	600 mm RCP	Wadi	M.R.	1000	269									269	269	269	
700 mm RCP	700 mm RCP	Asphalt	M.R.							74	441	1314	330	386	330	441	Not Used
	700 mm RCP	Natural Ground	M.R.									288	253	253	253	253	
800 mm RCP	800 mm RCP	Asphalt	M.R.									530	343	343	343	343	Not Used
	800 mm RCP	Natural Ground	M.R.									90	307	307	307	307	

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Table 2: RCP Trunk Sewers Cost Estimation Break Down

Depth to invert	Pipe diameter	Pipe cost				Installation cost						Manhole cost				Average Price
		Pipe cost	Overhead	Profit	Total pipe cost	Civil Works	Installation and testing	Total Installation cost	Overhead	Profit	Total installation cost	Manhole diameter	Manhole cost	Manhole cost per m	Total Price	
m	mm											mm	JD		JD	JD
3	700	39	4	8	50	81	11	91	23	18	132	1,500	2,000	40	222	278
4	700	39	4	8	50	102	11	113	28	23	164	1,500	2,250	45	259	
5	700	39	4	8	50	124	11	134	34	27	195	1,500	2,500	50	295	
6	700	39	4	8	50	146	11	156	39	31	226	1,500	3,000	60	336	
3	800	44	4	9	57	89	12	101	25	20	147	1,800	2,460	49	253	317
4	800	44	4	9	57	113	12	125	31	25	181	1,800	2,810	56	295	
5	800	44	4	9	57	137	12	149	37	30	216	1,800	3,200	64	337	
6	800	44	4	9	57	161	12	173	43	35	251	1,800	3,760	75	383	
3	900	55	6	11	72	97	15	112	28	22	163	1,800	2,460	49	284	353
4	900	55	6	11	72	124	15	139	35	28	201	1,800	2,810	56	329	
5	900	55	6	11	72	150	15	165	41	33	240	1,800	3,200	64	375	
6	900	55	6	11	72	177	15	192	48	38	278	1,800	3,760	75	425	
3	1000	66	7	13	86	106	18	124	31	25	179	2,100	3,150	63	328	408
4	1000	66	7	13	86	134	18	152	38	30	221	2,100	3,650	73	380	
5	1000	66	7	13	86	163	18	181	45	36	263	2,100	4,250	85	434	
6	1000	66	7	13	86	192	18	210	53	42	305	2,100	4,900	98	488	
3	1100	85	8	17	110	114	23	137	34	27	199	2,100	3,150	63	372	456
4	1100	85	8	17	110	145	23	168	42	34	244	2,100	3,650	73	427	
5	1100	85	8	17	110	176	23	199	50	40	289	2,100	4,250	85	484	
6	1100	85	8	17	110	207	23	231	58	46	334	2,100	4,900	98	542	
3	1200	94	9	19	122	122	26	147	37	29	214	2,100	3,150	63	398	488
4	1200	94	9	19	122	156	26	181	45	36	263	2,100	3,650	73	457	
5	1200	94	9	19	122	189	26	215	54	43	311	2,100	4,250	85	518	
6	1200	94	9	19	122	223	26	248	62	50	360	2,100	4,900	98	580	
3	1300	115	11	23	149	130	30	160	40	32	232	2,400	3,610	72	453	552
4	1300	115	11	23	149	166	30	196	49	39	284	2,400	4,210	84	518	
5	1300	115	11	23	149	202	30	232	58	46	336	2,400	4,950	99	585	
6	1300	115	11	23	149	238	30	268	67	54	389	2,400	5,660	113	651	
3	1400	133	13	27	173	138	35	173	43	35	251	2,400	3,610	72	496	599
4	1400	133	13	27	173	176	35	211	53	42	306	2,400	4,210	84	563	
5	1400	133	13	27	173	215	35	250	62	50	362	2,400	4,950	99	634	
6	1400	133	13	27	173	253	35	288	72	58	418	2,400	5,660	113	704	
3	1500	153	15	31	199	146	40	186	46	37	270	2,700	4,300	86	554	668
4	1500	153	15	31	199	187	40	227	57	45	329	2,700	5,050	101	628	
5	1500	153	15	31	199	228	40	267	67	53	388	2,700	6,000	120	706	
6	1500	153	15	31	199	268	40	308	77	62	447	2,700	6,800	136	782	

