参考資料－4　タフィーラ県及びマアン県対象地域の計画給水人口及び計画給水量

タフィーラ県対象地域の計画給水人口及び計画給水量

配水区	担当配水池	計画給水人口（人）				計画一日平均使用水量 (m3/日)				計画一日平均給水量 (m3/日)				計画一日最大給水量 (m3/日)				時間最大配水量 (m3/日) 日換算			
		2010	2015	2020	2025	2010	2015	2020	2025	2010	2015	2020	2025	2010	2015	2020	2025	2010	2015	2020	2025
Al Mansoura	Tafieleh 低区	4,199	4,577	4,978	5,351	470	573	622	669	628	674	732	787	943	1,012	1,099	1,182	1,886	2,024	2,197	2,364
Tafieleh 低区東		12,432	13,373	14,004	14,504	1,392	1,672	1,751	1,813	1,857	1,967	2,060	2,133	2,786	2,952	3,090	3,201	5,572	5,903	6,180	6,401
Tafieleh 低区西		5,859	6,363	6,917	7,429	656	795	865	928	875	936	1,018	1,092	1,313	1,405	1,527	1,639	2,627	2,810	3,054	3,278
	小計	22,490	24,313	25,899	27,284	2,519	3,040	3,238	3,411	3,359	3,577	3,809	4,013	5,043	5,369	5,716	6,022	10,085	10,737	11,432	12,043
Tafieleh 高区東	Tafieleh 高区	2,073	2,252	2,414	2,556	232	282	302	320	310	332	355	376	465	498	533	564	929	995	1,066	1,128
Tafieleh 高区西		1,464	1,599	1,739	1,868	164	200	217	234	219	235	256	275	329	354	384	413	658	707	768	825
	小計	3,537	3,851	4,153	4,424	396	482	519	553	528	567	611	651	794	851	917	977	1,587	1,702	1,834	1,953
Tafieleh 最高区	Ain-El Baidha	70	77	84	91	8	10	11	11	10	11	12	13	16	17	19	20	31	34	37	40
Sanfahah		3,450	3,762	4,089	4,394	387	471	511	549	516	554	601	646	775	833	903	971	1,551	1,666	1,805	1,941
Nemta		159	174	189	204	18	22	24	26	24	26	28	30	36	39	42	45	72	77	84	91
Ain-El Baidha		10,918	11,893	12,935	13,900	1,224	1,488	1,618	1,739	1,632	1,752	1,902	2,045	2,452	2,631	2,857	3,071	4,903	5,261	5,714	6,142
Ain-El Baidha-Bsaira 間		1,273	1,393	1,517	1,636	143	175	190	205	191	207	223	241	289	312	335	363	577	623	670	725
	小計	15,870	17,299	18,814	20,225	1,779	2,165	2,353	2,530	2,373	2,550	2,766	2,976	3,567	3,831	4,155	4,470	7,135	7,661	8,309	8,939
Bsaira	Bsaira	9,522	10,378	11,222	11,997	1,068	1,298	1,404	1,500	1,424	1,528	1,651	1,764	2,140	2,295	2,479	2,649	4,279	4,590	4,958	5,298
Gharandal	Gharandal	4,739	5,169	5,625	6,045	531	646	703	756	709	761	827	889	1,065	1,142	1,243	1,335	2,130	2,285	2,485	2,669
Qhadesiyeh	Qhadesiyeh	7,660	8,348	9,078	9,754	858	1,045	1,135	1,220	1,145	1,230	1,335	1,435	1,721	1,847	2,004	2,155	3,442	3,694	4,008	4,309
Erawath-Qhadesiyeh 間	Erawath ポンプ場	77	84	91	98	9	11	11	12	12	13	13	15	18	19	20	22	35	38	40	44
給水区域外		605	658	718	773	68	82	90	97	91	97	106	114	137	146	159	171	273	292	318	342
合計		64,500	70,100	75,600	80,600	7,228	8,769	9,455	10,080	9,640	10,322	11,118	11,856	14,483	15,500	16,692	17,799	28,966	30,999	33,384	35,598

マアン県対象地域の計画給水人口及び計画給水量

配水区	地域詳細	計画給水人口（人）				計画一日平均使用水量 (m3/日)				計画一日平均給水量 (m3/日)				計画一日最大給水量 (m3/日)				時間最大配水量 (m3/日) 日換算			
		2010	2015	2020	2025	2010	2015	2020	2025	2010	2015	2020	2025	2010	2015	2020	2025	2010	2015	2020	2025
Tahoonah																					
Tahoonah0dura 中部配水区	①0durah	2,073	2,332	2,586	2,840	423	467	491	511	603	622	634	639	906	937	952	959	1,813	1,873	1,905	1,919
	②市中部	1,742	1,955	2,164	2,373	356	391	411	427	508	521	531	534	762	782	797	802	1,524	1,565	1,594	1,603
Tahoonah 市北部中部配水区	③市中部	2,359	2,647	2,929	3,211	481	529	557	578	687	706	718	723	1,031	1,059	1,077	1,084	2,063	2,119	2,155	2,168
	④市北部	1,691	1,910	2,118	2,326	345	382	403	419	492	510	519	524	741	768	780	787	1,482	1,535	1,559	1,573
Tahoonah 旧市街配水区	⑤旧市街	12,001	12,951	13,851	14,652	2,448	2,590	2,632	2,637	3,497	3,051	3,100	3,105	5,247	4,578	4,651	4,658	10,494	9,156	9,302	9,316
Samneh																					
Samneh 南西配水区	⑧市西部	248	282	315	348	50	56	60	63	71	76	76	78	109	115	116	118	217	228	232	236
	⑥市中部	1,578	1,773	1,962	2,151	322	355	373	387	460	473	481	484	690	710	722	726	1,380	1,420	1,443	1,453
	⑩市南西部	4,036	4,528	5,014	5,500	823	906	953	990	1,176	1,207	1,230	1,238	1,766	1,812	1,846	1,858	3,532	3,624	3,692	3,717
Samneh 南東配水区	⑦旧市街	3,941	4,305	4,563	4,820	804	861	867	868	1,149	1,013	1,020	1,021	1,723	1,520	1,531	1,531	3,446	3,040	3,061	3,062
	⑨市南東部	3,131	3,517	3,898	4,279	638	703	741	770	911	938	956	963	1,370	1,410	1,436	1,447	2,739	2,820	2,871	2,893
合計		32,800	36,200	39,400	42,500	6,690	7,240	7,488	7,650	9,554	9,117	9,265	9,309	14,345	13,691	13,908	13,970	28,690	27,380	27,814	27,940
配水区別																					
Tahoonah 配水区																					
Tahoonah0dura 中部配水区		3,815	4,287	4,750	5,213	779	858	902	938	1,111	1,143	1,165	1,173	1,668	1,719	1,749	1,761	3,337	3,438	3,499	3,522
Tahoonah 市北部中部配水区		4,050	4,557	5,047	5,537	826	911	960	997	1,179	1,216	1,237	1,247	1,772	1,827	1,857	1,871	3,545	3,654	3,714	3,741
Tahoonah 旧市街配水区		12,001	12,951	13,851	14,652	2,448	2,590	2,632	2,637	3,497	3,051	3,100	3,105	5,247	4,578	4,651	4,658	10,494	9,156	9,302	9,316
小計		19,866	21,795	23,648	25,402	4,053	4,359	4,494	4,572	5,787	5,410	5,502	5,525	8,687	8,124	8,257	8,290	17,376	16,248	16,515	16,579
Samneh 配水区																					
Samneh 南西配水区		5,862	6,583	7,291	7,999	1,195	1,317	1,386	1,440	1,707	1,756	1,787	1,800	2,565	2,637	2,684	2,702	5,129	5,272	5,367	5,406
Samneh 南東配水区		7,072	7,822	8,461	9,099	1,442	1,564	1,608	1,638	2,060	1,951	1,976	1,984	3,093	2,930	2,967	2,978	6,185	5,860	5,932	5,955
小計		12,934	14,405	15,752	17,098	2,637	2,881	2,994	3,078	3,767	3,707	3,763	3,784	5,658	5,567	5,651	5,680	11,314	11,132	11,299	11,361
合計		32,800	36,200	39,400	42,500	6,690	7,240	7,488	7,650	9,554	9,117	9,265	9,309	14,345	13,691	13,908	13,970	28,690	27,380	27,814	27,940
地区別																					
0durah		2,073	2,332	2,586	2,840	423	467	491	511	603	622	634	639	906	937	952	959	1,813	1,873	1,905	1,919
市中部		5,679	6,375	7,055	7,735	1,159	1,275	1,341	1,392	1,655	1,700	1,730	1,741	2,483	2,551	2,596	2,612	4,967	5,104	5,192	5,224
市北部		1,691	1,910	2,118	2,326	345	382	403	419	492	510	519	524	741	768	780	787	1,482	1,535	1,559	1,573
旧市街		15,942	17,256	18,414	19,472	3,252	3,451	3,499	3,505	4,646	4,064	4,120	4,126	6,970	6,098	6,182	6,189	13,940	12,196	12,363	12,378
市西部		248	282	315	348	50	56	60	63	71	76	76	78	109	115	116	118	217	228	232	236
市南東部		3,131	3,517	3,898	4,279	638	703	741	770	911	938	956	963	1,370	1,410	1,436	1,447	2,739	2,820	2,871	2,893
市南西部		4,036	4,528	5,014	5,500	823	906	953	990	1,176	1,207	1,230	1,238	1,766	1,812	1,846	1,858	3,532	3,624	3,692	3,717
合計		32,800	36,200	39,400	42,500	6,690	7,240	7,488	7,650	9,554	9,117	9,265	9,309	14,345	13,691	13,908	13,970	28,690	27,380	27,814	27,940

参考資料－5　井戸の揚水試験結果

Well Pumping Test of Water Sources in Tafieleh Project Area

IDN	Station Name	Station Name	Duration (hr)	Yield (m^3/hr)	Static Water Level (m, bmp)	Pumping water Level (m, bmp)	Drawdown (m)	Specific Capacity (m^3/hr/m)	Yield (m3/day)
CF3015	Al Hasa 1	WADI RUWAK 1/HASA	24	115	46.9	47.43	0.53	216.98	2,300
CF3022	Al Hasa 2	WADI RUWAK 2 /HASA 6							2,664
CF3023	Al Hasa 3	WADI RUWAK 3 /HASA 5	48	143	47.65	47.8	0.15	953.33	2,860
CF3024	Al Hasa 4	WADI RUWAK 4 /HASA 7	48	130	68	68.35	0.35	371.43	2,600
CF3025	Al Hasa 5	WADI RUWEIHI/HASA	41	165	29.3	30.8	1.5	110	3,300
CF3014	Al Hasa 6	WADI ABU DHIBA/HASA	40	113	53.7	53.85	0.15	753.33	2,260
Subtotal				666					15,984

Source: WAJ HQ Groundwater Div.
Note: The data of well IDN CF3022 is not available and yield is estimated based on the average yield of other wells in the table.

Well Pumping Test of Water Sources in Ma'an Project Area

Station ID	Station Name	Duration (hr)	Yield (m^3/hr)	Static Water Level (m, bmp)	Pumping water Level (m, bmp)	Drawdown (m)	Specific Capacity (m^3/hr/m)	Yield (m3/day)
Tahoonah								
G 3186	TAHOUNEH NO 1A	89	50	73.4	76.7	3.3	15.2	1,000
G 1265	TAHOUNEH NO 2	24	98	55.2	57.05	1.85	52.97	1,960
G 3021	TAHOUNEH NO 3	24	139	29.87	47.6	17.73	7.84	2,780
G 3005	TAHOUNEH NO 4	40	66	9.7	47.9	38.2	1.73	1,320
G 3077	TAHOUNEH NO 5	43	70	64.85	77	12.15	5.76	1,400
G 3078	TAHOUNEH NO 6	48	65	64.52	75.32	10.8	6.02	1,300
G 3148	TAHOUNEH NO 7	100	22	93.55	110.6	17.05	1.29	440
G 3178	TAHOUNEH 8	28	65	85.4	92.88	7.48	8.7	1,300
G 3179	TAHOUNEH 9	41	64	83.75	95.8	12.05	5.3	1,280
G 3181	TAHOUNEH 10	44	100	46.8	51.2	4.4	22.7	2,000
G3246	TAHOUNEH 11		60	44		72.55		1,200
Subtotal								14,980
Samneh								
G 4086	SAMNEH 1	72	70	59	59.7	0.7	100	1,400
G 4096	SAMNEH 2	48	91	71.8	73.8	2	0	1,820
G 4099	SAMNEH 4	50	85	47.4	0	1.65	0	1,700
G 3206	SAMNEH 5	120	75	53.2	0	2.6	0	1,500
Sutotal								6,420
Total								20,200

Source: WAJ HQ Groundwater Div.

参考資料－6　タフィーラ県の送水システムの水理計算結果

NODE	Transmission pipeline			
ID	Elevation	Head	Demand	Pressure
	m	m	m3/d	m
Junc 24	1309.0	1314.5	2649.0	5.5
Junc 25	1265.0	1317.7	0.0	52.7
Junc 26	1296.0	1312.6	3512.0	16.6
Junc 30	1250.0	1345.4	0.0	95.4
Junc 31	1250.0	1334.6	0.0	84.6
Junc 32	1255.0	1341.8	0.0	86.8
Junc 33	1250.0	1332.4	0.0	82.4
Resvr 23	1353.0	1353.0	-6161.0	0.0

LINK	Transmission pipeline						
ID	Length	Diameter	Roughness	Flow	Velocity	Unit head loss	Status
	m	mm		m3/d	m/s	m/km	
Pipe 24	454.98	200	110	2649	0.98	7.07	Open
Pipe 25	359.08	200	100	3512	1.29	14.21	Open
Pipe 29	2890.2	300	110	4517.87	0.74	2.64	Open
Pipe 30	10136.07	200	100	1643.13	0.61	3.48	Open
Pipe 23	1360.35	300	110	4517.87	0.74	2.64	Open
Pipe 31	2733.47	300	110	4517.87	0.74	2.64	Open
Pipe 32	2297.16	250	110	4517.87	1.07	6.4	Open
Pipe 33	822.05	300	110	4517.87	0.74	2.64	Open

W A T E R　H A M M E R　A N A L Y S I S　　NO. P10011　　PAGE　1

Qhadesiyyeh

BASIC LEVEL　1292.000 m
DELTA T　.06252 sec

【 PIPELINE DATA 】

PIPELINE NO	LENGTH m	MATE-RIAL	DIA. mm	THICK-NESS mm	ELASTIC MODULUS (LONG.)	UPSTREAM NO.	PIPE	PUMP	SURGE	VALVE	END	FLOW RATE m3/m	LOSS PIPE-LINE	LOSS END VALVE	INTERVAL TIME sec	PIPELINE CONSTANT	DIVI-SION
001	4560.0	FCD3	200	10.0	2.100		1	0	0	0	0	0	1.500	45.000	.000	7.0025	35.2700	112
002	2440.0	FCD3	200	10.0	2.100	001	0	0	0	0	0	1	1.500	24.000	.000	3.7470	35.2700	60

【 PUMP DATA 】

NO	Q'TY	TYPE	TYPE OF VALVE CLOSING	V-NO	TOTAL HEAD m	FLOWRATE m3/m	MOTOR kw	MOTOR POLE	MOTOR TYPE	GD2 kg-m2	GD2 (WHEEL) kg-m2	SPEED min-1	EFF. %	START CONDITION k	START CONDITION HEAD m	START CONDITION FLOW RATE m3/m	START CONDITION SPEED	START CONDITION TORQUE
1	1	1	1	0	380.000	1.500	200.0	2	0	5.000	.000	2950	62	1.2589	380.000	1.500	1.000	1.000

【 PIPELINE ROUTE 】

001　002

【 PROFILE OF PIPELINE 】

NO	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m
001	.0	1290.00	2500.0	1475.90	2840.0	1477.90	4360.0	1566.20
	4560.0	1568.50	5020.0	1561.50	6320.0	1567.50	6400.0	1567.20
	6620.0	1565.50	6820.0	1572.00	7000.0	1582.50		

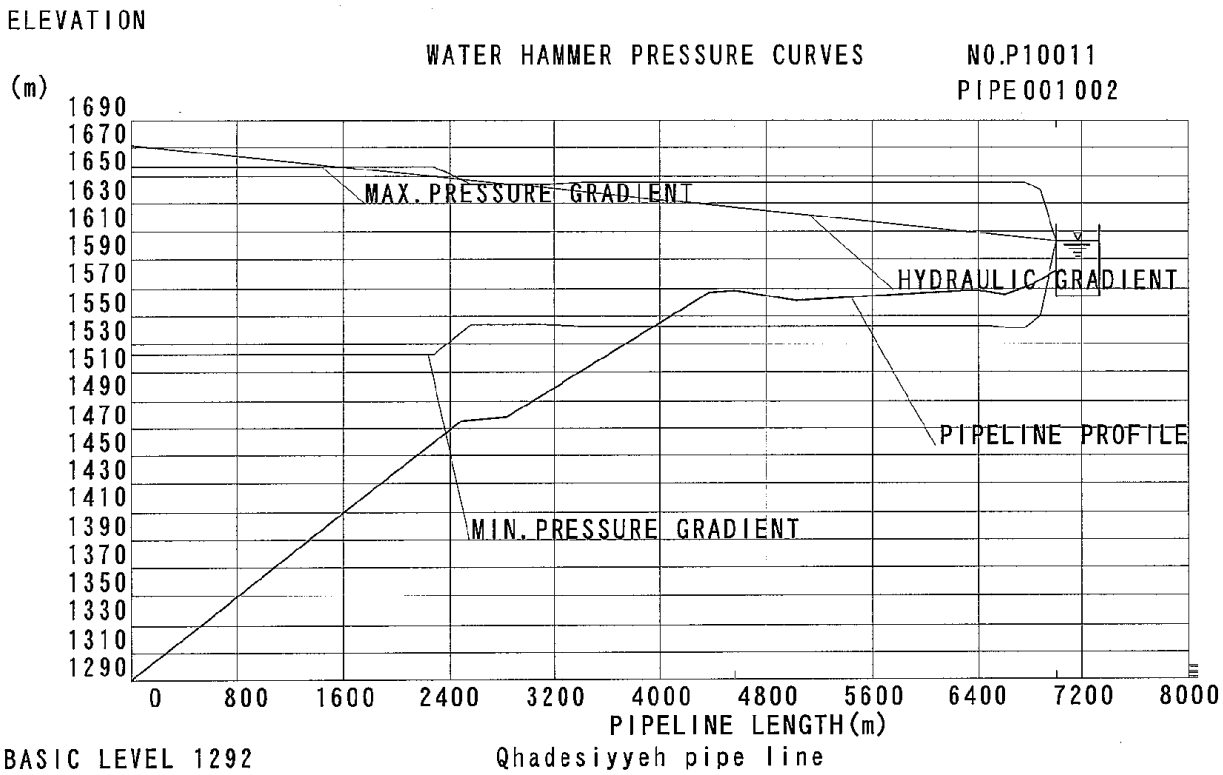
1. CALCULATION INTERVAL 4

3. PRESSURE OF PIPELINE

NO	LENGTH m	MAX TIME sec	MAX FLOW RATE m3/m	MAX HEAD m	MAX WATER LEVEL m	MIN TIME sec	MIN FLOW RATE m3/m	MIN HEAD m	MIN WATER LEVEL m
001	.0	21.008	.000	364.120	1656.120	7.253	.000	231.059	1523.059
001	285.0	20.789	.000	364.120	1656.120	7.471	.000	231.059	1523.059
001	570.0	20.570	.000	364.120	1656.120	7.690	.000	231.059	1523.059
001	855.0	20.351	.000	364.120	1656.120	7.909	.000	231.059	1523.059
001	1140.0	20.132	.000	364.120	1656.120	8.128	.000	231.059	1523.059
001	1425.0	19.913	.000	364.120	1656.120	8.347	.000	231.059	1523.059
001	1710.0	19.820	.002	364.001	1656.001	8.566	.000	231.059	1523.059
001	1995.0	19.976	.002	363.903	1655.903	8.784	.000	231.059	1523.059
001	2280.0	19.757	-.001	363.741	1655.741	9.003	.000	231.059	1523.059
001	2565.0	15.974	-.157	351.205	1643.205	5.283	.306	251.573	1543.573
001	2850.0	16.193	-.170	352.189	1644.189	5.064	.306	251.456	1543.457
001	3135.0	16.412	-.172	352.378	1644.378	4.845	.306	251.340	1543.340
001	3420.0	16.631	-.172	352.415	1644.415	4.627	.306	251.223	1543.223
001	3705.0	16.850	-.172	352.452	1644.453	4.408	.306	251.106	1543.106
001	3990.0	17.069	-.172	352.490	1644.490	4.189	.306	250.989	1542.989
001	4275.0	17.287	-.172	352.527	1644.527	3.970	.306	250.872	1542.872
002	.0	17.506	-.172	352.564	1644.564	3.751	.306	250.756	1542.755
002	122.0	17.600	-.172	352.580	1644.580	7.159	.306	250.706	1542.706
002	244.0	17.694	-.172	352.595	1644.595	7.065	.306	250.656	1542.656
002	366.0	17.725	-.172	352.611	1644.611	6.971	.306	250.606	1542.606
002	488.0	17.631	-.172	352.627	1644.627	6.877	.306	250.556	1542.556
002	610.0	17.537	-.172	352.643	1644.643	6.784	.306	250.506	1542.506
002	732.0	17.444	-.172	352.659	1644.659	6.690	.306	250.456	1542.456
002	854.0	17.350	-.172	352.674	1644.675	6.596	.306	250.407	1542.407
002	976.0	17.256	-.172	352.690	1644.690	6.502	.306	250.357	1542.357
002	1098.0	17.162	-.172	352.706	1644.706	6.409	.306	250.307	1542.307
002	1220.0	17.069	-.172	352.722	1644.722	6.315	.306	250.257	1542.257
002	1342.0	16.975	-.172	352.738	1644.738	6.221	.306	250.207	1542.207
002	1464.0	16.881	-.172	352.754	1644.754	6.127	.306	250.157	1542.157

3. PRESSURE OF PIPELINE

		MAX				MIN			
NO	LENGTH	TIME	FLOW RATE	HEAD	WATER LEVEL	TIME	FLOW RATE	HEAD	WATER LEVEL
	m	sec	m3/m	m	m	sec	m3/m	m	m
002	1586.0	16.787	-.172	352.769	1644.769	6.033	.306	250.107	1542.108
002	1708.0	16.693	-.172	352.785	1644.785	5.940	.306	250.058	1542.058
002	1830.0	16.600	-.172	352.801	1644.801	5.846	.306	250.008	1542.008
002	1952.0	16.506	-.172	352.817	1644.817	5.752	.306	249.958	1541.958
002	2074.0	16.412	-.172	352.825	1644.825	5.658	.306	249.908	1541.908
002	2196.0	16.318	-.172	352.839	1644.839	5.564	.306	249.858	1541.858
002	2318.0	16.224	-.261	346.979	1638.979	5.471	.439	258.180	1550.180


ELEVATION
WATER HAMMER PRESSURE CURVES
NO.P10011
PIPE001002
(m)
1690
1670
1650
1630
1610
1590
1570
1550
1530
1510
1490
1470
1450
1430
1410
1390
1370
1350
1330
1310
1290
MAX. PRESSURE GRADIENT
HYDRAULIC GRADIENT
PIPELINE PROFILE
MIN. PRESSURE GRADIENT
0
800
1600
2400
3200
4000
4800
5600
6400
7200
8000
PIPELINE LENGTH(m)
BASIC LEVEL 1292
Qhadesiyyeh pipe line

Qhadesiyyeh with air valves

BASIC LEVEL 1292.000 m
DELTA T .06438 sec

【 PIPELINE DATA 】

PIPELINE NO	LENGTH m	MATE-RIAL	DIA. mm	THICK-NESS mm	ELASTIC MODULUS (LONG.)	UPSTREAM PIPE NO.	CONDITION PUMP	SURGE	VALVE	END	FLOW RATE m3/m	LOSS PIPE-LINE	LOSS END VALVE	INTERVAL TIME sec	PIPELINE CONSTANT	DIVI-SION
001	4360.0	FCD3	200	10.0	2.100		1 0 0	0	0	0	1.500	43.000	.000	6.6954	35.2700	104
002	2640.0	FCD3	200	10.0	2.100	001	0 0 0	1	0	1	1.500	26.000	.000	4.0541	35.2700	64

【 PUMP DATA 】

NO	Q'TY	TYPE	TYPE OF VALVE CLOSING	V-NO	TOTAL HEAD m	FLOWRATE m3/m	-- MOTOR -- kw	POLE	TYPE	GD2 kg-m2	GD2 (WHEEL) kg-m2	SPEED min-1	EFF. %	START CONDITION HEAD m	START CONDITION FLOW RATE m3/m	START CONDITION SPEED	START CONDITION TORQUE
1	1	1	1	0	380.000	1.500	200.0	2	0	5.000	.000	2950	62	380.000	1.500	1.000	1.000

【 SURGE TANK DATA 】

NO	TYPE	V-NO	HEAD m	SECTION AREA m2	FRICTION LOSS m	Num. A/V	DIS-TANCE m	PIPE MATERIAL	DIA. mm	THIC-KNESS mm	ELASTIC MODULAS	INTERVAL TIME sec	PIPELINE CONSTANT	DIVI-SION	INITIAL AIR m3	LOSS m
1	6	0	276.200	999.990	.000	3	.0	0	0	.0	.000	.0000	.000	0	.0	.000