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COST BASIS**

Table 2: RCP Trunk Sewers Cost Estimation Break Down

Depth to invert	Pipe diameter	Pipe cost				Installation cost						Manhole cost				Average Price
		Pipe cost	Overhead	Profit	Total pipe cost	Civil Works	Installation and testing	Total Installation cost	Overhead	Profit	Total installation cost	Manhole diameter	Manhole cost	Manhole cost per m	Total Price	
m	mm											mm	JD		JD	JD
3	1600	174	17	35	226	154	45	199	50	40	289	2,700	4,300	86	601	720
4	1600	174	17	35	226	197	45	242	61	48	352	2,700	5,050	101	678	
5	1600	174	17	35	226	240	45	286	71	57	414	2,700	6,000	120	760	
6	1600	174	17	35	226	284	45	329	82	66	477	2,700	6,800	136	839	
3	1700	196	20	39	255	162	51	213	53	43	309	2,700	4,300	86	650	774
4	1700	196	20	39	255	207	51	259	65	52	375	2,700	5,050	101	731	
5	1700	196	20	39	255	253	51	304	76	61	441	2,700	6,000	120	816	
6	1700	196	20	39	255	299	51	350	87	70	507	2,700	6,800	136	898	
3	1800	220	22	44	286	170	57	227	57	45	329	3,000	5,000	100	715	850
4	1800	220	22	44	286	218	57	275	69	55	399	3,000	6,000	120	805	
5	1800	220	22	44	286	266	57	323	81	65	468	3,000	7,000	140	894	
6	1800	220	22	44	286	314	57	371	93	74	538	3,000	8,000	160	984	
3	1900	253	25	51	329	177	66	243	61	49	353	3,000	5,000	100	782	922
4	1900	253	25	51	329	228	66	294	73	59	426	3,000	6,000	120	875	
5	1900	253	25	51	329	278	66	344	86	69	499	3,000	7,000	140	968	
6	1900	253	25	51	329	328	66	394	99	79	572	3,000	8,000	160	1,061	
3	2000	288	29	58	374	185	75	260	65	52	377	3,000	5,000	100	851	996
4	2000	288	29	58	374	238	75	313	78	63	453	3,000	6,000	120	947	
5	2000	288	29	58	374	291	75	366	91	73	530	3,000	7,000	140	1,044	
6	2000	288	29	58	374	343	75	418	105	84	607	3,000	8,000	160	1,140	

**EXPANSION AND REINFORCEMENT OF ZARQA WASTEWATER SYSTEMS
COST BASIS**

Table 3: DI Force Mains Cost Estimation Break Down

Depth to invert (m)	Pipe diameter (mm)	Pipe cost						Civil Works						Fittings and Chambers			Total contract price (JD)
		Pipe cost CIF Aqaba	Transport to site	Pipe cost	Overhead	Profit	Total pipe cost	Excavation and Back filling	Installation and testing	Total Installation cost	Overhead	Profit	Total installation cost	Fittings	Chmabers	Total	
3	700	400	12	412	41	82	536	81	35	116	23	23	162	80	5	85	783
4	700	400	12	412	41	82	536	102	35	137	27	27	192	80	6	86	814
5	700	400	12	412	41	82	536	124	35	159	32	32	222	80	7	87	845
3	800	450	14	464	46	93	603	89	40	129	26	26	181	90	5	96	879
4	800	450	14	464	46	93	603	113	40	153	31	31	214	90	6	97	914
5	800	450	14	464	46	93	603	137	40	177	35	35	248	90	7	98	948
3	900	500	15	515	52	103	670	97	45	142	28	28	199	100	6	106	975
4	900	500	15	515	52	103	670	124	45	169	34	34	236	100	7	108	1,013
5	900	500	15	515	52	103	670	150	45	195	39	39	273	100	8	109	1,051
3	1000	560	17	577	58	115	750	106	50	156	31	31	218	112	7	119	1,087
4	1000	560	17	577	58	115	750	134	50	184	37	37	258	112	8	120	1,128
5	1000	560	17	577	58	115	750	163	50	213	43	43	299	112	9	121	1,170
3	1200	700	21	721	72	144	937	122	60	182	36	36	255	141	8	148	1,340
4	1200	700	21	721	72	144	937	156	60	216	43	43	302	141	9	150	1,389
5	1200	700	21	721	72	144	937	189	60	249	50	50	349	141	10	151	1,437
3	1400	900	27	927	93	185	1,205	138	70	208	42	42	291	181	9	190	1,686
4	1400	900	27	927	93	185	1,205	176	70	246	49	49	345	181	10	191	1,741
5	1400	900	27	927	93	185	1,205	215	70	285	57	57	399	181	12	193	1,797
3	1500	1,000	30	1,030	103	206	1,339	146	75	221	44	44	309	201	9	210	1,859
4	1500	1,000	30	1,030	103	206	1,339	187	75	262	52	52	367	201	11	212	1,917
5	1500	1,000	30	1,030	103	206	1,339	228	75	303	61	61	424	201	13	214	1,976
3	1600	1,150	35	1,185	118	237	1,540	154	80	234	47	47	327	231	10	241	2,108
4	1600	1,150	35	1,185	118	237	1,540	197	80	277	55	55	388	231	12	243	2,170
5	1600	1,150	35	1,185	118	237	1,540	240	80	320	64	64	448	231	13	244	2,233