【 PIPELINE ROUTE 】

001 002

【 PROFILE OF PIPELINE 】

NO	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m
001	.0	1290.00	2500.0	1475.90	2840.0	1477.90	4360.0	1566.20
	4560.0	1568.50	5020.0	1561.50	6320.0	1567.50	6400.0	1567.20
	6620.0	1565.50	6820.0	1572.00	7000.0	1582.50		

1. CALCULATION INTERVAL 4

2. FLUCTUATION OF WATER LEVEL IN TANK

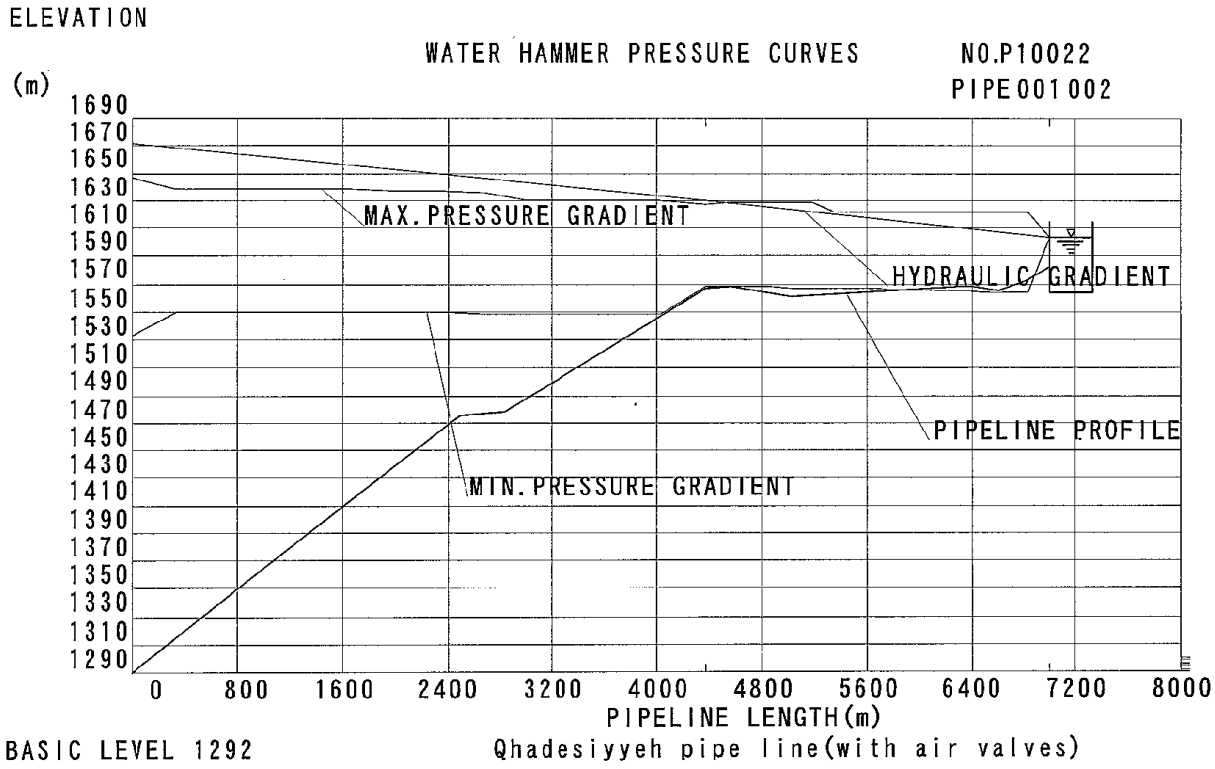
NO	MAX HEAD m	MAX WATER LEVEL m	MIN HEAD m	MIN WATER LEVEL m	FLUCTUATION W.LEVEL m	SECTION AREA m2	DISCHARGE FLOW m3
1	276.200	1568.200	276.200	1568.200	.000	999.9900	.000

3. PRESSURE OF PIPELINE

NO	LENGTH m	MAX TIME sec	MAX FLOW RATE m3/m	MAX HEAD m	MAX WATER LEVEL m	MIN TIME sec	MIN FLOW RATE m3/m	MIN HEAD m	MIN WATER LEVEL m
001	.0	17.640	.000	353.969	1645.969	6.824	.000	240.886	1532.886
001	335.4	17.382	-.110	346.218	1638.218	6.567	.236	257.456	1549.456
001	670.8	17.125	-.110	346.235	1638.235	6.309	.236	257.374	1549.374
001	1006.2	16.867	-.110	346.253	1638.253	6.052	.236	257.293	1549.292
001	1341.5	16.610	-.110	346.271	1638.271	5.794	.236	257.211	1549.211
001	1676.9	16.352	-.108	346.408	1638.408	5.537	.236	257.129	1549.129
001	2012.3	19.185	.130	344.656	1636.656	5.279	.236	257.047	1549.047
001	2347.7	19.442	.130	344.631	1636.631	5.022	.236	256.965	1548.965
001	2683.1	19.635	.103	342.683	1634.683	4.764	.236	256.883	1548.883
001	3018.5	17.382	.022	337.144	1629.144	4.506	.236	256.801	1548.801
001	3353.8	17.640	.020	337.244	1629.244	4.249	.236	256.719	1548.719
001	3689.2	17.897	.022	337.150	1629.150	3.991	.236	256.637	1548.637
001	4024.6	18.155	.022	337.150	1629.150	3.734	.236	256.555	1548.555
002	.0	20.923	.201	335.170	1627.170	3.605	.638	276.200	1568.200
002	165.0	21.116	.234	336.180	1628.180	7.339	.638	275.906	1567.906
002	330.0	21.245	.234	336.140	1628.140	7.210	.638	275.612	1567.612
002	495.0	21.374	.234	336.100	1628.100	7.082	.638	275.318	1567.318
002	660.0	21.502	.234	336.060	1628.060	6.953	.638	275.024	1567.024
002	825.0	21.631	.234	336.021	1628.021	6.824	.638	274.730	1566.730
002	990.0	20.151	.121	329.496	1621.496	6.695	.638	274.436	1566.436
002	1155.0	20.022	.121	329.485	1621.485	6.567	.638	274.142	1566.142
002	1320.0	19.893	.121	329.474	1621.474	6.438	.638	273.848	1565.848
002	1485.0	19.764	.121	329.464	1621.464	6.309	.638	273.553	1565.553

3. PRESSURE OF PIPELINE

		MAX				MIN			
NO	LENGTH	TIME	FLOW RATE	HEAD	WATER LEVEL	TIME	FLOW RATE	HEAD	WATER LEVEL
	m	sec	m3/m	m	m	sec	m3/m	m	m
002	1650.0	19.764	.126	329.121	1621.121	6.180	.638	273.259	1565.260
002	1815.0	19.829	.133	328.964	1620.964	6.052	.638	272.965	1564.965
002	1980.0	19.957	.133	328.950	1620.950	5.923	.638	272.671	1564.671
002	2145.0	20.086	.133	328.937	1620.937	5.794	.638	272.377	1564.377
002	2310.0	20.215	.133	328.924	1620.925	5.665	.638	272.083	1564.083
002	2475.0	20.344	.133	328.912	1620.912	5.537	.638	271.789	1563.789


ELEVATION
WATER HAMMER PRESSURE CURVES
NO.P10022
PIPE001002
(m)
1690
1670
1650
1630
1610
1590
1570
1550
1530
1510
1490
1470
1450
1430
1410
1390
1370
1350
1330
1310
1290
MAX. PRESSURE GRADIENT
HYDRAULIC GRADIENT
PIPELINE PROFILE
MIN. PRESSURE GRADIENT
0
800
1600
2400
3200
4000
4800
5600
6400
7200
8000
PIPELINE LENGTH(m)
BASIC LEVEL 1292
Qhadesiyyeh pipe line(with air valves)

W A T E R H A M M E R A N A L Y S I S NO. P1003 PAGE 1

Gharandal(without flywheel)

BASIC LEVEL 1292.000 m
DELTA T .09076 sec

【 PIPELINE DATA 】

PIPELINE NO	LENGTH m	MATE-RIAL	DIA. mm	THICK-NESS mm	ELASTIC MODULUS (LONG.)	UPSTREAM PIPE NO.	CONDITION PUMP	SURGE	VALVE	END	FLOW RATE m3/m	LOSS PIPE-LINE	LOSS END VALVE	INTERVAL TIME sec	PIPELINE CONSTANT	DIVI-SION
001	3710.0	FCD3	150	6.0	1.600		1 0	0	0	1	.950	48.000	.000	5.9902	59.6353	66

【 PUMP DATA 】

NO	Q'TY	TYPE	TYPE OF VALVE CLOSING	V-NO	TOTAL HEAD m	FLOWRATE m3/m	MOTOR kw	POLE	TYPE	GD2 kg-m2	GD2 (WHEEL) kg-m2	SPEED min-1	EFF. %	START CONDITION k	HEAD m	FLOW RATE m3/m	SPEED	TORQUE
1	1	1	1	0	230.000	.950	80.0	2	0	3.000	.000	2950	56	.8905	230.000	.950	1.000	1.000

【 PIPELINE ROUTE 】

001

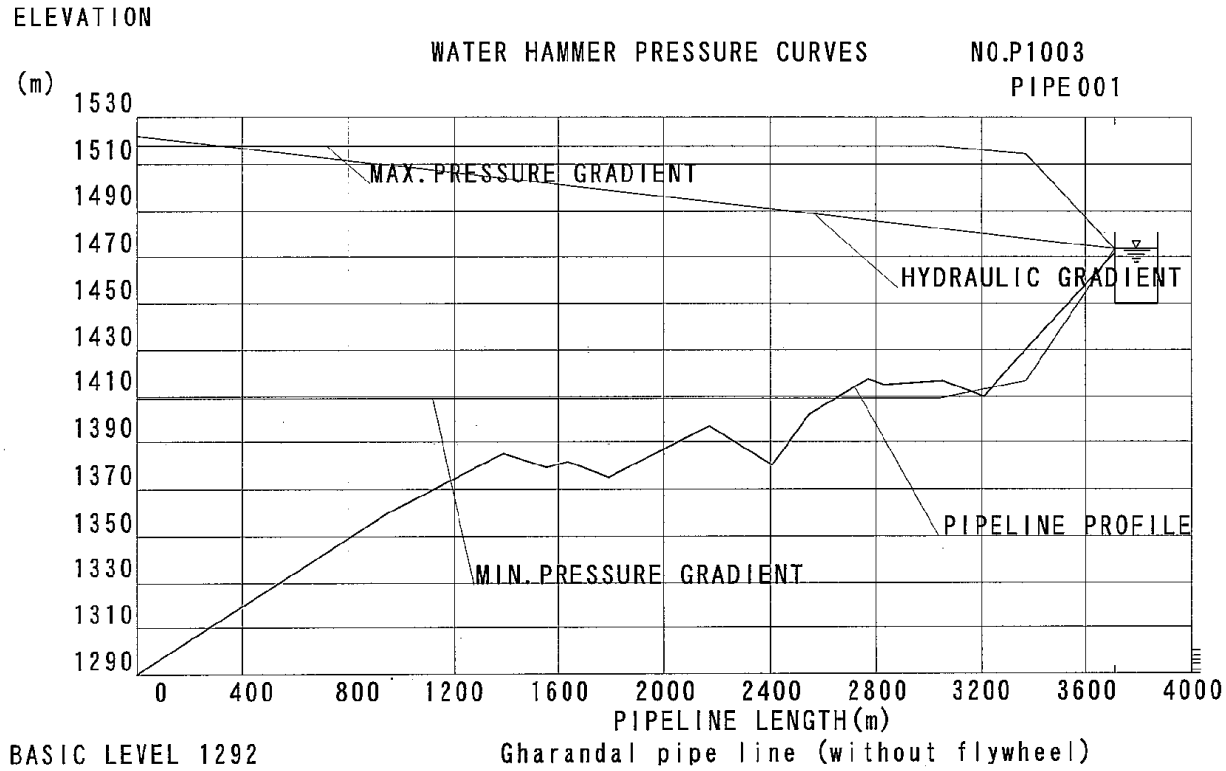
【 PROFILE OF PIPELINE 】

NO	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m
001	.0	1290.00	950.0	1360.00	1390.0	1385.00	1550.0	1379.00
	1630.0	1382.00	1790.0	1375.00	2170.0	1397.30	2410.0	1380.40
	2550.0	1402.40	2770.0	1417.30	2830.0	1415.00	3050.0	1416.00
	3210.0	1410.00	3710.0	1472.00				

1. CALCULATION INTERVAL 4

3. PRESSURE OF PIPELINE

		MAX				MIN			
NO	LENGTH m	TIME sec	FLOW RATE m3/m	HEAD m	WATER LEVEL m	TIME sec	FLOW RATE m3/m	HEAD m	WATER LEVEL m
001	.0	11.980	.000	225.269	1517.269	.726	.000	116.693	1408.693
001	337.3	11.708	.000	225.269	1517.269	5.718	.000	116.693	1408.693
001	674.5	11.436	.000	225.269	1517.269	5.446	.000	116.693	1408.693
001	1011.8	11.164	.000	225.269	1517.269	5.173	.000	116.693	1408.693
001	1349.1	10.891	.000	225.269	1517.269	4.901	.000	116.693	1408.693
001	1686.4	10.619	.000	225.269	1517.269	4.629	.000	116.693	1408.693
001	2023.6	10.347	.000	225.269	1517.269	4.357	.000	116.693	1408.693
001	2360.9	10.074	.000	225.269	1517.269	4.084	.000	116.693	1408.693
001	2698.2	9.802	.000	225.269	1517.269	3.812	.000	116.693	1408.693
001	3035.5	9.530	.000	225.269	1517.269	3.540	.000	116.693	1408.693
001	3372.7	9.348	.005	221.987	1513.987	3.358	-.012	124.093	1416.093


ELEVATION
WATER HAMMER PRESSURE CURVES
NO.P1003
PIPE001
(m)
1530
1510
1490
1470
1450
1430
1410
1390
1370
1350
1330
1310
1290
MAX. PRESSURE GRADIENT
HYDRAULIC GRADIENT
PIPELINE PROFILE
MIN. PRESSURE GRADIENT
0
400
800
1200
1600
2000
2400
2800
3200
3600
4000
PIPELINE LENGTH(m)
BASIC LEVEL 1292
Gharandal pipe line (without flywheel)

W A T E R H A M M E R A N A L Y S I S NO. P1004 PAGE 1

Gharandal (with flywheel)

BASIC LEVEL 1292.000 m
DELTA T .29951 sec

【 PIPELINE DATA 】

PIPELINE NO	LENGTH m	MATE-RIAL	DIA. mm	THICK-NESS mm	ELASTIC MODULUS (LONG.)	UPSTREAM PIPE NO.	CONDITION - PUMP	SURGE	VALVE	END	FLOW RATE m3/m	LOSS PIPE-LINE	LOSS END VALVE	INTERVAL TIME sec	PIPELINE CONSTANT	DIVI-SION
001	3710.0	FCD3	150	6.0	1.600		1	0	0	0	1	.950	48.000	.000	5.9902	59.6353	20

【 PUMP DATA 】

NO	Q'TY	TYPE	TYPE OF VALVE CLOSING	V-NO	TOTAL HEAD m	FLOWRATE m3/m	-- MOTOR -- kw	POLE	TYPE	GD2 kg-m2	GD2 (WHEEL) kg-m2	SPEED min-1	EFF. %	START CONDITION k	HEAD m	FLOW RATE m3/m	SPEED	TORQUE
1	1	1	1	0	230.000	.950	80.0	2	0	3.000	7.000	2950	56	.2671	230.000	.950	1.000	1.000

【 PIPELINE ROUTE 】

001

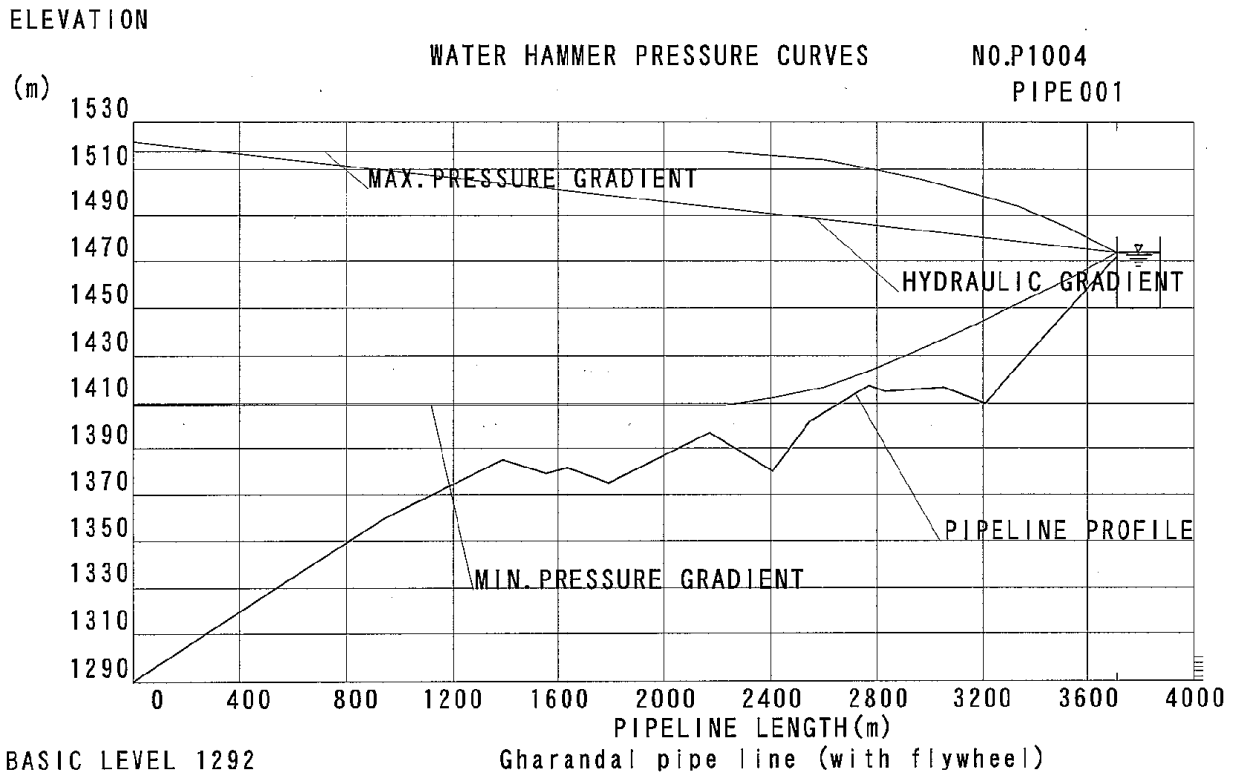
【 PROFILE OF PIPELINE 】

NO	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m	LENGTH m	LEVEL m
001	.0	1290.00	950.0	1360.00	1390.0	1385.00	1550.0	1379.00
	1630.0	1382.00	1790.0	1375.00	2170.0	1397.30	2410.0	1380.40
	2550.0	1402.40	2770.0	1417.30	2830.0	1415.00	3050.0	1416.00
	3210.0	1410.00	3710.0	1472.00				

1. CALCULATION INTERVAL 4

3. PRESSURE OF PIPELINE

NO	LENGTH m	MAX TIME sec	MAX FLOW RATE m3/m	MAX HEAD m	MAX WATER LEVEL m	MIN TIME sec	MIN FLOW RATE m3/m	MIN HEAD m	MIN WATER LEVEL m
001	.0	11.980	.000	225.269	1517.269	2.396	.000	116.693	1408.693
001	185.5	11.831	.000	225.269	1517.269	5.840	.000	116.693	1408.693
001	371.0	11.681	.000	225.269	1517.269	5.691	.000	116.693	1408.693
001	556.5	11.531	.000	225.269	1517.269	5.541	.000	116.693	1408.693
001	742.0	11.381	.000	225.269	1517.269	5.391	.000	116.693	1408.693
001	927.5	11.232	.000	225.269	1517.269	5.241	.000	116.693	1408.693
001	1113.0	11.082	.000	225.269	1517.269	5.092	.000	116.693	1408.693
001	1298.5	10.932	.000	225.269	1517.269	4.942	.000	116.693	1408.693
001	1484.0	10.782	.000	225.269	1517.269	4.792	.000	116.693	1408.693
001	1669.5	10.633	.000	225.269	1517.269	4.642	.000	116.693	1408.693
001	1855.0	10.483	.000	225.269	1517.269	4.493	.000	116.693	1408.693
001	2040.5	10.333	.000	225.269	1517.269	4.343	.000	116.693	1408.693
001	2226.0	10.183	.000	225.269	1517.269	4.193	.000	116.693	1408.693
001	2411.5	10.034	-.013	223.717	1515.717	4.043	.030	120.188	1412.188
001	2597.0	10.183	.003	221.782	1513.781	4.193	-.007	124.540	1416.540
001	2782.5	10.034	-.030	217.860	1509.860	4.043	.058	132.157	1424.157
001	2968.0	10.183	.003	213.839	1505.839	4.193	-.006	139.954	1431.954
001	3153.5	10.034	-.048	207.828	1499.828	4.043	.075	149.298	1441.298
001	3339.0	10.183	.005	201.409	1493.408	4.193	-.007	159.269	1451.269
001	3524.5	10.034	-.075	192.159	1484.159	4.043	.088	170.181	1462.181


ELEVATION
WATER HAMMER PRESSURE CURVES
NO.P1004
PIPE001
(m)
1530
1510
1490
1470
1450
1430
1410
1390
1370
1350
1330
1310
1290
MAX. PRESSURE GRADIENT
HYDRAULIC GRADIENT
PIPELINE PROFILE
MIN. PRESSURE GRADIENT
0
400
800
1200
1600
2000
2400
2800
3200
3600
4000
PIPELINE LENGTH(m)
BASIC LEVEL 1292
Gharandal pipe line (with flywheel)

ウオータハンマ防止装置

1 Parmakianの簡易計算図表より検証をした。

電算機により以下の図の作成をした。

- 配管縦断及び動水勾配線の作成
- 最低圧力勾配線の作成
- 概略再最高圧力勾配線図の作成
- 上記の図表より負圧地点をチェックする
- 電動機の出力からポンプの慣性時係数の算出
- フライホイールの大きさの算定をする

以上添付図の電算機による表計算結果を参照

2 フライホイールの大きさ決定

フライホイールの外径、D_2は以下の式よりもとめる。

$V=(\Pi \times D_2 \times N)/60$

ここに、

V:周速（m/sec.）60m/secとする

N:回転速度（min-1）2950m^{-1}(ポンプ回転数)

$60=(3.14 \times D_2 \times 2950)/60$

$D_2=$ 0.39 m

フライホイールの自重W(kgf)は以下の式から求める

$GD_2=(W \times (D_1^2+D_2^2))/2$

ここに、

GD_2:7kgf・m^2（表解析から電算機の簡易計算により求められたフライホイールの慣性効果)

D_1:フライホイールの内径（m）0.05とする

W:フライホイールの自重（ｋｇｆ）

$7=W \times 0.08125$

W= 86.15 kgf

フライホイールの厚さBは以下の式より求める

$W=\Pi \times (D_2^2-D_1^2) \times BXG$

ここに、

W:フライホイールの自重86.15（ｋｇｆ）

D1:フライホイールの内径（m）0.05とする

Π:円周率3.14

G:単位退席当たりの重量＝７８００ｋｇｆ/m^3

$86.15=(3.14 \times 0.1575 \times 7800 \times B)/4$

B= 0.089 m

以上の数値よりフライホイールの外形はおよそ40cm直径、厚さ10ｃｍとなる。

参考資料－8　タフィーラ県の配水システムの水理計算結果

1）タフィーラ市

NODE　Tafieleh city

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 1	1000.0	1071.2	14.1	71.2
Junc 2	970.0	1071.2	21.0	101.2
Junc 3	960.0	1071.2	29.4	111.2
Junc 4	945.0	1071.3	36.4	126.3
Junc 5	940.0	1071.4	60.4	131.4
Junc 6	935.0	1071.5	35.2	136.5
Junc 7	930.0	1071.8	38.4	141.8
Junc 8	930.0	1072.2	18.1	142.2
Junc 9	940.0	1072.6	13.5	132.6
Junc 10	950.0	1073.2	20.2	123.2
Junc 11	970.0	1073.9	20.7	103.9
Junc 12	980.0	1074.8	20.7	94.8
Junc 13	995.0	1075.7	54.8	80.7
Junc 14	1000.0	1084.8	22.9	84.8
Junc 15	1000.0	1077.5	22.9	77.5
Junc 16	1005.0	1078.6	22.9	73.6
Junc 17	1015.0	1081.6	22.5	66.6
Junc 18	1020.0	1082.4	22.5	62.4
Junc 19	1020.0	1084.3	22.5	64.3
Junc 20	1010.0	1087.9	29.1	77.9
Junc 21	1005.0	1089.7	29.1	84.7
Junc 22	1005.0	1091.7	29.1	86.7
Junc 23	1000.0	1091.8	29.1	91.8
Junc 24	995.0	1091.9	34.5	96.9
Junc 25	990.0	1092.5	5.4	102.5
Junc 26	1010.0	1090.5	29.1	80.5
Junc 27	1025.0	1089.4	29.1	64.4
Junc 28	1025.0	1088.4	27.1	63.4
Junc 29	1020.0	1087.9	22.5	67.9
Junc 30	1010.0	1086.7	10.8	76.7
Junc 31	1005.0	1085.7	22.9	80.7
Junc 32	1000.0	1082.7	51.1	82.7
Junc 33	1000.0	1084.4	54.8	84.4
Junc 34	990.0	1084.1	51.8	94.1
Junc 35	985.0	1083.8	20.7	98.8
Junc 36	975.0	1083.5	57.3	108.5
Junc 37	975.0	1083.4	20.7	108.4
Junc 38	960.0	1083.2	20.2	123.2
Junc 39	955.0	1083.2	20.2	128.2
Junc 40	950.0	1083.1	20.2	133.1
Junc 41	940.0	1083.0	13.5	143.0
Junc 42	930.0	1082.9	13.5	152.9
Junc 43	930.0	1082.9	13.5	152.9
Junc 44	930.0	1082.8	35.2	152.8
Junc 45	940.0	1082.7	35.2	142.7
Junc 46	940.0	1082.6	31.8	142.6
Junc 47	945.0	1082.6	31.8	137.6
Junc 48	950.0	1082.6	56.4	132.6
Junc 49	960.0	1082.6	29.4	122.6
Junc 50	965.0	1082.5	80.0	117.5
Junc 51	990.0	1082.5	15.4	92.5
Junc 52	1000.0	1082.5	6.9	82.5
Junc 53	995.0	1082.6	40.4	87.6
Junc 54	985.0	1083.3	20.7	98.3
Junc 55	1010.0	1082.2	40.4	72.2
Junc 56	990.0	1082.7	20.7	92.7
Junc 57	1010.0	1076.8	51.8	66.8
Junc 58	1020.0	1073.5	51.8	53.5
Junc 59	1030.0	1071.9	40.4	41.9
Junc 60	1055.0	1071.3	40.4	16.3
Junc 61	1000.0	1077.2	22.9	77.2
Junc 62	980.0	1074.6	22.9	94.6
Junc 63	980.0	1074.0	80.3	94.0
Junc 64	985.0	1074.0	58.9	89.0
Junc 65	1000.0	1075.6	56.7	75.6
Junc 66	995.0	1078.7	56.7	83.7
Junc 67	1005.0	1082.3	29.1	77.3
Junc 68	1015.0	1077.0	22.5	62.0
Junc 69	1020.0	1082.8	22.5	62.8
Junc 70	1015.0	1082.8	22.5	67.8
Junc 71	1015.0	1082.8	58.9	67.8
Junc 72	1010.0	1083.7	29.1	73.7
Junc 73	990.0	1092.5	5.4	102.5
Junc 74	1015.0	1090.7	5.4	75.7
Junc 75	1025.0	1089.7	5.4	64.7
Junc 76	1030.0	1066.6	33.8	36.6
Junc 77	1050.0	1086.1	18.8	36.1
Junc 78	1035.0	1070.6	35.8	35.6
Junc 79	1000.0	1092.7	34.5	92.7
Junc 80	1005.0	1093.0	34.5	88.0

LINK　Tafieleh city

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 1	270.78	150	100	−6.9	0	0	Open
Pipe 2	749.24	150	100	−22.3	0.01	0	Open
Pipe 3	74.54	150	100	−102.3	0.07	0.08	Open
Pipe 4	124.05	150	100	−131.7	0.09	0.13	Open
Pipe 5	76.59	150	100	−188.1	0.12	0.26	Open
Pipe 6	138.83	150	100	−219.9	0.14	0.34	Open
Pipe 7	127.86	150	100	−251.7	0.16	0.44	Open
Pipe 8	201.47	150	100	−286.9	0.19	0.56	Open
Pipe 9	123.42	150	100	−322.1	0.21	0.69	Open
Pipe 11	50.19	150	100	−335.6	0.22	0.75	Open
Pipe 12	115.62	150	100	−349.1	0.23	0.8	Open
Pipe 13	79.22	150	100	−362.6	0.24	0.86	Open
Pipe 14	69.69	150	100	−382.8	0.25	0.95	Open
Pipe 15	54.71	150	100	−443.4	0.29	1.25	Open
Pipe 16	128.38	150	100	−463.6	0.3	1.36	Open
Pipe 17	41.13	150	100	−505	0.33	1.59	Open
Pipe 18	154.67	150	100	−623.4	0.41	2.35	Open
Pipe 19	118.16	150	100	−644.1	0.42	2.49	Open
Pipe 20	110.94	150	100	−695.9	0.46	2.88	Open
Pipe 21	116.93	150	100	−750.7	0.49	3.31	Open
Pipe 22	148.56	150	100	−1009.1	0.66	5.73	Open
Pipe 23	168.23	150	100	−1032	0.68	5.97	Open
Pipe 24	197	150	100	−1042.8	0.68	6.09	Open
Pipe 25	77.86	150	100	−1065.3	0.7	6.33	Open
Pipe 26	150.35	150	100	−1092.4	0.72	6.64	Open
Pipe 27	166.18	150	100	−1121.5	0.73	6.97	Open
Pipe 29	169.78	150	100	−1150.6	0.75	7.31	Open
Pipe 30	870.42	100	100	−14.1	0.02	0.02	Open
Pipe 31	182.12	100	100	−35.1	0.05	0.08	Open
Pipe 32	232.45	100	100	−64.5	0.1	0.25	Open
Pipe 33	263.44	100	100	−100.9	0.15	0.58	Open
Pipe 34	78.84	100	100	−161.3	0.24	1.38	Open
Pipe 35	137.81	100	100	−196.5	0.29	1.99	Open
Pipe 36	124.08	100	100	−234.9	0.35	2.78	Open
Pipe 37	147.67	100	100	−253	0.37	3.19	Open
Pipe 38	154.79	100	100	−266.5	0.39	3.51	Open
Pipe 39	182	100	100	−286.7	0.42	4.02	Open
Pipe 40	192.7	100	100	−307.4	0.45	4.57	Open
Pipe 41	183.99	100	100	−328.1	0.48	5.16	Open
Pipe 42	261.76	100	100	−382.9	0.56	6.86	Open
Pipe 43	145.36	100	100	−405.8	0.6	7.64	Open
Pipe 44	205.86	100	100	−571.89	0.84	14.43	Open
Pipe 45	67.17	100	100	−513.94	0.76	11.84	Open
Pipe 46	145.67	100	100	−536.44	0.79	12.81	Open
Pipe 47	207.23	100	100	−631.61	0.93	17.34	Open
Pipe 48	69.57	100	100	−801.49	1.18	26.95	Open
Pipe 49	45.99	100	100	−1037.4	1.53	43.46	Open
Pipe 50	116.44	50	100	206.81	1.22	64.18	Open
Pipe 51	73.21	50	100	177.71	1.05	48.46	Open
Pipe 52	131.55	50	100	121.01	0.71	23.79	Open
Pipe 53	216.73	50	100	64.31	0.38	7.38	Open
Pipe 54	119.48	50	100	5.41	0.03	0.08	Open
Pipe 55	60.87	50	100	−74.89	0.44	9.78	Open
Pipe 56	165.95	50	100	−97.79	0.58	16.03	Open
Pipe 57	43.19	50	100	−143.19	0.84	32.48	Open
Pipe 58	201.86	50	100	22.5	0.13	1.05	Open
Pipe 61	74.17	50	100	19.8	0.12	0.83	Open
Pipe 62	126.17	50	100	−2.7	0.02	0.02	Open
Pipe 63	140.11	50	100	−61.6	0.36	6.81	Open
Pipe 64	130.94	50	100	−140.77	0.83	31.48	Open
Pipe 65	192.93	50	100	50.07	0.3	4.64	Open
Pipe 66	153.9	50	100	−72.68	0.43	9.25	Open
Pipe 10	110.88	50	100	−80.45	0.47	11.17	Open
Pipe 28	113.37	50	100	184.4	1.09	51.89	Open
Pipe 59	119.66	50	100	132.6	0.78	28.18	Open
Pipe 60	141.39	50	100	80.8	0.48	11.26	Open
Pipe 67	108.51	50	100	61.1	0.36	6.71	Open
Pipe 68	180.68	50	100	40.4	0.24	3.12	Open
Pipe 69	110.06	50	100	20.7	0.12	0.9	Open
Pipe 70	178.46	50	100	40.4	0.24	3.12	Open
Pipe 71	172.25	50	100	40.4	0.24	3.12	Open
Pipe 72	191.99	25	110	18.8	0.44	18.55	Open
Pipe 73	91.04	25	110	69.6	1.64	209.46	Open
Pipe 74	72.66	25	110	33.8	0.8	54.97	Open
Pipe 75	56.24	250	100	−1066.5	0.25	0.53	Open
Pipe 76	77.94	250	100	−2246.2	0.53	2.09	Open
Pipe 78	10.6	250	110	−2286.1	0.54	1.82	Open
Pipe 79	114.65	250	110	−2390.7	0.56	1.97	Open
Pipe 80	84.65	250	110	−2467.2	0.58	2.09	Open
Pipe 81	83.99	250	110	−2557.2	0.6	2.23	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 81	1015.0	1093.1	25.1	78.1
Junc 82	1015.0	1093.3	25.1	78.3
Junc 83	1020.0	1093.5	29.2	73.5
Junc 84	1025.0	1093.7	29.2	68.7
Junc 85	1025.0	1094.0	31.4	69.0
Junc 86	1030.0	1094.3	31.4	64.3
Junc 87	1040.0	1094.8	31.4	54.8
Junc 88	1040.0	1094.9	31.4	54.9
Junc 89	1040.0	1095.0	31.4	55.0
Junc 90	1040.0	1094.3	31.4	54.3
Junc 91	1040.0	1093.3	25.7	53.3
Junc 92	1040.0	1092.5	25.7	52.5
Junc 93	1035.0	1092.0	35.3	57.0
Junc 94	1035.0	1091.7	35.3	56.7
Junc 95	1035.0	1091.5	36.2	56.5
Junc 96	1035.0	1091.4	36.2	56.4
Junc 97	1040.0	1091.2	36.2	51.2
Junc 98	1035.0	1091.1	34.5	56.1
Junc 99	1035.0	1091.1	34.5	56.1
Junc 100	1040.0	1091.4	31.7	51.4
Junc 101	1045.0	1091.7	31.7	46.7
Junc 102	1050.0	1092.1	40.2	42.1
Junc 103	1050.0	1092.0	40.2	42.0
Junc 104	1050.0	1091.1	40.2	41.1
Junc 105	1050.0	1090.6	40.2	40.6
Junc 106	1045.0	1090.1	40.2	45.1
Junc 107	1045.0	1089.5	25.2	44.5
Junc 108	1050.0	1089.0	25.2	39.0
Junc 109	1045.0	1088.4	21.9	43.4
Junc 110	1045.0	1087.9	21.9	42.9
Junc 111	1035.0	1087.2	21.9	52.2
Junc 112	1040.0	1086.9	41.9	46.9
Junc 113	1040.0	1086.3	229.6	46.3
Junc 114	1035.0	1085.9	18.4	50.9
Junc 115	1040.0	1085.6	21.0	45.6
Junc 116	1045.0	1085.3	21.0	40.3
Junc 117	1045.0	1085.2	21.0	40.2
Junc 118	1045.0	1085.0	21.0	40.0
Junc 119	1040.0	1084.7	24.1	44.7
Junc 120	1035.0	1084.5	24.1	49.5
Junc 121	1030.0	1084.4	24.1	54.4
Junc 122	1030.0	1084.2	16.3	54.2
Junc 123	1030.0	1084.1	16.3	54.1
Junc 124	1030.0	1084.0	16.3	54.0
Junc 125	1030.0	1083.6	26.5	53.6
Junc 126	1030.0	1082.6	34.0	52.6
Junc 127	1032.0	1081.6	20.7	49.6
Junc 128	1035.0	1081.2	20.7	46.2
Junc 129	1030.0	1081.1	20.7	51.1
Junc 130	1030.0	1081.0	18.6	51.0
Junc 131	1030.0	1080.8	18.6	50.8
Junc 132	1025.0	1080.8	12.9	55.8
Junc 133	1025.0	1080.7	10.8	55.7
Junc 134	1030.0	1080.7	17.7	50.7
Junc 135	1030.0	1080.7	17.7	50.7
Junc 136	1035.0	1080.4	24.6	45.4
Junc 137	1002.0	1042.0	34.5	40.0
Junc 138	995.0	1044.8	25.1	49.8
Junc 139	995.0	1044.7	31.8	49.7
Junc 140	995.0	1044.6	31.8	49.6
Junc 141	985.0	1044.6	16.9	59.6
Junc 142	980.0	1044.4	16.9	64.4
Junc 143	968.0	1036.4	24.1	68.4
Junc 144	975.0	1041.4	18.0	66.4
Junc 145	995.0	1045.8	24.8	50.8
Junc 146	1000.0	1055.5	24.8	55.5
Junc 147	1005.0	1056.4	67.1	51.4
Junc 148	1005.0	1060.6	33.7	55.6
Junc 149	1010.0	1062.3	33.7	52.3
Junc 150	1015.0	1065.6	33.7	50.6
Junc 151	975.0	1028.7	21.5	53.7
Junc 152	980.0	1021.5	31.8	41.5
Junc 153	1010.0	1053.6	25.1	43.6
Junc 154	998.0	1050.0	25.1	52.0
Junc 155	990.0	1047.3	16.9	57.3
Junc 156	1035.0	1082.9	29.2	47.9
Junc 157	1030.0	1078.8	29.2	48.8
Junc 158	1035.0	1078.2	21.0	43.2
Junc 159	1055.0	1077.1	21.0	22.1
Junc 160	1065.0	1080.7	29.2	15.7
Junc 161	1060.0	1091.5	24.0	31.5
Junc 162	1055.0	1092.1	29.2	37.1
Junc 163	1055.0	1092.6	31.4	37.6
Junc 164	1045.0	1093.9	31.4	48.9
Junc 165	1045.0	1092.6	29.2	47.6
Junc 166	1040.0	1092.0	29.2	52.0
Junc 167	1030.0	1079.5	35.3	49.5
Junc 168	1025.0	1074.4	35.3	49.4

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 82	75.66	250	110	−2582.3	0.61	2.27	Open
Pipe 83	259.03	250	100	2280.7	0.54	2.15	Open
Pipe 84	56.79	250	110	−2865.24	0.68	2.76	Open
Pipe 85	80.52	250	110	−2944.86	0.69	2.9	Open
Pipe 86	33.31	250	110	−3623.12	0.85	4.26	Open
Pipe 87	73.69	250	110	−3679.94	0.87	4.38	Open
Pipe 88	97.63	250	110	−3711.34	0.88	4.45	Open
Pipe 89	27.54	250	110	−3742.74	0.88	4.52	Open
Pipe 90	18.57	250	110	−4419.8	1.04	6.15	Open
Pipe 91	68.14	100	110	535.77	0.79	10.72	Open
Pipe 92	102.72	100	110	504.37	0.74	9.58	Open
Pipe 93	87.23	100	110	478.67	0.71	8.7	Open
Pipe 94	95.32	100	110	390.11	0.57	5.95	Open
Pipe 95	59.7	100	110	354.81	0.52	4.99	Open
Pipe 96	65.96	100	110	241.17	0.36	2.44	Open
Pipe 97	69.29	100	110	204.97	0.3	1.81	Open
Pipe 98	137.73	100	110	168.77	0.25	1.26	Open
Pipe 99	110.79	100	110	132.57	0.2	0.81	Open
Pipe 100	96.6	100	110	98.07	0.14	0.46	Open
Pipe 101	85.44	150	110	−836.58	0.55	3.39	Open
Pipe 102	29.53	150	110	−899.09	0.59	3.88	Open
Pipe 103	96.59	150	110	−930.79	0.61	4.14	Open
Pipe 104	7.08	200	110	4536.29	1.67	19.14	Open
Pipe 105	76.55	200	110	3493.73	1.29	11.8	Open
Pipe 106	77.02	200	110	2479.03	0.91	6.25	Open
Pipe 107	74.12	200	110	2438.83	0.9	6.06	Open
Pipe 108	104.08	200	110	2398.63	0.88	5.88	Open
Pipe 109	97.79	200	110	2370.1	0.87	5.75	Open
Pipe 110	101.57	200	110	2344.9	0.86	5.64	Open
Pipe 111	87.52	200	110	2323	0.86	5.54	Open
Pipe 112	124.02	200	110	2301.1	0.85	5.44	Open
Pipe 113	12.72	250	110	−4986.97	1.18	7.69	Open
Pipe 114	122.97	250	110	−5018.37	1.18	7.78	Open
Pipe 115	289.21	250	110	−5024.37	1.18	7.8	Open
Pipe 116	160.45	250	110	−5050.07	1.19	7.87	Open
Pipe 117	128.08	50	110	99.2	0.58	13.8	Open
Pipe 118	84.01	50	110	93.8	0.55	12.44	Open
Pipe 119	32.57	25	110	−21	0.5	22.77	Open
Pipe 120	40.58	50	110	15.7	0.09	0.45	Open
Pipe 121	16.84	50	110	0.82	0	0	Open
Pipe 122	31.58	50	110	−16.98	0.1	0.53	Open
Pipe 123	63.05	50	110	−58.98	0.35	5.27	Open
Pipe 124	86.25	50	110	−107.45	0.63	16	Open
Pipe 125	29.59	50	110	−223.3	1.32	62	Open
Pipe 126	136.88	50	110	−416.14	2.45	196.38	Open
Pipe 127	55.51	25	110	−24.16	0.57	29.52	Open
Pipe 128	94.48	50	110	20.52	0.12	0.75	Open
Pipe 130	114.83	50	110	−168.84	1	36.95	Open
Pipe 131	141.02	50	110	136	0.8	24.75	Open
Pipe 132	164.57	50	110	110.3	0.65	16.79	Open
Pipe 133	120.58	25	110	42.3	1	83.28	Open
Pipe 134	90.06	25	110	25.7	0.61	33.1	Open
Pipe 135	91.41	25	110	−28.84	0.68	40.97	Open
Pipe 136	86.83	20	110	−10.8	0.4	19.7	Open
Pipe 137	95	50	110	−81.94	0.48	9.68	Open
Pipe 138	98.04	50	110	−78.7	0.46	8.99	Open
Pipe 139	114.73	50	110	−57.49	0.34	5.02	Open
Pipe 140	65.37	50	110	−73.11	0.43	7.84	Open
Pipe 141	83.82	50	110	−104.51	0.62	15.2	Open
Pipe 142	38.99	100	110	−645.66	0.95	15.14	Open
Pipe 143	63.46	50	110	36.42	0.21	2.16	Open
Pipe 144	97.77	50	110	18.62	0.11	0.62	Open
Pipe 145	69.64	50	110	21	0.12	0.78	Open
Pipe 148	46.02	50	110	−41.55	0.24	2.75	Open
Pipe 149	22.12	50	110	33.49	0.2	1.85	Open
Pipe 150	63.68	50	110	212.43	1.25	56.53	Open
Pipe 151	127.64	50	110	−75.79	0.45	8.38	Open
Pipe 152	24.93	50	110	−142.07	0.84	26.83	Open
Pipe 153	86.61	50	110	−192.27	1.13	46.99	Open
Pipe 154	84.18	50	110	−257.84	1.52	80.92	Open
Pipe 155	52.54	100	110	−411.06	0.61	6.56	Open
Pipe 156	106.13	100	110	−460.87	0.68	8.11	Open
Pipe 157	44.83	25	110	−34.5	0.81	57.1	Open
Pipe 158	47.01	50	110	−94.1	0.55	12.51	Open
Pipe 159	84.07	50	110	27.13	0.16	1.25	Open
Pipe 160	82.99	50	110	26.41	0.16	1.19	Open
Pipe 161	135.78	50	110	−5.39	0.03	0.06	Open
Pipe 162	20.3	50	110	94.3	0.56	12.56	Open
Pipe 163	113.45	100	110	573.9	0.85	12.17	Open
Pipe 164	30.34	100	110	523.7	0.77	10.27	Open
Pipe 165	113.51	50	110	133.49	0.79	23.91	Open
Pipe 166	143.95	50	110	116.59	0.69	18.61	Open
Pipe 167	270.62	25	110	24.1	0.57	29.38	Open
Pipe 169	254.89	25	110	−18	0.42	17.11	Open
Pipe 170	113.92	25	110	−42.8	1.01	85.12	Open
Pipe 171	134.72	50	110	−67.6	0.4	6.78	Open
Pipe 172	172.05	50	110	−134.7	0.79	24.31	Open
Pipe 173	70.9	50	110	−137	0.81	25.09	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 169	1025.0	1074.0	35.3	49.0
Junc 170	1025.0	1076.1	35.3	51.1
Junc 171	1165.0	1182.8	66.6	17.8
Junc 172	1145.0	1180.9	15.0	35.9
Junc 173	1120.0	1180.0	15.0	60.0
Junc 174	1105.0	1178.3	4.8	73.3
Junc 175	1100.0	1178.1	4.8	78.1
Junc 176	1090.0	1177.6	25.2	87.6
Junc 177	1080.0	1177.0	4.8	97.0
Junc 178	1080.0	1176.5	4.8	96.5
Junc 179	1085.0	1173.2	4.8	88.2
Junc 180	1090.0	1172.4	6.9	82.4
Junc 181	1065.0	1167.8	25.7	102.8
Junc 182	1085.0	1135.0	24.0	50.0
Junc 183	1085.0	1116.3	25.7	31.3
Junc 184	1090.0	1105.9	42.3	15.9
Junc 185	1070.0	1103.5	42.3	33.5
Junc 186	1110.0	1144.6	25.7	34.6
Junc 187	1110.0	1141.8	42.3	31.8
Junc 188	1115.0	1131.8	42.3	16.8
Junc 189	1120.0	1138.8	25.7	18.8
Junc 190	1090.0	1105.0	42.3	15.0
Junc 191	1070.0	1101.3	42.3	31.3
Junc 192	1090.0	1103.3	10.8	13.3
Junc 193	1070.0	1101.8	10.7	31.8
Junc 194	1070.0	1103.9	17.8	33.9
Junc 195	1070.0	1103.4	42.3	33.4
Junc 196	1070.0	1108.1	24.0	38.1
Junc 197	1060.0	1103.5	17.8	43.5
Junc 198	1070.0	1103.6	17.8	33.6
Junc 199	1060.0	1103.5	17.8	43.5
Junc 200	1050.0	1073.5	21.0	23.5
Junc 201	1045.0	1072.7	21.0	27.7
Junc 202	1060.0	1103.5	21.0	43.5
Junc 203	1070.0	1104.2	17.8	34.2
Junc 204	1070.0	1106.3	24.0	36.3
Junc 207	1055.0	1075.4	21.0	20.4
Junc 208	1050.0	1074.3	21.0	24.3
Junc 209	1090.0	1099.6	6.9	9.6
Junc 210	1065.0	1098.3	25.7	33.3
Junc 211	1060.0	1096.1	6.0	36.1
Junc 212	1040.0	1095.1	31.4	55.1
Junc 213	1085.0	1097.7	4.8	12.7
Junc 214	1080.0	1095.9	4.8	15.9
Junc 215	1075.0	1094.9	31.7	19.9
Junc 216	1070.0	1093.6	31.7	23.6
Junc 217	1060.0	1092.8	31.7	32.8
Junc 218	1030.0	1090.6	34.5	60.6
Junc 219	1035.0	1089.9	31.7	54.9
Junc 220	1030.0	1087.4	31.7	57.4
Junc 221	1020.0	1086.5	33.7	66.5
Junc 222	1025.0	1086.3	33.7	61.3
Junc 223	1030.0	1086.3	46.6	56.3
Junc 224	1040.0	1086.9	46.6	46.9
Junc 225	1040.0	1086.6	46.6	46.6
Junc 226	1035.0	1086.6	46.6	51.6
Junc 227	1030.0	1087.2	46.6	57.2
Junc 228	1035.0	1087.7	40.2	52.7
Junc 229	1045.0	1089.0	46.6	44.0
Junc 230	1045.0	1089.6	40.2	44.6
Junc 231	1015.0	1068.3	33.7	53.3
Junc 232	1010.0	1064.0	33.7	54.0
Junc 233	1010.0	1061.6	46.6	51.6
Junc 234	1000.0	1061.1	33.7	61.1
Junc 235	1000.0	1061.1	33.7	61.1
Junc 236	1000.0	1061.1	33.7	61.1
Junc 237	1000.0	1060.6	33.7	60.6
Junc 238	990.0	1032.8	33.7	42.8
Junc 239	990.0	1026.5	33.7	36.5
Junc 240	990.0	1029.7	31.8	39.7
Junc 241	1005.0	1061.3	29.2	56.3
Junc 242	1005.0	1061.6	29.2	56.6
Junc 243	1010.0	1062.2	29.2	52.2
Junc 244	1005.0	1063.3	29.2	58.3
Junc 245	1010.0	1065.0	29.2	55.0
Junc 246	1010.0	1065.1	16.9	55.1
Junc 247	1015.0	1065.4	34.2	50.4
Junc 248	1020.0	1066.2	46.6	46.2
Junc 249	1025.0	1067.7	29.2	42.7
Junc 250	1035.0	1068.7	29.2	33.7
Junc 251	1030.0	1070.4	29.2	40.4
Junc 252	1025.0	1075.2	46.6	50.2
Junc 253	1025.0	1080.5	46.6	55.5
Junc 254	1040.0	1072.6	46.6	32.6
Junc 255	1040.0	1070.1	46.6	30.1
Junc 256	1015.0	1069.5	46.6	54.5
Junc 257	1030.0	1068.4	29.2	38.4
Junc 258	1035.0	1069.8	46.6	34.8
Junc 259	1030.0	1075.4	40.2	45.4
Junc 260	1030.0	1058.5	40.2	28.5