**EXPANSION AND REINFORCEMENT OF ZARQA WASTEWATER SYSTEMS
COST BREAKDOWN OF PUMPING STATIONS**

Table 4: Small / Medium PS Cost Break Down

**Contract Prices For Pump Stations In Karak Contracts
(Awarded in Year 2009)**

Contract		Contract II		Contract III	Contract IV	
		MAP	MZP	MUP	ADP	MDP
Pump Station						
Pumps	No.	3	2	3	2	2
	m3/h	119	102	299	118.8	227
	m	36	47	71	53	30
Total Pumping Capacity	m3/h	238	102	598	118.8	227
Civil Works	JD	200,850	108,528	180,265	113655	131,859
Electrical Works	JD	186,945	159,775	406,689	325010	251,010
Mechanical Works	JD	161,000	155,000	315,140	200000	215,000
Civil and Electromechanical Works	JD	548,795	423,303	902,094	638665	597,869
Emergency Storage Tank	JD	119,440	-	-	-	-
Generator Room	JD	19,725	20,805	18,157	18598	17,998
Gaurd House	JD	27,995	28,495	34,620	36009	36,209
Total Pump Station Cost (JD)		715,955	472,603	954,871	693272	652,076

ZARQA GOVERNORATE WASTEWATER SYSTEM REINFORCEMENT AND EXPANSION

WEST ZARQA PUMP STATION EXPANSION COST BREAKDOWN

No.	Item	Option 4a - Phase I				Option 4a - Phase II			Total Option 4a	
		Unit	Quantity	Unit Cost (JD)	Total Cost (JD)	Quantity	Unit Cost (JD)	Total Cost (JD)	Quantity	Total Cost (JD)
1	West Zarqa PS Expantion Cost Breakdown									
1.1	Inlet Works Building									
1.1.1	Civil Works	m2	1,000	500	500,000				1,000	500,000
1.1.2	Mechanical Works	LS			100,000					100,000
1.1.3	Electrical Work	LS			100,000					100,000
	Subtotal				700,000					700,000
1.2	Screening									
1.2.1	Civil Works	LS			100,000					100,000
1.2.2	Mechanical Works									
A	Mechanical Coarse Bar Screen	No.	2	70,000	140,000				2	140,000
B	Mechanical Fine Bar Screen	No.	2	80,000	160,000				2	160,000
C	Manual Coarse Bar Screen	No.	1	10,000	10,000				1	10,000
D	Manual Fine Bar Screen	No.	1	13,000	13,000				1	13,000
E	Belt Convayor	No.	1	20,000	20,000				1	20,000
F	Screw Convayor / Compactor	No.	1	50,000	50,000				1	50,000
G	Screening Containers	No.	4	3,000	12,000				4	12,000
1.2.3	Electrical Work	LS			50,000					50,000
	Subtotal				555,000					555,000
1.3	Grit Chamber									
1.3.1	Civil Works	LS			100,000					100,000
1.3.2	Mechanical Works									
A	Mixer	No.	2	40,000	80,000				2	80,000
B	Airlift Pump	No.	2	20,000	40,000				2	40,000
C	Sand Clasifier	No.	2	35,000	70,000				2	70,000
D	Sand Containers	No.	4	3,000	12,000				4	12,000
1.3.3	Electrical Work	LS			50,000					50,000
	Subtotal				352,000					352,000
1.4	Pump Station									
1.4.1	Civil Works	LS			600,000					600,000
1.4.2	Mechanical Works									
A	Pumps	No.	5	307,881	1,539,405	2	307,881	615,762	7	2,155,167
B	Valves	No.	5	20,000	100,000	2	20,000	40,000	7	140,000
C	Crane	No.	1	100,000	100,000	0	0	0	1	100,000
D	Flow meter	No.	1	20,000	20,000	0	0	0	1	20,000
E	Pipework	No.	5	20,000	100,000	2	20,000	40,000	7	140,000
F	Surge Control Valves	No.	1	20,000	20,000	0	0	0	1	20,000
	Subtotal PS Mech. Works				1,879,405			695,762		2,575,167
1.4.3	Electrical Work	LS			600,000			120,000		720,000
	Subtotal				3,079,405			815,762		3,895,167
1.5	Odor Control									
1.5.1	Civil Works	LS						100,000		100,000
1.5.2	Mechanical Works	LS						400,000		400,000
1.5.3	Electrical Work	LS						100,000		100,000
	Subtotal							600,000		600,000
1.6	Power Supply									
1.6.1	Civil Works				0			0		0
1.6.2	Mechanical Works				0			0		0
1.6.3	Electrical Work	LS			800,000			300,000		1,100,000
	Subtotal				800,000			300,000		1,100,000
1.7	Site Works									
1.7.1	Civil Works	LS			100,000			100,000		200,000
1.7.2	Mechanical Works	LS			100,000			100,000		200,000
1.7.3	Electrical Work	LS			100,000			100,000		200,000
	Subtotal				300,000			300,000		600,000
1.8	New Storage Lagoon									
1.8.1	Civil Works	LS			200,000			200,000		400,000
	Subtotal				200,000			200,000		400,000
	Total Expansion West Zarqa PS				5,986,405			2,215,762		8,202,167