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 174	85.77	50	110	−170.7	1.01	37.7	Open
Pipe 175	14.59	50	110	−408.13	2.41	189.44	Open
Pipe 176	82.22	50	110	205.45	1.21	53.14	Open
Pipe 177	61.67	50	110	171.75	1.01	38.13	Open
Pipe 178	22.53	50	110	125.15	0.74	21.22	Open
Pipe 179	19.96	100	110	831.14	1.22	24.16	Open
Pipe 180	30.56	100	110	796.64	1.17	22.34	Open
Pipe 181	146.6	100	110	685.44	1.01	16.91	Open
Pipe 182	57.02	100	110	653.74	0.96	15.49	Open
Pipe 183	16.49	100	110	628.84	0.93	14.41	Open
Pipe 184	69.05	100	110	−52.14	0.08	0.14	Open
Pipe 185	98.58	100	110	−373.24	0.55	5.49	Open
Pipe 186	26.31	100	110	535.91	0.79	10.72	Open
Pipe 187	53.33	100	110	98.55	0.15	0.47	Open
Pipe 188	71.96	100	110	−475.31	0.7	8.58	Open
Pipe 189	53.89	100	110	−521.91	0.77	10.21	Open
Pipe 190	61.93	100	110	−934.3	1.38	30.01	Open
Pipe 191	46.01	100	110	−974.5	1.44	32.45	Open
Pipe 192	85.65	100	110	1002.36	1.48	34.18	Open
Pipe 193	69.89	100	110	955.76	1.41	31.3	Open
Pipe 194	29.96	50	110	−31.4	0.19	1.64	Open
Pipe 195	81.49	50	110	−65.1	0.38	6.32	Open
Pipe 196	127.22	50	110	14.83	0.09	0.41	Open
Pipe 197	12.42	50	110	−59.03	0.35	5.28	Open
Pipe 198	112.14	50	110	−26.62	0.16	1.21	Open
Pipe 199	76.01	50	110	−55.82	0.33	4.76	Open
Pipe 200	55.96	50	110	−85.02	0.5	10.37	Open
Pipe 201	61.81	50	110	−114.22	0.67	17.91	Open
Pipe 202	60.19	50	110	−143.42	0.85	27.31	Open
Pipe 203	60.73	50	110	−34.45	0.2	1.95	Open
Pipe 204	71.11	50	110	−51.35	0.3	4.07	Open
Pipe 205	97.31	50	110	−180.95	1.07	42	Open
Pipe 206	56.14	50	110	527.27	3.11	304.41	Open
Pipe 207	121.14	50	110	299.71	1.77	106.94	Open
Pipe 208	63.64	50	110	274.51	1.62	90.88	Open
Pipe 209	83.12	50	110	227.91	1.34	64.39	Open
Pipe 210	112.53	50	110	181.31	1.07	42.15	Open
Pipe 211	56.01	50	110	152.11	0.9	30.45	Open
Pipe 212	33.5	50	110	79.3	0.47	9.11	Open
Pipe 213	17.08	50	110	177.3	1.05	40.44	Open
Pipe 214	54.26	50	110	148.1	0.87	28.98	Open
Pipe 215	54.83	50	110	101.5	0.6	14.4	Open
Pipe 216	79.71	50	110	390.76	2.3	174.77	Open
Pipe 217	66.89	50	110	170.37	1	37.57	Open
Pipe 218	67.35	50	110	123.77	0.73	20.79	Open
Pipe 219	37.57	50	110	167.37	0.99	36.35	Open
Pipe 220	94.17	50	110	138.17	0.81	25.49	Open
Pipe 221	155.02	50	110	259.51	1.53	81.9	Open
Pipe 222	67.93	50	110	21.71	0.13	0.83	Open
Pipe 223	80.21	50	110	−18.49	0.11	0.61	Open
Pipe 224	83.64	50	110	−163.19	0.96	34.69	Open
Pipe 225	71.84	50	110	64.3	0.38	6.18	Open
Pipe 226	115.86	50	110	−291.79	1.72	101.76	Open
Pipe 227	130.85	50	110	−331.99	1.96	129.23	Open
Pipe 228	77.11	50	110	−372.19	2.19	159.7	Open
Pipe 229	99.52	50	110	−40.2	0.24	2.59	Open
Pipe 230	152.73	50	110	−80.4	0.47	9.35	Open
Pipe 231	40.56	50	110	197.6	1.16	49.44	Open
Pipe 232	119.26	50	110	128.6	0.76	22.31	Open
Pipe 233	126.44	50	110	64.3	0.38	6.18	Open
Pipe 234	85.02	50	110	−203.73	1.2	52.32	Open
Pipe 235	40.38	50	110	−647.28	3.82	445.05	Open
Pipe 236	12.42	50	110	−59.03	0.35	5.28	Open
Pipe 237	116.35	25	110	−33.7	0.79	54.67	Open
Pipe 238	62.86	25	110	31.8	0.75	49.1	Open
Pipe 239	70	25	110	99.2	2.34	403.75	Open
Pipe 240	72.91	50	110	173.79	1.02	38.98	Open
Pipe 241	62.95	50	110	127.19	0.75	21.86	Open
Pipe 242	69.13	50	110	196.9	1.16	49.11	Open
Pipe 243	115.93	25	110	79.3	1.87	266.71	Open
Pipe 244	132.57	25	110	62.4	1.47	171.1	Open
Pipe 245	38.87	25	110	45.5	1.07	95.33	Open
Pipe 246	610.12	20	110	21.4	0.79	69.91	Open
Pipe 247	238.16	50	110	83.4	0.49	10.01	Open
Pipe 248	252.82	25	110	49.2	1.16	110.18	Open
Pipe 249	133.29	25	110	24.6	0.58	30.52	Open
Pipe 250	203.6	20	110	10.8	0.4	19.7	Open
Pipe 251	137.28	20	110	−6.9	0.25	8.59	Open
Pipe 252	224.45	20	110	−19.2	0.71	57.19	Open
Pipe 253	86.25	25	110	−49.8	1.17	112.68	Open
Pipe 254	197.89	20	110	15.3	0.56	37.56	Open
Pipe 255	94.67	25	110	62.85	1.48	173.42	Open
Pipe 256	55.51	25	110	27.55	0.65	37.65	Open
Pipe 257	110.36	25	110	−7.75	0.18	3.59	Open
Pipe 258	58.51	25	110	−43.05	1.01	86.02	Open
Pipe 259	46.83	25	110	−78.35	1.85	260.79	Open
Pipe 260	149.9	50	110	325.96	1.92	124.92	Open
Pipe 261	130.68	50	110	254.85	1.5	79.2	Open
Pipe 262	106.32	50	110	130.62	0.77	22.97	Open
Pipe 263	702.04	100	110	−902.1	1.33	28.12	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 261	1025.0	1046.7	64.3	21.7
Junc 262	1025.0	1046.3	64.3	21.3
Junc 263	1020.0	1042.1	40.2	22.1
Junc 264	1020.0	1042.4	40.2	22.4
Junc 265	1015.0	1043.8	64.3	28.8
Junc 266	1010.0	1043.8	40.2	33.8
Junc 267	1010.0	1043.8	40.2	33.8
Junc 268	1015.0	1056.5	40.2	41.5
Junc 269	1025.0	1067.4	29.2	42.4
Junc 270	995.0	1062.0	34.2	67.0
Junc 271	985.0	1031.1	16.9	46.1
Junc 272	975.0	1008.4	16.9	33.4
Junc 273	970.0	1004.7	24.1	34.7
Junc 274	925.0	962.0	21.4	37.0
Junc 275	975.0	1059.6	34.2	84.6
Junc 276	940.0	1031.7	24.6	91.7
Junc 277	950.0	1027.7	6.9	77.7
Junc 278	965.0	1026.5	6.9	61.5
Junc 279	950.0	1023.7	10.8	73.7
Junc 280	980.0	1019.3	19.2	39.3
Junc 281	985.0	1032.1	15.3	47.1
Junc 282	1005.0	1041.8	19.2	36.8
Junc 283	1005.0	1039.1	64.3	34.1
Junc 284	1000.0	1038.4	64.3	38.4
Junc 285	990.0	1024.7	15.3	34.7
Junc 286	1015.0	1082.9	18.4	67.9
Junc 287	985.0	1079.1	18.4	94.1
Junc 288	970.0	1077.9	15.3	107.9
Junc 289	970.0	1004.0	45.9	34.0
Junc 290	960.0	993.5	24.6	33.5
Junc 291	1040.0	1079.5	21.0	39.5
Junc 292	1015.0	1052.7	18.4	37.7
Junc 293	1005.0	1033.4	45.9	28.4
Junc 294	1050.0	1084.2	21.0	34.2
Junc 295	1065.0	1083.2	41.9	18.2
Junc 296	1055.0	1082.7	41.9	27.7
Junc 297	1060.0	1084.1	28.9	24.1
Junc 298	1040.0	1082.9	16.3	42.9
Junc 299	1050.0	1082.2	26.5	32.2
Junc 300	1065.0	1081.1	34.7	16.1
Junc 301	1060.0	1080.9	34.7	20.9
Junc 302	1040.0	1080.9	18.6	40.9
Junc 303	1045.0	1076.7	18.6	31.7
Junc 304	1040.0	1077.2	18.6	37.2
Junc 305	1060.0	1074.9	18.6	14.9
Junc 306	1075.0	1175.9	31.7	100.9
Junc 307	1070.0	1174.9	31.7	104.9
Junc 308	1070.0	1173.2	25.2	103.2
Junc 309	1075.0	1172.2	25.2	97.2
Junc 310	1060.0	1170.7	21.9	110.7
Junc 311	1045.0	1169.4	12.3	124.4
Junc 312	1050.0	1168.7	12.3	118.7
Junc 313	1065.0	1168.1	41.9	103.1
Junc 314	1070.0	1167.5	41.9	97.5
Junc 315	1070.0	1167.0	41.9	97.0
Junc 316	1070.0	1166.8	41.9	96.8
Junc 317	1060.0	1166.2	21.0	106.2
Junc 318	1060.0	1165.9	21.0	105.9
Junc 319	1060.0	1163.0	28.9	103.0
Junc 320	1070.0	1148.7	28.9	78.7
Junc 321	1080.0	1138.8	28.9	58.8
Junc 322	1080.0	1152.6	24.8	72.6
Junc 323	1090.0	1137.1	9.4	47.1
Junc 324	1075.0	1136.4	9.4	61.4
Junc 325	1070.0	1143.0	28.9	73.0
Junc 326	1030.0	1164.0	16.3	134.0
Junc 327	1035.0	1128.6	16.3	93.6
Junc 328	1040.0	1121.9	24.1	81.9
Junc 329	1050.0	1121.0	16.3	71.0
Junc 330	1060.0	1119.0	9.4	59.0
Junc 331	1045.0	1160.8	26.5	115.8
Junc 332	1055.0	1152.6	16.3	97.6
Junc 333	1065.0	1149.4	12.3	84.4
Junc 334	1115.0	1145.8	16.9	30.8
Junc 335	1055.0	1159.7	26.5	104.7
Junc 336	1065.0	1158.4	26.5	93.4
Junc 337	1075.0	1145.1	26.5	70.1
Junc 338	1075.0	1143.3	26.5	68.3
Junc 339	1065.0	1156.4	34.7	91.4
Junc 340	1080.0	1155.3	34.7	75.3
Junc 341	1075.0	1154.3	34.7	79.3
Junc 342	1060.0	1153.2	29.1	93.2
Junc 343	1065.0	1151.7	18.6	86.7
Junc 344	1070.0	1151.4	29.1	81.4
Junc 345	1060.0	1150.7	100.0	90.7
Junc 346	1040.0	1077.2	17.7	37.2
Junc 347	1035.0	1080.0	17.7	45.0
Junc 348	1085.0	1150.9	29.1	65.9
Junc 349	1095.0	1150.6	29.1	55.6

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 264	154.21	100	110	−927.8	1.37	29.63	Open
Pipe 265	187.32	150	110	−934.7	0.61	4.17	Open
Pipe 266	111.63	100	110	−939.5	1.38	30.32	Open
Pipe 267	97.28	150	110	−944.3	0.62	4.25	Open
Pipe 268	182.74	250	110	5849.23	1.38	10.33	Open
Pipe 269	174.23	250	110	5844.43	1.38	10.32	Open
Pipe 270	103.37	250	110	5706.35	1.35	9.87	Open
Pipe 271	112.02	250	110	5674.65	1.34	9.77	Open
Pipe 272	88.89	250	110	5538.98	1.31	9.34	Open
Pipe 273	70.87	250	110	5507.28	1.3	9.24	Open
Pipe 274	85.66	150	110	1648.2	1.08	11.92	Open
Pipe 275	88.23	150	110	1616.5	1.06	11.49	Open
Pipe 276	105.52	150	110	1584.8	1.04	11.08	Open
Pipe 277	25.75	150	110	1484	0.97	9.81	Open
Pipe 278	178.97	150	110	1332.8	0.87	8.04	Open
Pipe 279	176.51	150	110	1310.9	0.86	7.8	Open
Pipe 280	83.09	150	110	1298.6	0.85	7.66	Open
Pipe 281	83.56	150	110	1286.3	0.84	7.53	Open
Pipe 282	77.08	150	110	1244.4	0.82	7.08	Open
Pipe 283	84.18	150	110	1145.7	0.75	6.08	Open
Pipe 284	40.79	150	110	1103.8	0.72	5.67	Open
Pipe 285	106.01	150	110	1061.9	0.7	5.28	Open
Pipe 286	73.64	150	110	1040.9	0.68	5.09	Open
Pipe 289	181.17	50	110	−41.9	0.25	2.8	Open
Pipe 290	99.72	50	110	−83.8	0.49	10.1	Open
Pipe 291	43.94	50	110	−133.7	0.79	23.98	Open
Pipe 292	113.59	20	110	−24.8	0.91	91.87	Open
Pipe 293	78.7	50	110	28.9	0.17	1.41	Open
Pipe 294	57.41	25	110	76.6	1.81	250.13	Open
Pipe 295	95.12	25	110	47.7	1.12	104.04	Open
Pipe 296	108.34	20	110	9.4	0.35	15.24	Open
Pipe 297	164.13	20	110	−28.9	1.06	121.96	Open
Pipe 298	156.93	20	110	−9.4	0.35	15.24	Open
Pipe 299	130.04	20	110	−9.4	0.35	15.24	Open
Pipe 300	77.77	20	110	−25.7	0.95	98.14	Open
Pipe 301	76.51	20	110	24.1	0.89	87.12	Open
Pipe 302	62.76	20	110	−66.1	2.44	564.47	Open
Pipe 303	239.46	25	110	−16.9	0.4	15.23	Open
Pipe 304	75.53	25	110	−29.2	0.69	41.92	Open
Pipe 305	86.24	25	110	−45.5	1.07	95.33	Open
Pipe 306	151.69	100	110	−778.3	1.15	21.4	Open
Pipe 309	18.98	200	110	1566.8	0.58	2.67	Open
Pipe 312	65.85	200	110	1318.8	0.49	1.94	Open
Pipe 313	48.26	200	110	1302.5	0.48	1.9	Open
Pipe 314	65.56	200	110	2279.2	0.84	5.35	Open
Pipe 315	105.72	200	110	2237.3	0.82	5.17	Open
Pipe 316	103.51	200	110	2007.7	0.74	4.23	Open
Pipe 317	75.05	200	110	1852.6	0.68	3.64	Open
Pipe 318	92.51	200	110	1831.6	0.67	3.57	Open
Pipe 319	48.23	50	110	243.8	1.44	72.95	Open
Pipe 320	52.28	50	110	138.8	0.82	25.7	Open
Pipe 321	74.01	25	110	78.4	1.85	261.13	Open
Pipe 322	119.56	50	110	136.7	0.81	24.99	Open
Pipe 323	198.03	50	110	118.3	0.7	19.12	Open
Pipe 324	87.94	50	110	99.9	0.59	13.98	Open
Pipe 325	245.75	25	110	84.6	1.99	300.66	Open
Pipe 326	148.25	25	110	38.7	0.91	70.63	Open
Pipe 327	20.21	150	110	1184.2	0.78	6.46	Open
Pipe 328	60.15	150	110	1167.9	0.76	6.3	Open
Pipe 329	171.48	150	110	1141.4	0.75	6.03	Open
Pipe 330	167.97	150	110	1107.4	0.73	5.71	Open
Pipe 331	118.75	100	110	282.3	0.42	3.27	Open
Pipe 332	46.48	100	110	261.6	0.39	2.84	Open
Pipe 333	94.33	100	110	186.72	0.28	1.52	Open
Pipe 334	99.03	100	110	168.12	0.25	1.25	Open
Pipe 335	102.13	100	110	120.56	0.18	0.68	Open
Pipe 337	87.8	50	110	−24.1	0.14	1	Open
Pipe 338	68.38	50	110	−58.1	0.34	5.12	Open
Pipe 339	43.46	50	110	−92.1	0.54	12.03	Open
Pipe 340	168.79	50	110	68.15	0.4	6.88	Open
Pipe 341	143.12	50	110	−54.88	0.32	4.61	Open
Pipe 342	86.64	50	110	91.55	0.54	11.89	Open
Pipe 343	61.96	50	110	58.03	0.34	5.11	Open
Pipe 344	103.35	25	110	17.54	0.41	16.31	Open
Pipe 345	28.86	100	110	763	1.12	20.63	Open
Pipe 346	69.59	100	110	380.45	0.56	5.68	Open
Pipe 347	68.92	100	110	291.6	0.43	3.47	Open
Pipe 348	37.35	50	110	200.52	1.18	50.8	Open
Pipe 349	100.92	50	110	90.87	0.54	11.73	Open
Pipe 350	203.45	50	110	62.96	0.37	5.94	Open
Pipe 352	88.97	25	110	−12.9	0.3	9.23	Open
Pipe 353	44.41	25	110	12.9	0.3	9.23	Open
Pipe 354	53.18	100	110	107.66	0.16	0.55	Open
Pipe 355	109.23	100	110	96.86	0.14	0.45	Open
Pipe 356	133.37	100	110	79.16	0.12	0.31	Open
Pipe 357	278.14	50	110	24.6	0.15	1.04	Open
Pipe 358	149.48	25	110	19.16	0.45	19.2	Open
Pipe 360	50.81	50	110	−100	0.59	14.01	Open
Pipe 361	41.25	100	110	−448.5	0.66	7.71	Open

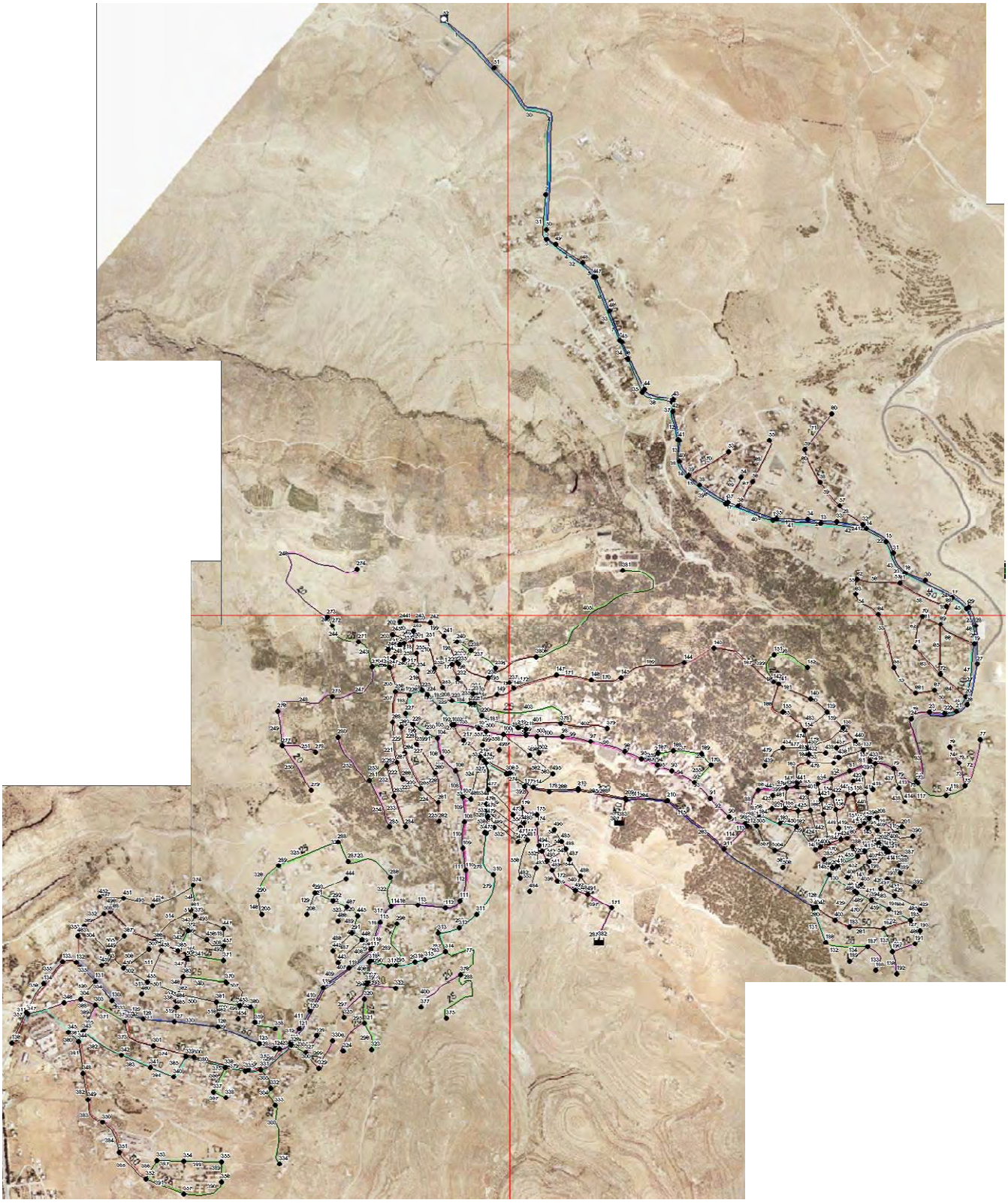
ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 350	1100.0	1150.2	24.8	50.2
Junc 351	1115.0	1149.9	24.8	34.9
Junc 352	1125.0	1149.6	49.2	24.6
Junc 353	1115.0	1149.0	3.6	34.0
Junc 354	1115.0	1148.3	3.6	33.3
Junc 355	1115.0	1147.5	21.4	32.5
Junc 356	1120.0	1147.3	84.6	27.3
Junc 357	1125.0	1147.8	49.2	22.8
Junc 358	1017.0	1039.8	24.1	22.8
Junc 359	1020.0	1039.9	34.0	19.9
Junc 360	1015.0	1040.3	34.0	25.3
Junc 361	1015.0	1042.4	34.0	27.4
Junc 362	1010.0	1049.4	20.7	39.4
Junc 363	995.0	1049.0	20.7	54.0
Junc 364	985.0	1015.0	18.1	30.0
Junc 365	985.0	1013.1	18.1	28.1
Junc 366	985.0	1011.9	18.1	26.9
Junc 367	995.0	1041.5	12.9	46.5
Junc 368	990.0	1010.7	12.9	20.7
Junc 369	1005.0	1041.9	12.9	36.9
Junc 370	995.0	1047.9	34.0	52.9
Junc 371	980.0	1014.3	20.5	34.3
Junc 372	970.0	1012.1	18.1	42.1
Junc 373	965.0	1011.8	20.5	46.8
Junc 374	950.0	1009.2	15.9	59.2
Junc 375	1140.0	1157.3	24.8	17.3
Junc 376	1105.0	1166.4	7.2	61.4
Junc 377	1115.0	1147.7	24.8	32.7
Junc 378	1030.0	1088.3	34.5	58.3
Junc 379	1025.0	1077.1	36.2	52.1
Junc 380	985.0	1058.8	80.9	73.8
Junc 381	920.0	1048.4	9.2	128.4
Junc 384	1065.0	1087.4	24.0	22.4
Junc 385	1065.0	1106.2	24.0	41.2
Junc 386	1065.0	1104.2	17.8	39.2
Junc 387	1065.0	1072.7	17.8	7.7
Junc 388	1065.0	1072.6	17.8	7.6
Junc 389	1063.0	1071.9	17.8	8.9
Junc 390	1045.0	1071.8	21.0	26.8
Junc 391	1060.0	1073.0	17.8	13.0
Junc 392	1060.0	1087.3	26.8	27.3
Junc 393	1065.0	1091.2	17.8	26.2
Junc 394	1068.0	1103.5	17.8	35.5
Junc 395	1055.0	1103.5	21.0	48.5
Junc 396	1050.0	1074.8	21.0	24.8
Junc 397	1015.0	1069.8	34.5	54.8
Junc 398	1045.0	1093.0	31.4	48.0
Junc 399	1035.0	1092.9	31.4	57.9
Junc 400	1062.0	1091.5	24.0	29.5
Junc 401	1030.0	1089.2	29.2	59.2
Junc 402	1070.0	1103.7	17.8	33.7
Junc 403	1084.0	1099.3	25.7	15.3
Junc 405	1070.0	1103.7	17.8	33.7
Junc 406	1075.0	1103.7	24.0	28.7
Junc 407	1067.0	1103.5	17.8	36.5
Junc 408	1055.0	1073.4	21.0	18.4
Junc 409	1057.0	1074.3	21.0	17.3
Junc 410	1071.0	1105.6	24.0	34.6
Junc 411	1065.0	1103.9	17.8	38.9
Junc 412	1060.0	1073.1	17.8	13.1
Junc 413	1010.0	1086.4	21.0	76.4
Junc 414	1015.0	1085.1	21.0	70.1
Junc 415	1032.0	1074.2	21.0	42.2
Junc 416	1005.0	1092.9	34.5	87.9
Junc 418	1030.0	1090.6	21.0	60.6
Junc 419	1055.0	1082.1	29.2	27.1
Junc 420	1040.0	1086.0	29.2	46.0
Junc 421	1030.0	1086.6	29.2	56.6
Junc 422	1030.0	1086.5	29.2	56.5
Junc 423	1020.0	1077.5	21.0	57.5
Junc 424	1065.0	1082.6	29.2	17.6
Junc 425	1045.0	1092.3	29.2	47.3
Junc 426	1025.0	1093.9	29.2	68.9
Junc 427	1065.0	1095.3	17.8	30.3
Junc 428	1062.0	1095.5	17.8	33.5
Junc 429	1060.0	1098.8	19.7	38.8
Junc 430	1003.0	1053.1	25.1	50.1
Junc 432	1005.0	1053.3	25.1	48.3
Junc 433	1005.0	1039.5	34.5	34.5
Junc 434	1004.0	1040.7	26.4	36.7
Junc 435	1008.0	1050.6	25.1	42.6
Junc 436	1007.0	1038.9	25.1	31.9
Junc 437	1004.0	1040.2	25.1	36.2
Junc 438	1005.0	1051.3	25.1	46.3
Junc 439	1010.0	1037.2	26.4	27.2
Junc 440	1000.0	1042.6	34.5	42.6
Junc 441	1025.0	1055.0	29.2	30.0
Junc 442	1035.0	1077.2	21.0	42.2
Junc 443	1040.0	1078.9	21.0	38.9