ZARQA GOVERNORATE WASTEWATER SYSTEM REINFORCEMENT AND EXPANSION

EAST ZARQA PUMP STATION EXPANSION COST BREAKDOWN

No.	Item	Option 4a - Phase I				Option 4a - Phase II			Total Option 4a	
		Unit	Quantity	Unit Cost (JD)	Total Cost (JD)	Quantity	Unit Cost (JD)	Total Cost (JD)	Quantity	Total Cost (JD)
1	East Zarqa PS Expantion Cost Breakdown									
1.1	Inlet Works Building									
1.1.1	Civil Works	m2				1,000	500	500,000	1,000	500,000
1.1.2	Mechanical Works	LS						30,000		30,000
1.1.3	Electrical Work	LS						30,000		30,000
	Subtotal							560,000		560,000
1.2	Screening									
1.2.1	Civil Works	LS			100,000					100,000
1.2.2	Mechanical Works									
A	Mechanical Coarse Bar Screen	No.	2	50,000	100,000				2	100,000
B	Mechanical Fine Bar Screen	No.	2	70,000	140,000				2	140,000
C	Belt Convayor	No.	1	15,000	15,000				1	15,000
D	Screw Convayor / Compactor	No.	1	30,000	30,000				1	30,000
E	Screening Containers	No.	4	3,000	12,000				4	12,000
1.2.3	Electrical Work	LS			50,000					50,000
	Subtotal				447,000					447,000
1.3	Grit Chamber									
1.3.1	Civil Works	LS			100,000					100,000
1.3.2	Mechanical Works									
A	Mixer	No.	2	30,000	60,000				2	60,000
B	Airlift Pump	No.	2	15,000	30,000				2	30,000
C	Sand Clasifier	No.	2	25,000	50,000				2	50,000
D	Sand Containers	No.	4	3,000	12,000				4	12,000
1.3.3	Electrical Work	LS			50,000					50,000
	Subtotal				302,000					302,000
1.4	Pump Station									
1.4.1	Civil Works	LS			50,000					50,000
1.4.2	Mechanical Works									
A	Pumps	No.	4	50,000	200,000	1	200,000	250,000	5	450,000
B	Valves	No.	4	20,000	80,000	1	20,000	20,000	5	100,000
C	Crane	No.	1	50,000	50,000	0	0	0	1	50,000
D	Flow meter	No.	1	20,000	20,000	0	0	0	1	20,000
E	Pipework	No.	4	10,000	40,000	1	10,000	10,000	5	50,000
F	Surge Control Valves	No.	1	20,000	20,000	0	0	0	1	20,000
	Subtotal PS Mech. Works				410,000			280,000		690,000
1.4.3	Electrical Work	LS			200,000			100,000		300,000
	Subtotal				660,000			380,000		1,040,000
1.5	Odor Control									
1.5.1	Civil Works	LS						50,000		50,000
1.5.2	Mechanical Works	LS						300,000		300,000
1.5.3	Electrical Work	LS						50,000		50,000
	Subtotal							400,000		400,000
1.6	Power Supply									
1.6.1	Civil Works				0			0		0
1.6.2	Mechanical Works				0			0		0
1.6.3	Electrical Work	LS			500,000			300,000		800,000
	Subtotal				500,000			300,000		800,000
1.7	Site Works									
1.7.1	Civil Works	LS			100,000			50,000		150,000
1.7.2	Mechanical Works	LS			50,000			50,000		100,000
1.7.3	Electrical Work	LS			50,000			50,000		100,000
	Subtotal				200,000			150,000		350,000
1.8	New Emergeny Tank									
1.8.1	Civil Works	LS						200,000		200,000
	Subtotal							200,000		200,000
	Total Expansion West Zarqa PS				2,109,000			1,990,000		4,099,000