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 362	170.86	100	110	−467.1	0.69	8.31	Open
Pipe 363	122.59	100	110	−496.2	0.73	9.3	Open
Pipe 364	94.97	100	110	−530.9	0.78	10.54	Open
Pipe 365	89.72	100	110	−565.6	0.83	11.85	Open
Pipe 366	105.55	25	110	53	1.25	126.46	Open
Pipe 367	51.13	25	110	26.5	0.62	35.03	Open
Pipe 368	62.71	25	110	11.82	0.28	7.86	Open
Pipe 369	99.39	25	110	18.6	0.44	18.19	Open
Pipe 371	132.02	25	110	−25.38	0.6	32.33	Open
Pipe 372	38.04	50	110	54.18	0.32	4.5	Open
Pipe 373	161.33	50	110	10.2	0.06	0.2	Open
Pipe 374	162.14	50	110	−24.5	0.14	1.03	Open
Pipe 375	212.76	50	110	−59.2	0.35	5.3	Open
Pipe 376	70.46	50	110	−85.7	0.51	10.52	Open
Pipe 377	81.88	50	110	−102	0.6	14.53	Open
Pipe 378	58.88	100	110	706.3	1.04	17.88	Open
Pipe 379	79.93	100	110	679.8	1	16.65	Open
Pipe 380	154.68	100	110	600.3	0.88	13.23	Open
Pipe 381	125.22	100	110	319.4	0.47	4.11	Open
Pipe 382	103.46	100	110	290.3	0.43	3.44	Open
Pipe 383	116.2	100	110	261.2	0.38	2.83	Open
Pipe 384	137.23	100	110	236.4	0.35	2.35	Open
Pipe 385	146.21	100	110	211.6	0.31	1.92	Open
Pipe 386	83.85	50	110	70.37	0.41	7.31	Open
Pipe 387	102.89	50	110	66.77	0.39	6.63	Open
Pipe 388	142.12	50	110	63.17	0.37	5.98	Open
Pipe 389	78.99	50	110	41.77	0.25	2.78	Open
Pipe 390	170.39	50	110	−42.83	0.25	2.91	Open
Pipe 391	155.59	50	110	−92.03	0.54	12.01	Open
Pipe 392	92.11	200	110	−2597.3	0.96	6.81	Open
Pipe 393	67.56	200	110	−2654	0.98	7.09	Open
Pipe 394	38.03	200	110	−2658.8	0.98	7.11	Open
Pipe 395	141.76	200	110	−2708.6	1	7.36	Open
Pipe 396	46.76	200	110	−2732.05	1.01	7.48	Open
Pipe 397	104.24	200	110	−2871.2	1.06	8.2	Open
Pipe 398	146.02	25	110	−31.8	0.75	49.1	Open
Pipe 399	122.96	25	110	−53.3	1.26	127.78	Open
Pipe 77	233.35	50	110	56.8	0.33	4.91	Open
Pipe 288	294.32	25	110	24.8	0.58	30.98	Open
Pipe 400	203.6	20	110	24.8	0.91	91.87	Open
Pipe 401	171.29	50	110	79.5	0.47	9.16	Open
Pipe 402	180.61	25	110	36.2	0.85	62.42	Open
Pipe 403	394.16	25	110	8.8	0.21	4.55	Open
Pipe 404	205.67	50	110	90.1	0.53	11.55	Open
Pipe 405	707.42	20	110	9.2	0.34	14.64	Open
Pipe 406	85.07	50	110	159.2	0.94	33.13	Open
Pipe 407	510.86	150	110	860.7	0.56	3.58	Open
Pipe 408	111.85	200	110	1412.1	0.52	2.2	Open
Pipe 409	124.61	200	110	1391.1	0.51	2.14	Open
Pipe 410	102.86	200	110	1367	0.5	2.08	Open
Pipe 411	81.81	200	110	1342.9	0.49	2.01	Open
Pipe 412	25.66	50	100	−235.5	1.39	81.63	Open
Pipe 287	143.35	200	110	2937.8	1.08	8.56	Open
Pipe 307	105.39	300	110	10906.2	1.79	13.48	Open
Pipe 311	9.45	25	110	−36.86	0.87	64.53	Open
Pipe 308	49.43	50	110	285.82	1.68	97.93	Open
Pipe 370	118.7	25	110	17.55	0.41	16.33	Open
Pipe 414	19.83	50	110	267.22	1.58	86.46	Open
Pipe 415	27.18	50	110	130.92	0.77	23.07	Open
Pipe 416	72.39	25	110	21	0.5	22.77	Open
Pipe 417	67.36	50	110	53.4	0.31	4.38	Open
Pipe 418	38.77	50	110	35.6	0.21	2.07	Open
Pipe 419	38.62	25	110	17.8	0.42	16.76	Open
Pipe 420	45.54	25	110	44.6	1.05	91.86	Open
Pipe 421	107.91	25	110	26.8	0.63	35.77	Open
Pipe 423	68.89	25	110	29.2	0.69	41.92	Open
Pipe 424	147.17	100	110	315.35	0.46	4.02	Open
Pipe 425	51.67	25	110	5.97	0.14	2.22	Open
Pipe 426	62.14	50	110	115.3	0.68	18.23	Open
Pipe 427	65.22	50	110	94.3	0.56	12.56	Open
Pipe 429	132.22	25	110	25.7	0.61	33.1	Open
Pipe 430	61.1	25	110	2.89	0.07	0.58	Open
Pipe 431	56.11	25	110	−26.3	0.62	34.53	Open
Pipe 432	104.64	25	110	5.18	0.12	1.71	Open
Pipe 433	41.17	25	110	−12.62	0.3	8.86	Open
Pipe 434	31.9	50	110	89	0.52	11.29	Open
Pipe 435	16.1	50	110	71.2	0.42	7.46	Open
Pipe 436	42.46	25	110	45.28	1.07	94.47	Open
Pipe 437	77.4	25	110	42	0.99	82.19	Open
Pipe 438	56.76	25	110	21	0.5	22.77	Open
Pipe 439	101.32	25	110	21	0.5	22.77	Open
Pipe 440	100.01	25	110	10.22	0.24	6	Open
Pipe 441	76.32	25	110	34.5	0.81	57.1	Open
Pipe 442	117.23	25	110	−15.03	0.35	12.25	Open
Pipe 443	34.93	25	110	25.43	0.6	32.45	Open
Pipe 444	45.82	25	110	−7.05	0.17	3.01	Open
Pipe 445	57.92	25	110	21	0.5	22.77	Open
Pipe 446	58.05	25	110	−14.17	0.33	10.99	Open
Pipe 447	59.25	25	110	−50.42	1.19	115.29	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 444	1003.0	1031.0	18.4	28.0
Junc 445	1028.0	1077.1	21.0	49.1
Junc 446	1040.0	1081.8	21.0	41.8
Junc 447	962.0	1010.8	20.5	48.8
Junc 448	970.0	1009.2	15.9	39.2
Junc 449	1005.0	1042.3	12.9	37.3
Junc 450	1005.0	1043.0	12.9	38.0
Junc 451	972.0	1010.4	17.9	38.4
Junc 452	985.0	1008.9	17.9	23.9
Junc 453	1015.0	1040.8	34.0	25.8
Junc 454	1022.0	1037.8	34.0	15.8
Junc 455	1007.0	1044.7	20.7	37.7
Junc 456	968.0	1011.0	20.5	43.0
Junc 457	972.0	1011.1	20.5	39.1
Junc 458	990.0	1042.5	18.1	52.5
Junc 459	1015.0	1041.6	12.9	26.6
Junc 460	1013.0	1043.6	20.7	30.6
Junc 461	962.0	1010.9	18.1	48.9
Junc 462	1022.0	1039.5	34.0	17.5
Junc 463	1010.0	1041.5	12.9	31.5
Junc 464	1020.0	1050.0	20.7	30.0
Junc 465	1020.0	1080.4	20.7	60.4
Junc 466	1030.0	1074.4	21.0	44.4
Junc 467	1025.0	1075.7	21.0	50.7
Junc 468	1055.0	1089.5	25.2	34.5
Junc 469	1080.0	1168.8	25.2	88.8
Junc 470	1090.0	1158.7	25.2	68.7
Junc 471	1090.0	1158.0	25.2	68.0
Junc 472	1085.0	1158.3	25.2	73.3
Junc 473	1090.0	1161.0	25.2	71.0
Junc 474	1070.0	1093.8	31.7	23.8
Junc 475	1070.0	1093.0	25.2	23.0
Junc 476	1070.0	1093.1	25.2	23.1
Junc 477	1073.0	1173.8	25.2	100.8
Junc 478	1070.0	1172.9	25.2	102.9
Junc 479	1070.0	1172.7	25.2	102.7
Junc 480	1095.0	1174.8	4.8	79.8
Junc 481	1095.0	1172.4	4.8	77.4
Junc 482	1095.0	1168.6	21.9	73.6
Junc 483	1120.0	1175.0	15.0	55.0
Junc 484	1120.0	1173.8	15.0	53.8
Junc 485	1133.0	1180.7	4.8	47.7
Junc 486	1155.0	1181.3	15.0	26.3
Junc 487	1150.0	1180.8	15.0	30.8
Junc 488	1140.0	1180.7	15.0	40.7
Junc 489	1138.0	1180.6	15.0	42.6
Junc 490	1120.0	1180.6	4.8	60.6
Junc 491	1158.0	1181.9	33.0	23.9
Junc 492	1157.0	1181.5	15.0	24.5
Junc 493	1125.0	1180.3	15.0	55.3
Junc 494	1120.0	1178.9	15.0	58.9
Junc 495	1070.0	1093.7	34.5	23.7
Junc 496	1050.0	1092.1	34.5	42.1
Junc 498	1050.0	1088.2	31.7	38.2
Junc 499	1050.0	1088.9	31.7	38.9
Junc 500	1043.0	1091.6	31.7	48.6
Junc 502	1050.0	1087.4	34.5	37.4
Junc 503	1033.0	1091.1	34.5	58.1
Junc 504	1055.0	1092.3	6.0	37.3
Junc 505	1042.0	1094.3	31.4	52.3
Junc 506	1065.0	1092.1	6.0	27.1
Junc 507	990.0	1040.9	18.1	50.9
Junc 508	995.0	1041.1	12.9	46.1
Junc 509	985.0	1048.8	18.1	63.8
Junc 205	970.0	992.7	14.1	22.7
Junc 206	1005.0	1032.4	14.1	27.4
Junc 404	1085.0	1148.1	0.0	63.1
Resvr 382	1184.0	1184.0	−2937.8	0.0
Resvr 383	1101.0	1101.0	−10906.2	0.0

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 448	75.09	25	110	14.22	0.34	11.06	Open
Pipe 449	42.29	25	110	−14.98	0.35	12.18	Open
Pipe 450	61.09	25	110	−8.11	0.19	3.84	Open
Pipe 451	50.03	100	110	423.5	0.62	6.93	Open
Pipe 452	47.36	100	110	373.75	0.55	5.5	Open
Pipe 453	32.34	50	110	324.84	1.91	124.13	Open
Pipe 454	32.65	50	110	89.4	0.53	11.38	Open
Pipe 455	42.02	25	110	−0.25	0.01	0.01	Open
Pipe 456	30.57	50	110	99.7	0.59	13.93	Open
Pipe 457	19.72	250	110	2522.7	0.59	2.18	Open
Pipe 459	75.23	50	110	21.78	0.13	0.83	Open
Pipe 460	21.01	50	110	−157.75	0.93	32.57	Open
Pipe 461	81.76	25	110	−16.76	0.4	14.97	Open
Pipe 462	40.48	250	110	3577.16	0.84	4.16	Open
Pipe 463	59.28	25	110	−6.14	0.14	2.33	Open
Pipe 464	114.38	25	110	−23.94	0.56	29.01	Open
Pipe 465	53.17	25	110	−43.64	1.03	88.22	Open
Pipe 466	58.44	25	110	13.46	0.32	9.99	Open
Pipe 467	36.06	50	110	57.1	0.34	4.96	Open
Pipe 468	13.48	50	110	−93.94	0.55	12.48	Open
Pipe 469	59.28	50	110	50.44	0.3	3.94	Open
Pipe 470	134.8	25	110	45.4	1.07	94.95	Open
Pipe 471	57.62	25	110	−56.26	1.33	141.26	Open
Pipe 472	52.39	50	110	235.68	1.39	68.52	Open
Pipe 473	26.39	50	110	241.63	1.42	71.76	Open
Pipe 474	67.7	50	110	189.67	1.12	45.83	Open
Pipe 476	155.52	50	110	205.93	1.21	53.37	Open
Pipe 477	98.62	25	110	52.8	1.24	125.57	Open
Pipe 478	96.83	25	110	25.1	0.59	31.68	Open
Pipe 479	102.47	25	110	26.4	0.62	34.78	Open
Pipe 480	64.82	25	110	25.1	0.59	31.68	Open
Pipe 481	97.6	25	110	25.1	0.59	31.68	Open
Pipe 482	77.24	25	110	25.1	0.59	31.68	Open
Pipe 483	112.66	25	110	31.08	0.73	47.07	Open
Pipe 484	71.05	50	110	−153.7	0.91	31.04	Open
Pipe 485	23.43	100	110	473.5	0.7	8.52	Open
Pipe 486	101.28	25	110	21	0.5	22.77	Open
Pipe 487	127.48	25	110	21	0.5	22.77	Open
Pipe 488	45.05	50	110	201.8	1.19	51.4	Open
Pipe 489	71.21	50	110	159.8	0.94	33.36	Open
Pipe 490	130.36	25	110	18.4	0.43	17.82	Open
Pipe 492	56.45	25	110	34.38	0.81	56.74	Open
Pipe 493	120.27	25	110	−11.69	0.28	7.7	Open
Pipe 494	177.11	25	110	1.64	0.04	0.2	Open
Pipe 495	115.53	25	110	−14.26	0.34	11.12	Open
Pipe 496	71.34	50	110	50.06	0.3	3.89	Open
Pipe 497	92.16	25	110	17.9	0.42	16.94	Open
Pipe 498	54.3	25	110	34	0.8	55.57	Open
Pipe 499	75	50	110	125.95	0.74	21.47	Open
Pipe 500	146.74	50	110	193.95	1.14	47.76	Open
Pipe 501	127.73	50	110	167.9	0.99	36.56	Open
Pipe 502	104.94	50	110	108.4	0.64	16.26	Open
Pipe 503	88.5	50	110	77.4	0.46	8.71	Open
Pipe 504	130.13	50	110	38.7	0.23	2.41	Open
Pipe 505	87.13	25	110	12.9	0.3	9.23	Open
Pipe 506	121.39	25	110	18.1	0.43	17.29	Open
Pipe 507	126.06	25	110	−34.15	0.81	56.02	Open
Pipe 508	76.54	25	110	5.08	0.12	1.64	Open
Pipe 509	82.53	25	110	−15.42	0.36	12.86	Open
Pipe 511	131.47	25	110	−18.1	0.43	17.29	Open
Pipe 512	75.62	25	110	12.9	0.3	9.23	Open
Pipe 513	51.56	25	110	20.7	0.49	22.17	Open
Pipe 514	189.44	25	110	−9.81	0.23	5.54	Open
Pipe 516	52.22	25	110	34	0.8	55.57	Open
Pipe 517	26.53	25	110	25.83	0.61	33.41	Open
Pipe 518	67.44	25	110	8.81	0.21	4.55	Open
Pipe 519	54.83	100	110	804.4	1.19	22.74	Open
Pipe 520	89.08	25	110	28.97	0.68	41.31	Open
Pipe 521	64.16	25	110	−1.46	0.03	0.16	Open
Pipe 522	59.73	25	110	96.8	2.28	385.85	Open
Pipe 523	60.88	25	110	21	0.5	22.77	Open
Pipe 524	166.63	25	110	21.87	0.52	24.55	Open
Pipe 525	31.43	25	110	−3.33	0.08	0.75	Open
Pipe 527	172.48	50	110	50.4	0.3	3.94	Open
Pipe 528	109.88	50	110	25.2	0.15	1.09	Open
Pipe 529	135.3	20	110	25.2	0.93	94.63	Open
Pipe 530	153.38	20	110	25.2	0.93	94.63	Open
Pipe 531	157.38	20	110	25.2	0.93	94.63	Open
Pipe 532	152.7	20	110	25.2	0.93	94.63	Open
Pipe 533	35.71	20	110	25.2	0.93	94.63	Open
Pipe 534	55.91	150	110	1534.4	1	10.44	Open
Pipe 535	21.47	150	110	1433.6	0.94	9.2	Open
Pipe 536	63.86	150	110	1383.2	0.91	8.61	Open
Pipe 537	19.47	250	110	5592.55	1.32	9.51	Open
Pipe 538	50.03	200	110	2766.79	1.02	7.66	Open
Pipe 539	79.13	200	110	2747.05	1.01	7.56	Open
Pipe 540	60.13	20	110	4.74	0.17	4.28	Open
Pipe 541	79.93	20	110	−3.97	0.15	3.05	Open

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 542	83.06	20	110	−5.33	0.2	5.33	Open
Pipe 543	84.99	25	110	12.25	0.29	8.39	Open
Pipe 544	79.28	50	110	61.15	0.36	5.63	Open
Pipe 545	40.76	50	110	42.18	0.25	2.83	Open
Pipe 546	34	50	110	21.85	0.13	0.84	Open
Pipe 547	53.42	25	110	4.8	0.11	1.48	Open
Pipe 548	85.33	50	110	71.41	0.42	7.51	Open
Pipe 549	42.23	200	110	2721.02	1	7.43	Open
Pipe 550	40.61	200	110	2711.35	1	7.38	Open
Pipe 551	83.82	200	110	2663.6	0.98	7.14	Open
Pipe 552	89.13	25	110	30	0.71	44.08	Open
Pipe 553	95.5	25	110	15	0.35	12.21	Open
Pipe 554	58.38	25	110	31.5	0.74	48.24	Open
Pipe 555	66.91	25	110	26.7	0.63	35.52	Open
Pipe 556	154.57	25	110	21.9	0.52	24.61	Open
Pipe 557	54.42	25	110	31.7	0.75	48.81	Open
Pipe 558	65.21	25	110	31.7	0.75	48.81	Open
Pipe 559	126.87	50	110	−64.29	0.38	6.12	Open
Pipe 561	64.33	25	110	34.5	0.81	57.1	Open
Pipe 562	115.86	50	110	−98.79	0.58	13.64	Open
Pipe 563	91.44	50	110	−133.29	0.79	23.79	Open
Pipe 564	41.87	100	110	29.07	0.04	0.05	Open
Pipe 565	68.69	150	110	835.69	0.55	3.39	Open
Pipe 566	129.22	25	110	−5.47	0.13	1.89	Open
Pipe 567	123.05	25	110	−17.47	0.41	16.19	Open
Pipe 568	108.76	25	110	6	0.14	2.24	Open
Pipe 569	34.39	100	110	596.78	0.88	13.08	Open
Pipe 129	88.45	25	110	14.1	0.33	10.89	Open
Pipe 146	74.27	25	110	14.1	0.33	10.89	Open
Valve 147	#N/A	100	#N/A	603.1	0.89	38.7	Active
Valve 336	#N/A	100	#N/A	783.7	1.15	30.38	Active
Valve 351	#N/A	100	#N/A	273.5	0.4	33.77	Active
Valve 310	#N/A	100	#N/A	766.1	1.13	13.06	Active



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NODE Bsaira

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 1	1265.0	1300.8	0.0	35.8
Junc 2	1265.0	1299.1	51.6	34.1
Junc 3	1265.0	1298.3	17.9	33.3
Junc 4	1265.0	1294.1	56.4	29.1
Junc 5	1250.0	1292.9	31.8	42.9
Junc 6	1210.0	1228.2	17.8	18.2
Junc 7	1195.0	1228.4	35.8	33.4
Junc 8	1185.0	1229.6	28.2	44.6
Junc 9	1195.0	1233.8	28.2	38.8
Junc 10	1227.0	1269.9	13.8	42.9
Junc 11	1275.0	1297.0	67.8	22.0
Junc 12	1275.0	1296.4	2.3	21.4
Junc 13	1260.0	1291.4	11.9	31.4
Junc 14	1255.0	1286.2	16.0	31.2
Junc 15	1258.0	1283.5	16.0	25.5
Junc 16	1225.0	1272.1	16.2	47.1
Junc 17	1210.0	1240.0	15.1	30.0
Junc 18	1195.0	1238.6	24.8	43.6
Junc 19	1185.0	1237.7	24.8	52.7
Junc 20	1175.0	1236.7	15.3	61.7
Junc 21	1170.0	1236.0	15.3	66.0
Junc 22	1175.0	1233.8	21.2	58.8
Junc 23	1175.0	1231.9	60.2	56.9
Junc 24	1175.0	1232.5	47.7	57.5
Junc 25	1180.0	1232.9	47.7	52.9
Junc 26	1255.0	1295.2	4.6	40.2
Junc 27	1275.0	1294.5	12.3	19.5
Junc 28	1275.0	1293.0	12.3	18.0
Junc 29	1265.0	1289.3	9.4	24.3
Junc 30	1220.0	1261.0	10.6	41.0
Junc 31	1205.0	1231.0	15.3	26.0
Junc 32	1220.0	1258.6	15.3	38.6
Junc 33	1235.0	1263.1	38.7	28.1
Junc 34	1218.0	1268.8	16.2	50.8
Junc 35	1203.0	1237.9	15.1	34.9
Junc 36	1195.0	1236.9	15.1	41.9
Junc 37	1195.0	1235.0	15.1	40.0
Junc 38	1185.0	1235.3	21.2	50.3
Junc 39	1185.0	1235.4	21.2	50.4
Junc 40	1225.0	1259.7	21.2	34.7
Junc 41	1205.0	1258.6	24.6	53.6
Junc 42	1235.0	1258.1	21.3	23.1
Junc 43	1245.0	1258.1	2.3	13.1
Junc 44	1215.0	1252.3	7.2	37.3
Junc 45	1230.0	1258.0	12.4	28.0
Junc 46	1240.0	1256.9	17.0	16.9
Junc 47	1190.0	1227.1	85.0	37.1
Junc 48	1205.0	1224.5	10.8	19.5
Junc 49	1170.0	1225.7	89.8	55.7
Junc 50	1205.0	1225.1	3.6	20.1
Junc 51	1210.0	1225.0	3.6	15.0
Junc 55	1200.0	1214.2	28.2	14.2
Junc 56	1185.0	1208.5	22.6	23.5
Junc 57	1200.0	1237.0	19.4	37.0
Junc 58	1190.0	1235.5	17.7	45.5
Junc 59	1185.0	1235.2	17.7	50.2
Junc 60	1165.0	1194.2	18.3	29.2
Junc 61	1180.0	1233.9	24.8	53.9
Junc 62	1140.0	1197.5	26.7	57.5
Junc 63	1145.0	1193.8	18.3	48.8
Junc 64	1125.0	1153.2	26.7	28.2
Junc 65	1140.0	1190.1	91.8	50.1
Junc 66	1132.0	1198.3	27.1	66.3
Junc 67	1130.0	1159.8	27.1	29.8
Junc 68	1110.0	1159.1	59.1	49.1
Junc 69	1100.0	1158.7	59.1	58.7
Junc 70	1110.0	1157.3	161.8	47.3
Junc 71	1115.0	1156.8	76.4	41.8
Junc 72	1115.0	1156.7	76.4	41.7
Junc 73	1120.0	1156.1	22.8	36.1
Junc 74	1125.0	1155.1	58.2	30.1
Junc 75	1135.0	1146.5	56.6	11.5
Junc 76	1135.0	1145.4	45.8	10.4
Junc 77	1130.0	1145.0	20.0	15.0
Junc 78	1130.0	1144.9	22.8	14.9
Junc 79	1125.0	1154.9	22.8	29.9
Junc 80	1130.0	1152.6	22.8	22.6
Junc 81	1105.0	1153.4	14.7	48.4
Junc 82	1105.0	1139.0	53.6	34.0
Junc 83	1088.0	1137.6	7.2	49.6
Junc 84	1110.0	1157.9	14.7	47.9
Junc 85	1085.0	1124.5	59.1	39.5
Junc 86	1060.0	1089.6	38.8	29.6
Junc 87	1035.0	1085.5	70.6	50.5
Junc 88	1165.0	1193.5	22.7	28.5