**EXPANSION AND REINFORCEMENT OF ZARQA WASTEWATER SYSTEMS
COST BREAKDOWN OF PACKAGED WWTPs**

Table 7: Pricing Details for Birein Local Wastewater Treatment Plant (600 m³/d)

No.	Description	Notes	Value (JD)
1	Balancing tank, lift station pumps (2d, 1s)		21,194
2	Coarse & fine screens, grit removal system & odour control		80,651
3	Selector / aeration tanks & Internals		168,890
4	Settling tanks, connections, pipework & internals (2 Nos.)		80,912
5	Air blowers & accessories		64,020
6	Chlorine contact tank & internals, chemical dosing system (1 Nos.)		15,838
7	Primary sludge pumps		9,510
8	Return sludge pumps		13,290
9	Sludge holding tank & internals (1 Nos.)		39,342
10	Sludge disposal pumps (1d, 1s)		10,580
11	Filter feed / backwash pumps(1d, 1s) & raw water tank		11,829
12	Motorized pressure dual filters (1d, 1s)		33,567
13	Additional Items (electrical, pipes & support & Lab. equipment)		26,963
14	Total material cost		576,586
15	Freight	5% of item 14	28,829
16	Local transportation & packing	3% of item 14	17,298
17	total material cost delivered		622,713
18	Engineering, training & services	1% of item 17	6,227
19	Erection & construction cost	15% of item 14	86,488
20	Total direct cost & associated services		715,428
21	General administration & overheads	10% of item 20	71,543
22	Contractor profit	20% of item 20	143,086
23	Total Capital Cost		930,056

**EXPANSION AND REINFORCEMENT OF ZARQA WASTEWATER SYSTEMS
COST BREAKDOWN OF PACKAGED WWTPs**

Table 8: Pricing Details for Sarout Local Wastewater Treatment Plant (400 m³/d)

No.	Description	Notes	Value (JD)
1	Balancing tank, lift station pumps (2d, 1s)		14,969
2	Coarse & fine screens, grit removal system & odour control		66,020
3	Selector / aeration tanks & Internals		114,063
4	Settling tanks, connections, pipework & internals (2 Nos.)		73,772
5	Air blowers & accessories		59,850
6	Chlorine contact tank & internals, chemical dosing system (1 Nos.)		8,618
7	Primary sludge pumps		8,200
8	Return sludge pumps		10,960
9	Sludge holding tank & internals (1 Nos.)		22,178
10	Sludge disposal pumps (1d, 1s)		8,240
11	Filter feed / backwash pumps(1d, 1s) & raw water tank		8,864
12	Motorized pressure dual filters (1d, 1s)		24,681
13	Additional Items (electrical, pipes & support & Lab. equipment)		23,963
14	Total material cost		444,378
15	Freight	5% of item 14	22,219
16	Local transportation & packing	3% of item 14	13,331
17	total material cost delivered		479,928
18	Engineering, training & services	1% of item 17	4,799
19	Erection & construction cost	15% of item 14	66,657
20	Total direct cost & associated services		551,384
21	General administration & overheads	10% of item 20	55,138
22	Contractor profit	20% of item 20	110,277
23	Total Capital Cost		716,800