LINK Bsaira

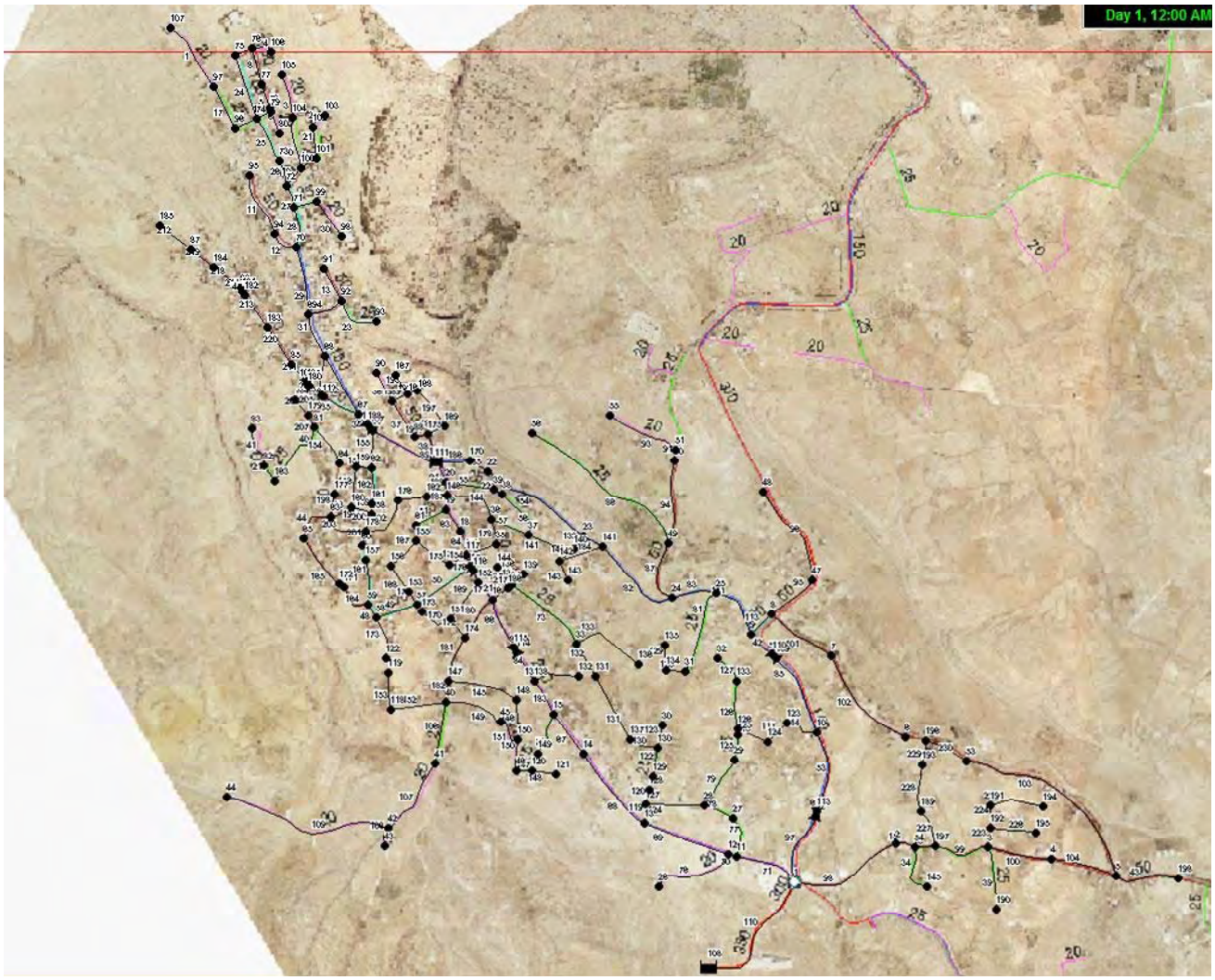
ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 1	267.1	20	110	−7.2	0.3	9.3	Open
Pipe 2	61.6	25	110	−22.8	0.5	26.5	Open
Pipe 3	161.6	25	110	−20.0	0.5	20.8	Open
Pipe 4	79.8	25	110	−20.0	0.5	20.8	Open
Pipe 5	92.1	50	110	22.8	0.1	0.9	Open
Pipe 6	85.8	25	110	−22.8	0.5	26.5	Open
Pipe 7	68.7	50	110	−108.6	0.6	16.3	Open
Pipe 8	135.7	50	110	42.8	0.3	2.9	Open
Pipe 9	68.7	50	110	−68.4	0.4	6.9	Open
Pipe 10	80.6	50	110	−134.0	0.8	24.1	Open
Pipe 11	240.0	50	110	−95.4	0.6	12.8	Open
Pipe 12	106.2	50	110	−171.8	1.0	38.1	Open
Pipe 13	138.0	50	110	−157.2	0.9	32.4	Open
Pipe 14	132.7	50	110	−275.2	1.6	91.3	Open
Pipe 17	173.6	50	110	−53.0	0.3	4.3	Open
Pipe 18	86.8	50	110	−111.2	0.7	17.1	Open
Pipe 19	57.6	50	110	45.6	0.3	3.3	Open
Pipe 20	188.1	50	110	−42.8	0.3	2.9	Open
Pipe 21	113.3	50	110	45.6	0.3	3.3	Open
Pipe 22	86.0	50	110	97.8	0.6	13.4	Open
Pipe 23	174.7	25	110	37.2	0.9	65.7	Open
Pipe 24	240.7	50	110	−165.2	1.0	35.5	Open
Pipe 25	176.5	100	110	−380.2	0.6	5.7	Open
Pipe 26	93.6	100	110	−403.0	0.6	6.3	Open
Pipe 27	86.4	150	110	−613.4	0.4	1.9	Open
Pipe 28	148.2	150	110	−787.5	0.5	3.0	Open
Pipe 29	245.1	150	110	−1121.0	0.7	5.8	Open
Pipe 30	153.5	25	110	21.4	0.5	23.6	Open
Pipe 31	167.6	200	110	−1455.3	0.5	2.3	Open
Pipe 32	258.4	200	110	−1525.8	0.6	2.5	Open
Pipe 33	51.6	200	110	−2155.7	0.8	4.8	Open
Pipe 35	141.5	100	110	−602.9	0.9	13.3	Open
Pipe 36	129.0	50	110	−37.2	0.2	2.2	Open
Pipe 37	155.2	50	110	−85.0	0.5	10.4	Open
Pipe 38	101.8	50	110	−211.9	1.3	56.3	Open
Pipe 40	266.0	50	110	94.6	0.6	12.6	Open
Pipe 41	153.3	20	110	7.2	0.3	9.3	Open
Pipe 44	151.7	50	110	134.1	0.8	24.1	Open
Pipe 48	58.8	50	110	−53.6	0.3	4.4	Open
Pipe 49	158.9	50	110	−80.6	0.5	9.4	Open
Pipe 50	238.9	50	110	−94.6	0.6	12.6	Open
Pipe 51	122.1	25	110	−24.8	0.6	31.0	Open
Pipe 54	425.0	50	110	53.4	0.3	4.4	Open
Pipe 55	173.0	50	110	−72.2	0.4	7.7	Open
Pipe 56	191.3	50	110	29.9	0.2	1.5	Open
Pipe 57	145.3	50	110	−97.1	0.6	13.3	Open
Pipe 61	85.5	200	110	−2946.3	1.1	8.6	Open
Pipe 63	95.9	200	110	−3126.8	1.2	9.6	Open
Pipe 64	90.2	200	110	−3151.6	1.2	9.8	Open
Pipe 66	194.9	200	110	−3950.8	1.5	14.8	Open
Pipe 67	180.6	200	110	−4030.4	1.5	15.4	Open
Pipe 68	335.8	200	110	−4046.4	1.5	15.5	Open
Pipe 69	327.2	200	110	−4016.6	1.5	15.3	Open
Pipe 70	33.9	200	110	−4023.5	1.5	15.3	Open
Pipe 71	234.0	200	110	−4200.3	1.6	16.6	Open
Pipe 73	327.5	50	110	112.2	0.7	17.3	Open
Pipe 74	214.4	25	110	16.0	0.4	13.8	Open
Pipe 76	308.9	20	110	−4.6	0.2	4.1	Open
Pipe 77	149.9	50	110	109.0	0.6	16.4	Open
Pipe 78	113.3	50	110	96.7	0.6	13.2	Open
Pipe 79	198.7	25	110	18.8	0.4	18.6	Open
Pipe 81	320.3	50	110	−62.7	0.4	5.9	Open
Pipe 82	362.6	50	110	−30.3	0.2	1.5	Open
Pipe 83	168.3	100	110	−225.8	0.3	2.2	Open
Pipe 85	315.7	100	110	−594.8	0.9	13.0	Open
Pipe 86	658.1	25	110	−22.6	0.5	26.1	Open
Pipe 87	235.9	50	110	147.8	0.9	28.9	Open
Pipe 91	39.6	50	110	−31.8	0.2	1.7	Open
Pipe 93	275.7	25	110	−28.2	0.7	39.3	Open
Pipe 94	303.3	50	110	−35.4	0.2	2.1	Open
Pipe 95	194.8	50	110	95.8	0.6	12.9	Open
Pipe 96	385.6	25	110	10.8	0.3	6.6	Open
Pipe 97	266.1	100	110	−701.5	1.0	17.7	Open
Pipe 98	433.0	100	110	318.5	0.5	4.1	Open
Pipe 99	204.7	100	110	192.4	0.3	1.6	Open
Pipe 100	237.7	50	110	114.0	0.7	17.9	Open
Pipe 101	267.3	50	110	53.6	0.3	4.4	Open
Pipe 102	413.9	50	110	17.8	0.1	0.6	Open
Pipe 103	742.7	25	110	−14.5	0.3	11.5	Open
Pipe 104	243.4	50	110	−57.6	0.3	5.0	Open
Pipe 106	225.8	50	110	55.4	0.3	4.7	Open
Pipe 107	298.0	50	110	30.8	0.2	1.6	Open
Pipe 108	71.0	25	110	2.3	0.1	0.4	Open
Pipe 109	628.8	20	110	7.2	0.3	9.3	Open
Pipe 110	498.0	250	110	5220.3	1.2	8.4	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 89	1168.0	1191.9	27.1	23.9
Junc 90	1165.0	1191.6	37.2	26.6
Junc 91	1105.0	1142.1	157.2	37.1
Junc 92	1100.0	1146.6	80.8	46.6
Junc 93	1100.0	1135.1	37.2	35.1
Junc 94	1105.0	1153.2	76.4	48.2
Junc 95	1105.0	1150.1	95.4	45.1
Junc 96	1105.0	1153.6	58.2	48.6
Junc 97	1100.0	1152.8	45.8	52.8
Junc 98	1090.0	1152.1	21.4	62.1
Junc 99	1100.0	1155.7	76.4	55.7
Junc 100	1115.0	1154.7	22.8	39.7
Junc 101	1105.0	1154.2	22.8	49.2
Junc 102	1105.0	1153.9	22.8	48.9
Junc 103	1100.0	1152.2	22.8	52.2
Junc 104	1120.0	1154.2	22.8	34.2
Junc 105	1130.0	1150.8	20.0	20.8
Junc 106	1135.0	1143.8	20.0	8.8
Junc 107	1100.0	1150.4	7.2	50.4
Junc 53	1220.0	1284.3	18.0	64.3
Junc 109	1205.0	1265.8	26.4	60.8
Junc 110	1205.0	1235.0	26.4	30.0
Junc 111	1170.0	1200.0	15.3	30.0
Junc 112	1110.0	1157.8	14.7	47.8
Junc 52	1245.0	1296.1	2.3	51.1
Junc 113	1245.0	1275.0	14.6	30.0
Junc 114	1245.0	1279.4	11.9	34.4
Junc 115	1245.0	1275.0	11.9	30.0
Junc 116	1205.0	1270.6	15.1	65.6
Junc 117	1205.0	1239.5	15.1	34.5
Junc 118	1210.0	1259.5	9.4	49.5
Junc 119	1205.0	1258.9	9.4	53.9
Junc 120	1243.0	1253.5	19.6	10.5
Junc 121	1245.0	1252.2	16.0	7.2
Junc 122	1195.0	1234.6	9.4	39.6
Junc 123	1235.0	1268.8	17.9	33.8
Junc 124	1250.0	1268.3	17.9	18.3
Junc 125	1253.0	1288.8	9.4	35.8
Junc 126	1250.0	1268.0	9.4	18.0
Junc 127	1253.0	1291.6	11.9	38.6
Junc 128	1248.0	1291.2	11.9	43.2
Junc 129	1243.0	1260.9	10.6	17.9
Junc 130	1237.0	1261.5	10.6	24.5
Junc 131	1237.0	1262.5	11.9	25.5
Junc 132	1250.0	1280.0	11.9	30.0
Junc 133	1232.0	1260.0	15.3	28.0
Junc 134	1200.0	1230.7	19.2	30.7
Junc 135	1190.0	1227.1	28.2	37.1
Junc 136	1210.0	1257.8	19.2	47.8
Junc 137	1235.0	1261.7	10.6	26.7
Junc 138	1250.0	1281.3	11.9	31.3
Junc 139	1210.0	1268.1	15.1	58.1
Junc 140	1185.0	1231.9	38.8	46.9
Junc 141	1183.0	1231.9	19.2	48.9
Junc 142	1195.0	1231.4	38.8	36.4
Junc 143	1198.0	1231.3	38.7	33.3
Junc 144	1210.0	1268.1	15.1	58.1
Junc 146	1180.0	1237.2	15.3	57.2
Junc 147	1228.0	1262.4	21.2	34.4
Junc 148	1238.0	1257.7	11.9	19.7
Junc 149	1250.0	1280.5	16.0	30.5
Junc 150	1242.0	1257.4	12.4	15.4
Junc 151	1215.0	1271.2	19.4	56.2
Junc 152	1217.0	1271.2	16.2	54.2
Junc 153	1200.0	1237.1	19.4	37.1
Junc 154	1200.0	1238.6	24.8	38.6
Junc 155	1185.0	1237.6	24.8	52.6
Junc 156	1185.0	1237.2	18.3	52.2
Junc 157	1175.0	1232.4	18.3	57.4
Junc 158	1145.0	1196.8	18.3	51.8
Junc 159	1135.0	1195.1	26.7	60.1
Junc 160	1143.0	1195.1	26.7	52.1
Junc 161	1145.0	1197.0	26.7	52.0
Junc 162	1165.0	1193.5	15.3	28.5
Junc 163	1110.0	1150.0	33.8	40.0
Junc 164	1097.0	1153.8	14.7	56.8
Junc 165	1095.0	1125.0	14.7	30.0
Junc 166	1173.0	1190.5	22.7	17.5
Junc 167	1160.0	1185.5	34.3	25.5
Junc 168	1175.0	1192.7	22.7	17.7
Junc 169	1173.0	1193.6	22.7	20.6
Junc 170	1175.0	1234.4	21.2	59.4
Junc 171	1170.0	1233.0	17.7	63.0
Junc 172	1165.0	1189.5	42.3	24.5
Junc 173	1205.0	1268.8	19.4	63.8
Junc 174	1225.0	1271.6	16.2	46.6
Junc 175	1168.0	1194.3	22.7	26.3
Junc 176	1155.0	1194.9	15.3	39.9
Junc 177	1135.0	1190.9	26.7	55.9

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 89	255.3	200	110	2608.0	1.0	6.9	Open
Pipe 90	48.9	200	110	3483.0	1.3	11.7	Open
Pipe 111	215.4	100	110	336.2	0.5	4.5	Open
Pipe 113	104.8	50	110	177.6	1.1	40.6	Open
Pipe 42	106.7	100	110	542.0	0.8	11.0	Open
Pipe 53	302.0	100	110	684.5	1.0	16.9	Open
Pipe 84	125.3	200	110	3974.5	1.5	15.0	Open
Pipe 114	127.4	50	110	75.9	0.5	8.4	Open
Pipe 117	97.2	50	110	58.0	0.3	5.1	Open
Pipe 118	118.8	50	110	40.1	0.2	2.6	Open
Pipe 119	69.1	50	110	-41.8	0.3	2.8	Open
Pipe 120	52.5	25	110	11.9	0.3	8.0	Open
Pipe 122	105.2	25	110	-10.6	0.3	6.4	Open
Pipe 123	84.2	25	110	10.6	0.3	6.4	Open
Pipe 124	213.3	50	110	-65.6	0.4	6.4	Open
Pipe 125	95.2	25	110	9.4	0.2	5.1	Open
Pipe 126	174.9	25	110	30.7	0.7	45.9	Open
Pipe 127	113.1	25	110	15.3	0.4	12.7	Open
Pipe 128	71.3	50	110	47.4	0.3	3.5	Open
Pipe 129	92.1	25	110	28.2	0.7	39.3	Open
Pipe 130	106.2	50	110	-31.8	0.2	1.7	Open
Pipe 131	264.8	50	110	-42.4	0.3	2.9	Open
Pipe 132	137.2	50	110	-54.3	0.3	4.5	Open
Pipe 133	275.0	25	110	19.2	0.5	19.3	Open
Pipe 134	166.9	25	110	11.9	0.3	8.0	Open
Pipe 135	59.6	25	110	14.3	0.3	11.2	Open
Pipe 136	104.5	25	110	-0.8	0.0	0.1	Open
Pipe 137	87.1	25	110	15.8	0.4	13.5	Open
Pipe 139	57.2	50	110	-2.8	0.0	0.0	Open
Pipe 140	68.8	50	110	70.4	0.4	7.3	Open
Pipe 141	176.5	50	110	112.0	0.7	17.3	Open
Pipe 142	164.2	25	110	7.1	0.2	3.1	Open
Pipe 143	75.9	50	110	38.7	0.2	2.4	Open
Pipe 144	215.3	50	110	-28.1	0.2	1.3	Open
Pipe 145	266.0	25	110	18.3	0.4	17.6	Open
Pipe 146	143.7	25	110	6.4	0.2	2.5	Open
Pipe 147	56.8	25	110	35.6	0.8	60.5	Open
Pipe 148	89.8	25	110	16.0	0.4	13.8	Open
Pipe 149	225.8	50	110	71.0	0.4	7.4	Open
Pipe 150	113.7	50	110	52.6	0.3	4.3	Open
Pipe 151	114.9	50	110	58.6	0.4	5.2	Open
Pipe 152	202.8	50	110	18.8	0.1	0.6	Open
Pipe 153	132.8	25	110	9.4	0.2	5.1	Open
Pipe 154	162.9	50	110	26.7	0.2	1.2	Open
Pipe 155	137.3	100	110	371.1	0.6	5.4	Open
Pipe 156	150.0	25	110	2.9	0.1	0.6	Open
Pipe 157	55.1	25	110	29.5	0.7	42.8	Open
Pipe 159	42.4	100	110	288.2	0.4	3.4	Open
Pipe 161	163.1	25	110	18.3	0.4	17.6	Open
Pipe 162	129.8	100	110	314.8	0.5	4.0	Open
Pipe 163	84.3	50	110	104.0	0.6	15.1	Open
Pipe 164	134.4	25	110	17.7	0.4	16.5	Open
Pipe 165	213.7	50	110	42.3	0.3	2.8	Open
Pipe 167	131.4	50	110	43.0	0.3	2.9	Open
Pipe 168	113.0	50	110	24.7	0.2	1.1	Open
Pipe 169	170.0	50	110	-13.7	0.1	0.4	Open
Pipe 170	124.8	25	110	19.4	0.5	19.6	Open
Pipe 171	59.2	25	110	-5.4	0.1	1.8	Open
Pipe 172	86.6	50	110	52.4	0.3	4.2	Open
Pipe 173	166.6	25	110	9.4	0.2	5.1	Open
Pipe 174	69.9	50	110	92.6	0.6	12.1	Open
Pipe 175	151.1	50	110	67.8	0.4	6.8	Open
Pipe 176	48.3	200	110	-3358.3	1.2	11.0	Open
Pipe 177	81.7	200	110	3485.4	1.3	11.8	Open
Pipe 178	95.8	50	110	-84.1	0.5	10.2	Open
Pipe 179	115.1	50	110	99.1	0.6	13.8	Open
Pipe 180	171.4	100	110	274.5	0.4	3.1	Open
Pipe 181	171.4	50	110	205.9	1.2	53.4	Open
Pipe 182	77.1	50	110	166.4	1.0	36.0	Open
Pipe 183	141.0	200	110	3998.4	1.5	15.2	Open
Pipe 184	78.9	50	110	-4.0	0.0	0.0	Open
Pipe 185	77.4	50	110	-74.6	0.4	8.1	Open
Pipe 186	122.1	50	110	-95.7	0.6	12.9	Open
Pipe 187	50.3	200	110	-3077.2	1.1	9.3	Open
Pipe 188	50.3	200	110	3033.8	1.1	9.1	Open
Pipe 189	67.8	50	110	81.6	0.5	9.6	Open
Pipe 190	49.0	50	110	107.6	0.6	16.1	Open
Pipe 191	62.4	25	110	20.7	0.5	22.1	Open
Pipe 192	35.7	25	110	-36.3	0.9	62.6	Open
Pipe 193	89.5	25	110	34.3	0.8	56.4	Open
Pipe 195	107.9	25	110	15.3	0.4	12.7	Open
Pipe 197	168.2	50	110	58.9	0.4	5.3	Open
Pipe 198	80.3	25	110	26.7	0.6	35.4	Open
Pipe 199	80.8	50	110	-127.8	0.8	22.1	Open
Pipe 200	62.4	50	110	142.2	0.8	26.9	Open
Pipe 201	54.5	25	110	18.3	0.4	17.6	Open
Pipe 202	187.1	50	110	30.6	0.2	1.6	Open
Pipe 203	167.2	50	110	75.0	0.4	8.2	Open
Pipe 205	90.9	50	110	165.2	1.0	35.5	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 178	1155.0	1195.2	18.3	40.2
Junc 179	1103.0	1154.6	14.7	51.6
Junc 180	1095.0	1157.3	14.7	62.3
Junc 181	1060.0	1090.1	38.8	30.1
Junc 182	1060.0	1090.9	74.6	30.9
Junc 183	1067.0	1103.5	59.1	36.5
Junc 184	1045.0	1086.6	38.8	41.6
Junc 185	1000.0	1084.5	10.8	84.5
Junc 186	1220.0	1269.3	16.2	49.3
Junc 187	1130.0	1198.0	27.1	68.0
Junc 188	1130.0	1160.0	27.1	30.0
Junc 189	1245.0	1291.1	9.0	46.1
Junc 191	1245.0	1298.1	9.0	53.1
Junc 192	1255.0	1298.1	9.0	43.1
Junc 193	1225.0	1285.7	10.6	60.7
Junc 194	1245.0	1293.1	12.3	48.1
Junc 195	1255.0	1293.9	12.3	38.9
Junc 196	1215.0	1284.7	10.6	69.7
Junc 197	1265.0	1298.7	9.0	33.7
Junc 54	1265.0	1298.8	9.0	33.8
Junc 145	1280.0	1298.7	23.0	18.7
Junc 190	1288.0	1298.2	18.0	10.2
Junc 198	1275.0	1291.2	11.3	16.2
Resvr 108	1305.0	1305.0	−5220.3	0.0

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 206	74.5	25	110	14.7	0.4	11.7	Open
Pipe 207	50.1	50	110	135.9	0.8	24.7	Open
Pipe 208	167.6	25	110	−11.4	0.3	7.3	Open
Pipe 209	12.1	100	110	434.4	0.6	7.3	Open
Pipe 210	68.2	100	110	419.7	0.6	6.8	Open
Pipe 211	83.8	100	110	390.4	0.6	6.0	Open
Pipe 212	142.3	25	110	10.8	0.3	6.6	Open
Pipe 213	141.7	50	110	272.2	1.6	89.5	Open
Pipe 214	16.2	50	110	158.9	0.9	33.0	Open
Pipe 215	67.5	25	110	60.8	1.4	163.1	Open
Pipe 216	71.8	50	110	174.7	1.0	39.3	Open
Pipe 217	18.8	50	110	142.7	0.8	27.1	Open
Pipe 218	125.2	50	100	120.1	0.7	23.5	Open
Pipe 219	103.8	50	100	81.4	0.5	11.4	Open
Pipe 220	162.9	50	110	331.3	2.0	128.7	Open
Pipe 221	36.9	50	110	−51.0	0.3	4.0	Open
Pipe 222	11.1	150	100	2209.9	1.5	24.5	Open
Pipe 223	72.8	50	110	42.5	0.3	2.9	Open
Pipe 224	83.5	50	110	21.3	0.1	0.8	Open
Pipe 225	199.5	20	110	12.3	0.5	25.1	Open
Pipe 226	168.7	20	110	12.3	0.5	25.1	Open
Pipe 227	140.0	25	110	33.6	0.8	54.4	Open
Pipe 228	174.8	25	110	24.7	0.6	30.7	Open
Pipe 229	91.2	25	110	14.1	0.3	10.8	Open
Pipe 230	165.8	20	110	−3.5	0.1	2.4	Open
Pipe 15	77.1	100	110	266.9	0.4	3.0	Open
Pipe 16	71.9	100	110	235.0	0.4	2.3	Open
Pipe 34	182.3	50	110	23.0	0.1	0.9	Open
Pipe 39	227.3	50	110	18.0	0.1	0.6	Open
Pipe 43	238.0	25	110	11.3	0.3	7.2	Open
Pipe 45	15.0	50	110	197.6	1.2	49.5	Open
Valve 115	#N/A	200	#N/A	2835.2	1.0	36.0	Active
Valve 52	#N/A	100	#N/A	568.4	0.8	30.8	Active
Valve 65	#N/A	100	#N/A	699.2	1.0	21.1	Active
Valve 88	#N/A	200	#N/A	3962.6	1.5	4.4	Active
Valve 92	#N/A	200	#N/A	3468.0	1.3	30.6	Active
Valve 105	#N/A	100	#N/A	405.1	0.6	32.3	Active
Valve 116	#N/A	200	#N/A	2182.8	0.8	38.0	Active


Day 1, 12:00 AM

3）ガランダール

NODE Gharandal

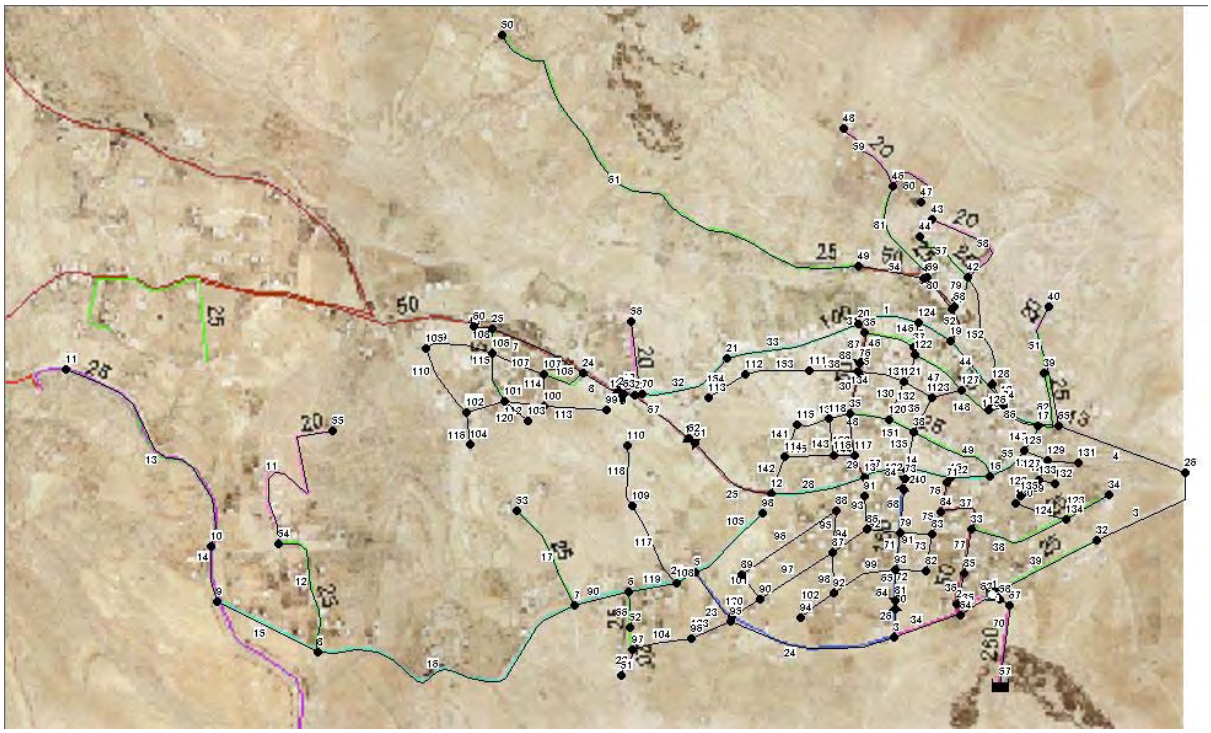
ID	Elevation m	Demand m3/d	Head m	Pressure m
Junc 1	1415.0	1468.1	0.0	53.1
Junc 2	1408.0	1430.0	4.8	22.0
Junc 3	1415.0	1466.6	4.8	51.6
Junc 4	1405.0	1431.6	13.2	26.6
Junc 5	1380.0	1431.1	12.4	51.1
Junc 6	1390.0	1423.9	12.4	33.9
Junc 7	1390.0	1417.5	35.8	27.5
Junc 8	1375.0	1396.4	52.8	21.4
Junc 9	1355.0	1379.1	4.6	24.1
Junc 10	1345.0	1372.5	7.2	27.5
Junc 11	1300.0	1354.1	23.0	54.1
Junc 12	1365.0	1397.8	19.2	32.8
Junc 13	1365.0	1399.1	23.3	34.1
Junc 14	1365.0	1399.9	43.6	34.9
Junc 15	1365.0	1397.7	15.8	32.7
Junc 16	1364.0	1396.2	15.9	32.2
Junc 17	1345.0	1393.7	22.1	48.7
Junc 18	1340.0	1361.8	22.1	21.8
Junc 19	1335.0	1362.0	48.9	27.0
Junc 20	1330.0	1369.5	28.9	39.5
Junc 21	1330.0	1368.9	21.2	38.9
Junc 22	1315.0	1369.3	10.6	54.3
Junc 23	1310.0	1345.0	10.6	35.0
Junc 24	1300.0	1344.7	45.9	44.7
Junc 25	1275.0	1342.2	11.3	67.2
Junc 32	1400.0	1467.3	12.3	67.3
Junc 33	1385.0	1430.8	15.8	45.8
Junc 34	1385.0	1428.8	12.3	43.8
Junc 35	1350.0	1398.5	34.7	48.5
Junc 36	1330.0	1369.6	28.9	39.6
Junc 37	1343.0	1366.3	48.9	23.3
Junc 38	1360.0	1396.8	43.6	36.8
Junc 39	1365.0	1390.5	17.9	25.5
Junc 40	1395.0	1436.2	17.9	41.2
Junc 41	1330.0	1360.7	48.9	30.7
Junc 42	1350.0	1418.9	19.4	68.9
Junc 43	1380.0	1413.4	19.4	33.4
Junc 44	1360.0	1415.5	19.4	55.5
Junc 45	1335.0	1360.3	19.4	25.3
Junc 46	1365.0	1415.5	0.0	50.5
Junc 47	1380.0	1412.2	19.4	32.2
Junc 48	1395.0	1407.2	28.2	12.2
Junc 49	1320.0	1360.0	24.6	40.0
Junc 50	1325.0	1358.3	4.6	33.3
Junc 51	1420.0	1460.9	7.2	40.9
Junc 52	1405.0	1423.9	12.4	18.9
Junc 53	1360.0	1415.4	10.8	55.4
Junc 54	1345.0	1395.0	46.0	50.0
Junc 55	1295.0	1392.7	4.6	97.7
Junc 56	1290.0	1336.2	28.2	46.2
Junc 65	1345.0	1441.8	22.1	96.8
Junc 67	1415.0	1468.5	14.1	53.5
Junc 68	1330.0	1417.2	48.9	87.2
Junc 69	1335.0	1416.5	19.4	81.5
Junc 70	1315.0	1368.9	10.6	53.9
Junc 71	1370.0	1430.8	15.8	60.8
Junc 72	1370.0	1433.8	15.8	63.8
Junc 73	1370.0	1400.0	15.8	30.0
Junc 74	1340.0	1393.7	22.1	53.7
Junc 75	1340.0	1397.0	28.9	57.0
Junc 76	1340.0	1370.0	28.9	30.0
Junc 61	1340.0	1396.7	10.6	56.7
Junc 62	1340.0	1370.0	10.6	30.0
Junc 63	1310.0	1369.2	10.6	59.2
Junc 58	1415.0	1468.3	14.1	53.3
Junc 60	1275.0	1341.9	11.3	66.9
Junc 64	1410.0	1467.6	4.8	57.6
Junc 79	1383.0	1434.1	15.8	51.1
Junc 80	1405.0	1466.2	4.8	61.2
Junc 81	1405.0	1435.0	4.8	30.0
Junc 82	1395.0	1433.4	4.8	38.4
Junc 83	1383.0	1432.8	15.8	49.8
Junc 84	1373.0	1431.9	15.8	58.9
Junc 85	1395.0	1430.1	4.8	35.1
Junc 86	1382.0	1433.5	23.3	51.5
Junc 87	1389.0	1432.9	23.3	43.9
Junc 88	1375.0	1430.6	23.3	55.6
Junc 89	1390.0	1430.8	13.2	40.8
Junc 90	1402.0	1431.9	13.2	29.9
Junc 91	1372.0	1431.0	23.3	59.0
Junc 92	1402.0	1433.1	35.3	31.1
Junc 93	1383.0	1434.6	4.8	51.6
Junc 94	1405.0	1432.9	35.3	27.9

LINK Gharandal

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 7	270.3	50	110	−80.2	0.5	9.3	Open
Pipe 8	108.5	100	110	−246.3	0.4	2.5	Open
Pipe 9	28.7	100	110	−295.6	0.4	3.6	Open
Pipe 10	224.9	25	110	28.2	0.7	39.3	Open
Pipe 11	557.5	20	110	−4.6	0.2	4.1	Open
Pipe 12	356.8	50	110	−50.6	0.3	4.0	Open
Pipe 13	679.6	25	110	−23.0	0.5	27.0	Open
Pipe 14	149.8	25	110	−30.2	0.7	44.6	Open
Pipe 15	297.0	25	110	−34.8	0.8	58.0	Open
Pipe 16	826.8	50	110	−138.2	0.8	25.5	Open
Pipe 17	301.4	25	110	10.8	0.3	6.6	Open
Pipe 20	88.5	20	110	7.2	0.3	9.3	Open
Pipe 21	56.6	100	110	−254.0	0.4	2.7	Open
Pipe 23	153.7	100	110	−285.6	0.4	3.3	Open
Pipe 24	452.2	50	110	−45.2	0.3	3.2	Open
Pipe 25	254.8	100	110	−327.4	0.5	4.3	Open
Pipe 26	74.8	200	110	2266.4	0.8	5.3	Open
Pipe 27	114.4	150	110	−1280.9	0.8	7.5	Open
Pipe 28	254.0	100	110	−355.7	0.5	5.0	Open
Pipe 29	65.3	150	110	901.9	0.6	3.9	Open
Pipe 30	114.4	100	110	602.8	0.9	13.3	Open
Pipe 31	27.5	100	110	193.4	0.3	1.6	Open
Pipe 32	260.2	50	110	−10.6	0.1	0.2	Open
Pipe 33	362.5	50	110	−31.8	0.2	1.7	Open
Pipe 34	183.9	200	110	−2316.4	0.9	5.5	Open
Pipe 35	102.3	200	110	−2321.2	0.9	5.5	Open
Pipe 36	84.1	25	110	−4.8	0.1	1.5	Open
Pipe 37	153.7	50	110	−69.5	0.4	7.1	Open
Pipe 38	269.9	50	110	44.1	0.3	3.1	Open
Pipe 39	311.6	100	110	248.5	0.4	2.6	Open
Pipe 40	122.2	50	110	116.9	0.7	18.7	Open
Pipe 44	208.6	50	110	−22.1	0.1	0.9	Open
Pipe 46	138.8	50	110	133.6	0.8	24.0	Open
Pipe 47	158.5	50	110	22.0	0.1	0.9	Open
Pipe 48	103.9	50	110	102.8	0.6	14.7	Open
Pipe 49	249.1	50	110	38.0	0.2	2.3	Open
Pipe 51	331.6	25	110	17.9	0.4	16.9	Open
Pipe 52	98.9	50	110	97.5	0.6	13.4	Open
Pipe 53	110.6	50	110	48.6	0.3	3.7	Open
Pipe 54	177.8	50	110	29.2	0.2	1.4	Open
Pipe 57	173.1	25	110	19.4	0.5	19.7	Open
Pipe 58	279.9	25	110	19.4	0.5	19.7	Open
Pipe 59	210.2	25	110	28.2	0.7	39.3	Open
Pipe 60	170.2	25	110	19.4	0.5	19.7	Open
Pipe 61	1229.0	25	110	4.6	0.1	1.4	Open
Pipe 70	217.4	200	110	2597.9	1.0	6.8	Open
Pipe 74	225.6	50	110	196.2	1.2	48.8	Open
Pipe 79	90.9	50	110	−115.9	0.7	18.4	Open
Pipe 80	108.0	50	110	67.0	0.4	6.7	Open
Pipe 81	284.7	50	110	47.6	0.3	3.5	Open
Pipe 82	103.7	50	110	101.1	0.6	14.3	Open
Pipe 83	29.5	200	110	2583.8	1.0	6.8	Open
Pipe 86	113.9	50	110	−13.3	0.1	0.3	Open
Pipe 87	83.0	100	110	355.9	0.5	5.0	Open
Pipe 90	147.6	50	110	184.8	1.1	43.7	Open
Pipe 55	117.6	50	110	123.2	0.7	20.6	Open
Pipe 62	187.8	25	110	17.9	0.4	16.9	Open
Pipe 66	93.8	50	110	12.4	0.1	0.3	Open
Pipe 67	183.9	100	110	306.2	0.5	3.8	Open
Pipe 43	49.8	25	110	11.3	0.3	7.2	Open
Pipe 63	28.7	200	110	2569.7	1.0	6.7	Open
Pipe 65	83.1	200	110	2256.8	0.8	5.3	Open
Pipe 68	116.6	200	110	1625.5	0.6	2.9	Open
Pipe 71	98.4	200	110	2160.8	0.8	4.9	Open
Pipe 72	83.1	25	110	15.8	0.4	13.5	Open
Pipe 73	97.3	25	110	11.0	0.3	6.9	Open
Pipe 75	63.2	50	110	101.2	0.6	14.3	Open
Pipe 76	81.2	25	110	15.8	0.4	13.5	Open
Pipe 77	117.9	25	110	9.6	0.2	5.3	Open
Pipe 91	84.5	50	110	106.0	0.6	15.6	Open
Pipe 92	88.7	100	110	413.5	0.6	6.6	Open
Pipe 93	91.2	25	110	23.3	0.6	27.6	Open
Pipe 94	109.8	100	110	367.0	0.5	5.3	Open
Pipe 95	110.7	25	110	20.2	0.5	21.2	Open
Pipe 96	302.8	25	110	−3.1	0.1	0.7	Open
Pipe 97	231.9	100	110	328.2	0.5	4.3	Open
Pipe 98	107.8	25	110	−4.8	0.1	1.5	Open
Pipe 99	179.8	50	110	75.4	0.4	8.3	Open
Pipe 100	86.1	100	110	298.8	0.4	3.6	Open
Pipe 101	81.0	25	110	16.3	0.4	14.2	Open
Pipe 102	108.8	50	110	35.3	0.2	2.0	Open
Pipe 103	115.7	50	110	32.0	0.2	1.7	Open
Pipe 104	160.1	25	110	19.6	0.5	20.0	Open

ID	Elevation m	Demand m3/d	Head m	Pressure m
Junc 95	1405.0	1465.1	13.2	60.1
Junc 96	1403.0	1464.9	12.4	61.9
Junc 97	1410.0	1461.7	12.4	51.7
Junc 98	1370.0	1426.4	19.2	56.4
Junc 99	1310.0	1340.7	10.6	30.7
Junc 100	1303.0	1341.8	14.1	38.8
Junc 101	1300.0	1341.5	23.5	41.5
Junc 102	1300.0	1341.1	23.5	41.1
Junc 103	1312.0	1338.9	14.1	26.9
Junc 104	1320.0	1338.7	23.5	18.7
Junc 105	1260.0	1341.0	11.3	81.0
Junc 106	1275.0	1341.9	11.3	66.9
Junc 107	1277.0	1342.3	45.9	65.3
Junc 108	1385.0	1430.9	12.4	45.9
Junc 109	1355.0	1419.1	21.4	64.1
Junc 110	1325.0	1416.0	10.6	91.0
Junc 111	1343.0	1395.7	28.9	52.7
Junc 112	1337.0	1395.0	21.2	58.0
Junc 113	1335.0	1394.8	32.0	59.8
Junc 114	1358.0	1397.3	32.0	39.3
Junc 115	1353.0	1397.8	34.7	44.8
Junc 116	1360.0	1398.5	34.7	38.5
Junc 117	1358.0	1398.8	34.7	40.8
Junc 118	1353.0	1398.1	34.7	45.1
Junc 120	1357.0	1397.0	43.6	40.0
Junc 121	1350.0	1395.0	43.6	45.0
Junc 122	1343.0	1394.4	48.9	51.4
Junc 123	1355.0	1395.0	43.6	40.0
Junc 124	1335.0	1365.6	48.9	30.6
Junc 125	1353.0	1393.8	22.1	40.8
Junc 126	1345.0	1393.8	22.1	48.8
Junc 127	1345.0	1394.2	43.6	49.2
Junc 128	1338.0	1430.8	22.1	92.8
Junc 129	1360.0	1393.2	22.1	33.2
Junc 130	1375.0	1428.0	15.9	53.0
Junc 131	1368.0	1393.1	4.6	25.1
Junc 132	1370.0	1392.4	15.9	22.4
Junc 133	1362.0	1393.0	15.9	31.0
Junc 134	1390.0	1429.9	15.9	39.9
Junc 135	1370.0	1392.1	15.9	22.1
Junc 26	1360.0	1466.6	0.0	106.6
Resvr 57	1470.0	1470.0	−2597.9	0.0

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 105	243.8	25	110	−19.2	0.5	19.3	Open
Pipe 106	121.2	50	110	120.2	0.7	19.7	Open
Pipe 107	149.4	25	110	7.1	0.2	3.1	Open
Pipe 108	64.9	50	110	57.6	0.3	5.1	Open
Pipe 109	184.2	25	110	9.1	0.2	4.8	Open
Pipe 110	206.2	25	110	−2.2	0.1	0.4	Open
Pipe 111	102.8	50	110	−49.3	0.3	3.8	Open
Pipe 112	107.4	50	110	−42.5	0.3	2.9	Open
Pipe 113	166.5	25	110	10.6	0.3	6.4	Open
Pipe 114	85.8	50	110	67.2	0.4	6.7	Open
Pipe 115	137.9	50	110	44.4	0.3	3.1	Open
Pipe 116	83.5	25	110	23.5	0.6	28.1	Open
Pipe 117	237.8	25	110	32.0	0.8	49.6	Open
Pipe 118	164.5	20	110	10.6	0.4	19.0	Open
Pipe 119	127.7	50	110	209.6	1.2	55.1	Open
Pipe 120	79.6	20	110	14.1	0.5	32.3	Open
Pipe 122	22.9	200	110	1593.9	0.6	2.8	Open
Pipe 123	133.5	25	110	12.3	0.3	8.5	Open
Pipe 124	139.9	25	110	15.9	0.4	13.6	Open
Pipe 125	67.8	50	110	74.4	0.4	8.1	Open
Pipe 126	79.5	25	110	4.6	0.1	1.4	Open
Pipe 127	56.9	50	110	47.7	0.3	3.6	Open
Pipe 128	65.5	25	110	15.9	0.4	13.6	Open
Pipe 129	44.1	25	110	15.9	0.4	13.6	Open
Pipe 130	108.5	25	110	18.6	0.4	18.1	Open
Pipe 131	81.3	50	110	70.9	0.4	7.4	Open
Pipe 132	88.0	50	110	11.1	0.1	0.2	Open
Pipe 133	79.0	50	110	79.1	0.5	9.1	Open
Pipe 134	124.3	50	110	107.0	0.6	15.9	Open
Pipe 135	104.0	50	110	152.5	0.9	30.6	Open
Pipe 136	104.6	50	110	111.6	0.7	17.2	Open
Pipe 138	129.1	50	110	82.1	0.5	9.7	Open
Pipe 139	59.1	50	110	69.7	0.4	7.2	Open
Pipe 140	88.0	50	110	44.4	0.3	3.1	Open
Pipe 141	88.7	25	110	9.7	0.2	5.5	Open
Pipe 142	106.5	25	110	−9.1	0.2	4.8	Open
Pipe 143	96.9	25	110	−9.4	0.2	5.1	Open
Pipe 144	57.1	50	110	57.3	0.3	5.0	Open
Pipe 145	129.3	25	110	13.2	0.3	9.7	Open
Pipe 146	65.3	50	110	−84.7	0.5	10.3	Open
Pipe 147	76.8	50	110	26.7	0.2	1.2	Open
Pipe 148	91.6	50	110	57.5	0.3	5.0	Open
Pipe 149	44.0	50	110	35.4	0.2	2.0	Open
Pipe 150	110.2	150	110	810.0	0.5	3.2	Open
Pipe 151	72.8	50	110	40.6	0.2	2.6	Open
Pipe 152	304.6	50	110	174.1	1.0	39.1	Open
Pipe 153	172.1	50	110	53.2	0.3	4.4	Open
Pipe 154	116.0	50	110	32.0	0.2	1.7	Open
Pipe 1	167.1	50	110	132.7	0.8	23.6	Open
Pipe 2	97.5	50	110	168.5	1.0	36.8	Open
Pipe 3	329.9	100	110	236.2	0.4	2.4	Open
Pipe 4	359.4	50	110	−236.2	1.4	68.8	Open
Valve 84	#N/A	200	#N/A	1609.7	0.6	33.8	Active
Valve 88	#N/A	100	#N/A	384.8	0.6	27.0	Active
Valve 19	#N/A	100	#N/A	316.8	0.5	26.7	Active
Valve 64	#N/A	200	#N/A	2261.6	0.8	31.2	Active
Valve 121	#N/A	100	#N/A	285.1	0.4	24.2	Active



4）カデシエ

NODE Qhadesiyeh

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 1	1580.0	1596.5	3.6	16.5
Junc 2	1575.0	1595.6	13.6	20.6
Junc 3	1570.0	1594.0	30.0	24.0
Junc 4	1550.0	1590.0	38.7	40.0
Junc 5	1530.0	1587.1	18.7	57.1
Junc 6	1505.0	1557.1	40.2	52.1
Junc 7	1495.0	1525.0	34.2	30.0
Junc 8	1495.0	1523.7	34.2	28.7
Junc 9	1490.0	1522.9	34.2	32.9
Junc 10	1480.0	1521.3	36.7	41.3
Junc 11	1450.0	1484.9	46.4	34.9
Junc 12	1430.0	1484.0	15.0	54.0
Junc 13	1430.0	1483.6	15.0	53.6
Junc 14	1440.0	1482.9	45.5	42.9
Junc 15	1440.0	1482.6	20.0	42.6
Junc 16	1435.0	1478.8	13.2	43.8
Junc 17	1425.0	1474.8	13.2	49.8
Junc 18	1405.0	1449.1	54.0	44.1
Junc 19	1405.0	1448.7	31.8	43.7
Junc 20	1390.0	1447.8	50.0	57.8
Junc 21	1360.0	1436.2	57.6	76.2
Junc 22	1485.0	1522.9	43.7	37.9
Junc 23	1470.0	1521.4	56.7	51.4
Junc 24	1465.0	1521.1	73.4	56.1
Junc 25	1455.0	1485.0	73.4	30.0
Junc 26	1445.0	1483.9	73.4	38.9
Junc 27	1430.0	1483.6	15.0	53.6
Junc 28	1570.0	1596.0	3.4	26.0
Junc 29	1545.0	1587.2	44.6	42.2
Junc 30	1540.0	1584.9	84.6	44.9
Junc 31	1535.0	1583.4	23.7	48.4
Junc 32	1530.0	1582.0	23.7	52.0
Junc 33	1525.0	1581.4	23.7	56.4
Junc 34	1515.0	1580.8	4.6	65.8
Junc 35	1515.0	1574.1	23.7	59.1
Junc 36	1520.0	1559.9	20.0	39.9
Junc 37	1485.0	1524.7	54.2	39.7
Junc 38	1485.0	1521.3	34.2	36.3
Junc 39	1485.0	1520.0	53.7	35.0
Junc 40	1485.0	1519.2	33.7	34.2
Junc 41	1475.0	1518.7	32.2	43.7
Junc 42	1480.0	1519.3	42.2	39.3
Junc 43	1485.0	1519.3	43.7	34.3
Junc 44	1480.0	1523.7	20.0	43.7
Junc 45	1460.0	1516.7	7.2	56.7
Junc 46	1495.0	1556.1	34.2	61.1
Junc 47	1500.0	1556.3	15.2	56.3
Junc 48	1495.0	1523.6	31.1	28.6
Junc 49	1490.0	1521.1	31.1	31.1
Junc 50	1490.0	1520.3	21.1	30.3
Junc 51	1485.0	1519.4	26.7	34.4
Junc 52	1475.0	1518.6	22.4	43.6
Junc 53	1495.0	1520.4	16.1	25.4
Junc 54	1495.0	1520.4	16.1	25.4
Junc 55	1475.0	1519.9	46.7	44.9
Junc 56	1445.0	1518.3	56.4	73.3
Junc 57	1455.0	1479.8	43.4	24.8
Junc 58	1460.0	1477.5	25.7	17.5
Junc 59	1455.0	1476.8	25.7	21.8
Junc 60	1440.0	1473.1	51.3	33.1
Junc 61	1475.0	1520.5	53.7	45.5
Junc 62	1475.0	1519.5	42.2	44.5
Junc 63	1445.0	1484.7	40.0	39.7
Junc 64	1420.0	1467.0	14.1	47.0
Junc 65	1420.0	1465.9	22.1	45.9
Junc 66	1425.0	1464.2	10.0	39.2
Junc 67	1410.0	1453.7	50.2	43.7
Junc 68	1410.0	1451.1	31.8	41.1
Junc 69	1420.0	1437.8	16.0	17.8
Junc 70	1415.0	1449.7	13.8	34.7
Junc 71	1465.0	1519.3	42.2	54.3
Junc 72	1470.0	1519.4	42.2	49.4
Junc 73	1445.0	1479.8	51.3	34.8
Junc 74	1455.0	1477.5	41.3	22.5
Junc 75	1450.0	1477.1	41.3	27.1
Junc 76	1435.0	1469.9	25.8	34.9
Junc 77	1425.0	1482.7	15.0	57.7
Junc 78	1430.0	1482.4	25.8	52.4
Junc 79	1420.0	1474.2	25.8	54.2
Junc 80	1455.0	1482.0	16.4	27.0
Junc 81	1435.0	1481.1	20.0	46.1
Junc 82	1450.0	1480.6	30.0	30.6
Junc 83	1415.0	1471.6	20.0	56.6

LINK Qhadesiyeh

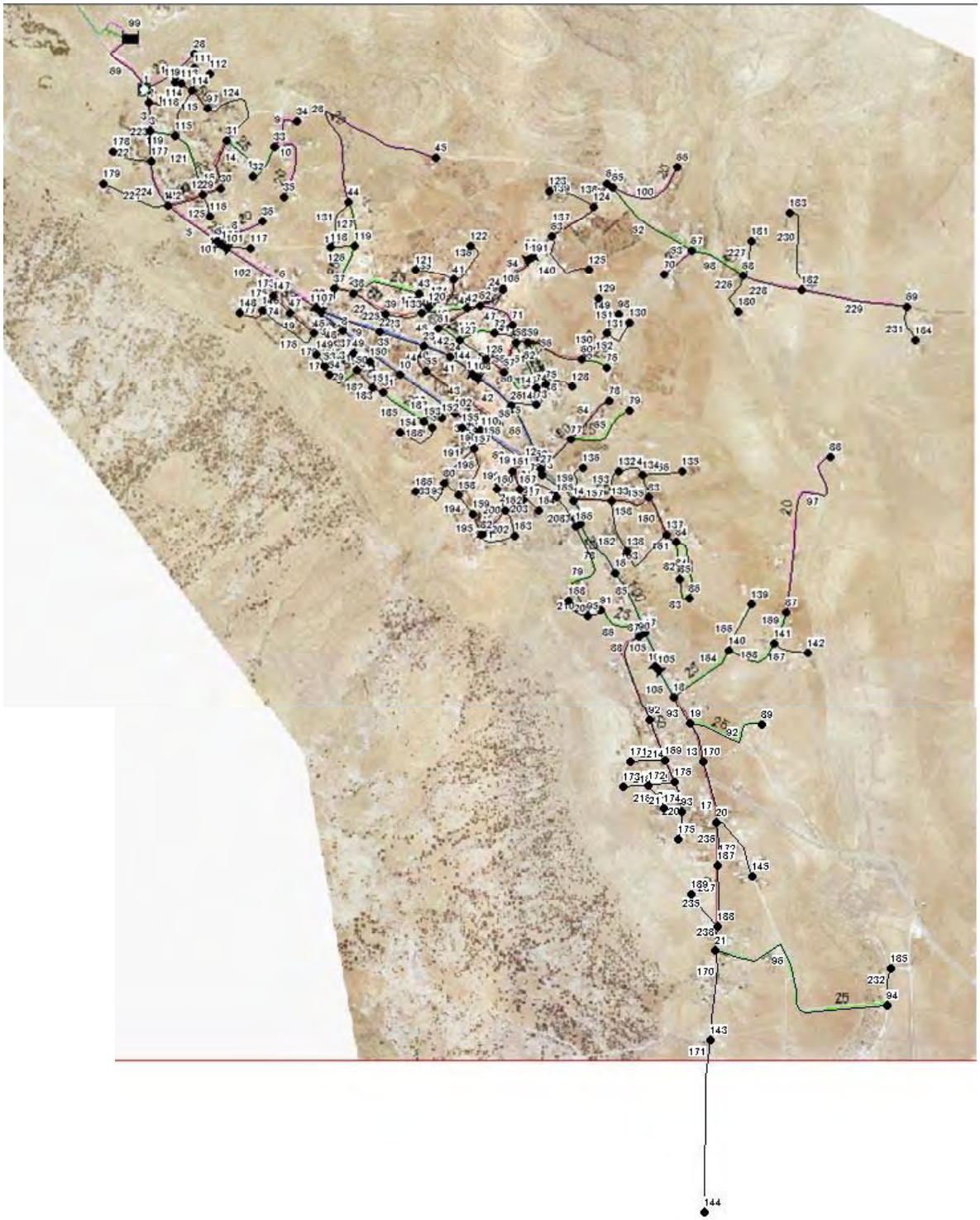
ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 1	214.4	20	110	3.4	0.1	2.3	Open
Pipe 2	48.9	200	110	4300.1	1.6	17.3	Open
Pipe 3	101.5	200	110	4160.9	1.5	16.3	Open
Pipe 5	211.6	200	110	3785.8	1.4	13.7	Open
Pipe 7	152.4	200	110	3544.9	1.3	12.1	Open
Pipe 8	177.0	50	110	20.0	0.1	0.7	Open
Pipe 9	146.0	20	110	−4.6	0.2	4.1	Open
Pipe 10	257.6	25	110	23.7	0.6	28.5	Open
Pipe 11	149.1	50	110	125.6	0.7	21.4	Open
Pipe 14	165.9	50	110	75.7	0.5	8.4	Open
Pipe 15	133.2	50	110	52.0	0.3	4.2	Open
Pipe 16	181.0	50	110	−77.4	0.5	8.7	Open
Pipe 19	105.2	50	110	29.7	0.2	1.5	Open
Pipe 20	88.4	100	110	305.3	0.5	3.8	Open
Pipe 21	68.4	50	110	195.9	1.2	48.6	Open
Pipe 22	132.2	50	110	85.5	0.5	10.5	Open
Pipe 23	129.1	50	110	61.5	0.4	5.7	Open
Pipe 25	158.2	50	110	−12.0	0.1	0.3	Open
Pipe 26	247.5	50	110	76.2	0.5	8.5	Open
Pipe 28	750.5	20	110	7.2	0.3	9.3	Open
Pipe 29	120.8	50	110	17.4	0.1	0.6	Open
Pipe 30	110.5	50	110	−64.6	0.4	6.2	Open
Pipe 31	77.9	50	110	−31.1	0.2	1.6	Open
Pipe 32	106.2	150	110	1683.2	1.1	12.4	Open
Pipe 33	65.3	150	110	1617.9	1.1	11.5	Open
Pipe 34	185.7	150	110	1391.2	0.9	8.7	Open
Pipe 36	62.2	50	110	−96.8	0.6	13.2	Open
Pipe 37	38.8	50	110	−192.5	1.1	47.1	Open
Pipe 38	214.5	150	110	1502.2	1.0	10.0	Open
Pipe 40	99.0	150	110	749.4	0.5	2.8	Open
Pipe 41	103.4	150	110	676.0	0.4	2.3	Open
Pipe 42	155.4	100	110	427.0	0.6	7.0	Open
Pipe 43	313.1	50	110	−56.4	0.3	4.9	Open
Pipe 44	102.4	50	110	−103.1	0.6	14.8	Open
Pipe 45	85.0	100	110	519.7	0.8	10.1	Open
Pipe 46	161.7	100	110	406.6	0.6	6.4	Open
Pipe 47	143.8	50	110	25.1	0.2	1.1	Open
Pipe 51	23.1	50	110	193.9	1.1	47.7	Open
Pipe 52	356.3	50	110	161.8	1.0	34.1	Open
Pipe 53	130.1	20	110	13.8	0.5	31.0	Open
Pipe 55	95.6	25	110	−25.8	0.6	33.3	Open
Pipe 56	199.9	50	110	−116.1	0.7	18.5	Open
Pipe 57	45.2	50	110	−107.2	0.6	15.9	Open
Pipe 58	115.5	50	110	−121.5	0.7	20.1	Open
Pipe 59	130.7	50	110	−175.6	1.0	39.7	Open
Pipe 60	160.7	50	110	−10.8	0.1	0.2	Open
Pipe 61	177.0	50	110	11.4	0.1	0.3	Open
Pipe 62	159.5	50	110	34.7	0.2	2.0	Open
Pipe 63	145.7	50	110	66.6	0.4	6.6	Open
Pipe 64	189.7	50	110	25.8	0.2	1.1	Open
Pipe 65	252.5	25	110	25.8	0.6	33.3	Open
Pipe 66	246.8	100	110	164.4	0.2	1.2	Open
Pipe 67	233.1	150	110	1333.5	0.9	8.1	Open
Pipe 68	155.9	150	110	1137.5	0.7	6.0	Open
Pipe 73	190.5	50	110	41.7	0.3	2.8	Open
Pipe 74	75.7	150	110	978.9	0.6	4.5	Open
Pipe 75	26.0	100	110	−82.8	0.1	0.3	Open
Pipe 76	143.2	150	110	1046.7	0.7	5.1	Open
Pipe 77	88.4	150	110	779.6	0.5	3.0	Open
Pipe 78	209.8	100	110	709.5	1.1	18.0	Open
Pipe 79	389.5	25	110	−20.1	0.5	21.1	Open
Pipe 82	126.4	25	110	30.2	0.7	44.7	Open
Pipe 83	90.3	25	110	3.8	0.1	1.0	Open
Pipe 84	220.5	25	110	−22.6	0.5	26.0	Open
Pipe 85	231.5	100	110	−696.3	1.0	17.4	Open
Pipe 86	167.8	25	110	−6.3	0.2	2.4	Open
Pipe 87	25.2	75	110	207.5	0.5	7.5	Open
Pipe 88	330.7	50	110	176.6	1.0	40.2	Open
Pipe 92	307.7	50	110	38.4	0.2	2.4	Open
Pipe 93	103.7	100	110	328.2	0.5	4.3	Open
Pipe 96	799.1	50	110	30.2	0.2	1.5	Open
Pipe 97	666.2	25	110	18.0	0.4	17.1	Open
Pipe 98	199.4	50	110	97.8	0.6	13.4	Open
Pipe 100	288.0	25	110	10.0	0.2	5.8	Open
Pipe 69	260.3	200	110	4307.1	1.6	17.4	Open
Pipe 101	22.6	200	110	3767.1	1.4	13.6	Open
Pipe 102	223.0	200	110	3679.5	1.4	13.0	Open
Pipe 105	134.7	100	110	475.6	0.7	8.6	Open
Pipe 106	108.6	100	110	455.6	0.7	7.9	Open
Pipe 112	15.4	150	110	1313.5	0.9	7.8	Open
Pipe 12	20.5	50	110	110.6	0.7	16.9	Open
Pipe 114	46.6	50	110	83.9	0.5	10.1	Open
Pipe 115	80.5	50	110	58.7	0.4	5.2	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 84	1415.0	1469.0	31.8	54.0
Junc 85	1420.0	1463.4	26.4	43.4
Junc 86	1410.0	1463.3	26.4	53.3
Junc 87	1380.0	1446.0	15.4	66.0
Junc 88	1390.0	1434.6	18.0	44.6
Junc 89	1390.0	1448.0	38.4	58.0
Junc 90	1425.0	1474.6	24.6	49.6
Junc 91	1430.0	1474.2	13.2	44.2
Junc 92	1415.0	1461.3	56.4	46.3
Junc 93	1400.0	1456.4	40.2	56.4
Junc 94	1355.0	1435.0	20.2	80.0
Junc 95	1430.0	1474.3	8.2	44.3
Junc 96	1565.0	1592.4	15.0	27.4
Junc 97	1540.0	1591.2	36.7	51.2
Junc 98	1425.0	1472.7	10.0	47.7
Junc 100	1530.0	1586.7	20.0	56.7
Junc 101	1530.0	1560.0	37.6	30.0
Junc 102	1470.0	1519.4	10.0	49.4
Junc 104	1420.0	1473.6	0.0	53.6
Junc 105	1420.0	1450.0	20.0	30.0
Junc 107	1495.0	1555.3	20.0	60.3
Junc 108	1455.0	1520.9	0.0	65.9
Junc 109	1455.0	1485.0	10.0	30.0
Junc 110	1455.0	1518.6	0.0	63.6
Junc 111	1560.0	1591.9	6.7	31.9
Junc 112	1550.0	1591.2	5.0	41.2
Junc 113	1560.0	1592.1	20.0	32.1
Junc 114	1550.0	1591.6	20.0	41.6
Junc 115	1560.0	1591.6	20.0	31.6
Junc 116	1540.0	1587.0	40.0	47.0
Junc 117	1510.0	1559.5	10.0	49.5
Junc 118	1475.0	1523.7	8.0	48.7
Junc 119	1470.0	1523.9	20.0	53.9
Junc 120	1485.0	1519.2	30.0	34.2
Junc 121	1470.0	1518.5	5.0	48.5
Junc 122	1460.0	1518.5	5.0	58.5
Junc 123	1430.0	1471.2	10.0	41.2
Junc 124	1425.0	1472.1	20.0	47.1
Junc 125	1430.0	1482.5	7.2	52.5
Junc 126	1460.0	1520.1	0.0	60.1
Junc 127	1465.0	1520.1	0.0	55.1
Junc 128	1445.0	1475.0	20.0	30.0
Junc 129	1430.0	1471.2	10.0	41.2
Junc 130	1430.0	1472.2	9.0	42.2
Junc 131	1435.0	1472.8	10.0	37.8
Junc 132	1425.0	1470.3	27.0	45.3
Junc 133	1430.0	1475.3	10.0	45.3
Junc 134	1420.0	1470.2	10.0	50.2
Junc 135	1410.0	1467.9	10.0	57.9
Junc 136	1430.0	1482.0	10.0	52.0
Junc 137	1415.0	1469.5	0.0	54.5
Junc 138	1425.0	1465.9	50.0	40.9
Junc 139	1395.0	1444.0	10.0	49.0
Junc 140	1395.0	1447.1	10.0	52.1
Junc 141	1385.0	1446.2	10.0	61.2
Junc 142	1375.0	1444.1	10.0	69.1
Junc 143	1355.0	1429.7	10.0	74.7
Junc 144	1345.0	1419.5	10.0	74.5
Junc 145	1375.0	1442.8	20.2	67.8
Junc 146	1500.0	1556.4	15.0	56.4
Junc 147	1505.0	1556.5	15.0	51.5
Junc 148	1490.0	1555.3	15.0	65.3
Junc 149	1490.0	1519.8	15.0	29.8
Junc 150	1485.0	1519.6	15.0	34.6
Junc 151	1490.0	1519.6	20.0	29.6
Junc 152	1475.0	1518.1	10.0	43.1
Junc 153	1480.0	1518.6	10.0	38.6
Junc 154	1480.0	1515.7	10.0	35.7
Junc 155	1465.0	1482.9	10.0	17.9
Junc 156	1450.0	1484.4	10.0	34.4
Junc 157	1450.0	1483.7	10.0	33.7
Junc 158	1455.0	1481.6	0.0	26.6
Junc 159	1450.0	1481.0	15.8	31.0
Junc 160	1440.0	1480.6	20.0	40.6
Junc 161	1435.0	1482.4	20.0	47.4
Junc 162	1440.0	1480.6	50.0	40.6
Junc 163	1445.0	1479.9	20.0	34.9
Junc 164	1440.0	1478.3	15.5	38.3
Junc 165	1440.0	1481.2	20.0	41.2
Junc 166	1440.0	1482.5	15.5	42.5
Junc 167	1430.0	1481.4	20.0	51.4
Junc 168	1430.0	1473.9	5.0	43.9
Junc 169	1410.0	1458.4	10.0	48.4
Junc 170	1395.0	1448.3	30.0	53.3
Junc 171	1415.0	1456.4	10.0	41.4
Junc 172	1415.0	1455.8	10.0	40.8
Junc 173	1410.0	1454.2	10.0	44.2

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 116	72.9	25	110	6.7	0.2	2.7	Open
Pipe 117	85.8	20	110	5.0	0.2	4.7	Open
Pipe 118	173.7	25	110	0.2	0.0	0.0	Open
Pipe 119	91.7	50	110	138.5	0.8	25.6	Open
Pipe 121	230.3	50	110	118.7	0.7	19.2	Open
Pipe 122	124.8	50	110	127.9	0.8	22.1	Open
Pipe 123	66.1	50	110	162.0	1.0	34.2	Open
Pipe 124	315.7	25	110	−22.0	0.5	24.9	Open
Pipe 125	79.8	50	110	40.0	0.2	2.6	Open
Pipe 126	165.1	50	110	55.2	0.3	4.7	Open
Pipe 127	158.9	50	110	28.1	0.2	1.3	Open
Pipe 128	83.7	25	110	10.0	0.2	5.8	Open
Pipe 130	82.0	25	110	−7.1	0.2	3.0	Open
Pipe 131	177.7	20	110	0.9	0.0	0.2	Open
Pipe 132	57.4	50	110	32.5	0.2	1.7	Open
Pipe 133	30.3	50	110	39.7	0.2	2.5	Open
Pipe 134	152.1	50	110	42.2	0.3	2.8	Open
Pipe 135	140.8	25	110	5.0	0.1	1.6	Open
Pipe 136	169.8	25	110	5.0	0.1	1.6	Open
Pipe 137	179.5	50	110	238.0	1.4	69.8	Open
Pipe 138	94.5	50	110	208.0	1.2	54.4	Open
Pipe 139	168.2	25	110	10.0	0.2	5.8	Open
Pipe 140	236.6	20	110	7.2	0.3	9.3	Open
Pipe 141	99.8	50	110	−17.2	0.1	0.5	Open
Pipe 142	85.6	50	110	59.4	0.4	5.3	Open
Pipe 143	128.6	50	110	59.4	0.4	5.3	Open
Pipe 144	110.9	25	110	0.0	0.0	0.0	Open
Pipe 145	90.7	50	110	189.2	1.1	45.6	Open
Pipe 146	76.7	50	110	148.6	0.9	29.2	Open
Pipe 147	34.7	50	110	96.0	0.6	13.0	Open
Pipe 148	98.4	25	110	20.0	0.5	20.8	Open
Pipe 149	90.7	20	110	10.0	0.4	17.1	Open
Pipe 150	124.6	50	110	39.0	0.2	2.5	Open
Pipe 151	79.7	50	110	20.0	0.1	0.7	Open
Pipe 152	125.5	25	110	9.0	0.2	4.7	Open
Pipe 153	115.1	25	110	29.7	0.7	43.3	Open
Pipe 154	98.3	25	110	2.7	0.1	0.5	Open
Pipe 155	85.6	25	110	−17.3	0.4	15.9	Open
Pipe 156	138.0	20	110	10.0	0.4	17.1	Open
Pipe 157	135.5	50	110	211.6	1.3	56.1	Open
Pipe 158	141.6	50	110	139.6	0.8	26.0	Open
Pipe 159	151.7	25	110	10.0	0.2	5.8	Open
Pipe 160	143.7	50	110	102.3	0.6	14.6	Open
Pipe 161	45.8	50	110	84.6	0.5	10.3	Open
Pipe 162	186.4	25	110	32.3	0.8	50.4	Open
Pipe 163	217.6	25	110	−17.7	0.4	16.7	Open
Pipe 164	255.8	50	110	73.4	0.4	7.9	Open
Pipe 166	180.0	20	110	10.0	0.4	17.1	Open
Pipe 167	122.6	20	110	10.0	0.4	17.1	Open
Pipe 168	203.8	50	110	53.4	0.3	4.4	Open
Pipe 169	116.0	50	110	33.4	0.2	1.8	Open
Pipe 170	312.8	25	110	20.0	0.5	20.8	Open
Pipe 171	595.2	20	110	10.0	0.4	17.1	Open
Pipe 172	234.6	25	110	20.2	0.5	21.2	Open
Pipe 173	45.6	50	110	94.4	0.6	12.6	Open
Pipe 174	84.8	50	110	44.9	0.3	3.2	Open
Pipe 175	64.5	50	110	34.5	0.2	2.0	Open
Pipe 176	232.9	25	110	4.5	0.1	1.3	Open
Pipe 177	93.8	25	110	15.0	0.4	12.2	Open
Pipe 178	34.5	50	110	−33.5	0.2	1.9	Open
Pipe 179	49.2	25	110	15.0	0.4	12.2	Open
Pipe 180	59.4	25	110	15.0	0.4	12.1	Open
Pipe 181	92.4	25	110	0.0	0.0	0.0	Open
Pipe 182	81.3	50	110	78.2	0.5	8.9	Open
Pipe 183	42.5	50	110	58.1	0.3	5.1	Open
Pipe 184	86.7	25	110	21.0	0.5	22.7	Open
Pipe 185	171.4	50	110	52.4	0.3	4.2	Open
Pipe 186	38.8	50	110	32.4	0.2	1.7	Open
Pipe 187	89.4	25	110	10.0	0.2	5.8	Open
Pipe 188	167.8	20	110	10.0	0.4	17.1	Open
Pipe 189	21.6	50	110	129.7	0.8	22.7	Open
Pipe 190	42.7	50	110	109.7	0.7	16.6	Open
Pipe 191	162.3	50	110	85.6	0.5	10.5	Open
Pipe 192	85.1	20	110	10.0	0.4	17.1	Open
Pipe 193	66.3	50	110	59.2	0.4	5.3	Open
Pipe 194	79.6	50	110	73.3	0.4	7.9	Open
Pipe 195	75.3	50	110	57.5	0.3	5.0	Open
Pipe 196	189.0	25	110	14.1	0.3	10.9	Open
Pipe 197	55.2	50	110	143.6	0.9	27.4	Open
Pipe 199	83.6	25	110	20.9	0.5	22.5	Open
Pipe 200	82.3	25	110	0.9	0.0	0.1	Open
Pipe 201	132.6	25	110	9.4	0.2	5.1	Open
Pipe 202	94.4	25	110	10.6	0.3	6.5	Open
Pipe 203	72.1	20	110	15.5	0.6	38.5	Open
Pipe 204	16.0	50	110	50.1	0.3	3.9	Open
Pipe 205	67.6	50	110	102.7	0.6	14.7	Open
Pipe 206	41.7	50	110	77.2	0.5	8.7	Open

ID	Elevation m	Head m	Demand m3/d	Pressure m
Junc 174	1405.0	1455.8	10.0	50.8
Junc 175	1395.0	1454.4	20.0	59.4
Junc 176	1405.0	1457.2	10.0	52.2
Junc 177	1565.0	1592.4	30.0	27.4
Junc 178	1545.0	1591.7	5.0	46.7
Junc 179	1535.0	1588.8	5.0	53.8
Junc 180	1400.0	1448.4	10.0	48.4
Junc 181	1420.0	1448.9	10.0	28.9
Junc 182	1420.0	1450.4	10.0	30.4
Junc 183	1430.0	1445.2	10.0	15.2
Junc 184	1420.0	1435.6	10.0	15.6
Junc 185	1360.0	1432.8	10.0	72.8
Junc 186	1450.0	1479.4	10.0	29.4
Junc 187	1380.0	1443.0	20.0	63.0
Junc 188	1365.0	1437.6	20.0	72.6
Junc 189	1380.0	1435.1	10.0	55.1
Junc 190	1455.0	1518.6	0.0	63.6
Junc 191	1455.0	1485.0	0.0	30.0
Junc 103	1465.0	1519.1	0.0	54.1
Junc 106	1465.0	1519.1	0.0	54.1
Resvr 99	1601.0	1601.0	−4307.1	0.0

ID	Length m	Diameter mm	Roughness	Flow m3/d	Velocity m/s	Unit head loss m/km	Status
Pipe 207	147.1	25	110	5.5	0.1	1.9	Open
Pipe 208	120.4	25	110	−14.5	0.3	11.5	Open
Pipe 209	51.4	25	110	6.9	0.2	2.9	Open
Pipe 210	95.6	20	110	5.0	0.2	4.7	Open
Pipe 211	147.9	50	110	120.2	0.7	19.7	Open
Pipe 212	85.1	50	110	100.2	0.6	14.1	Open
Pipe 213	108.0	50	110	72.6	0.4	7.7	Open
Pipe 214	120.2	20	110	10.0	0.4	17.1	Open
Pipe 215	89.4	25	110	17.6	0.4	16.4	Open
Pipe 216	93.5	25	110	−2.4	0.1	0.4	Open
Pipe 217	69.4	25	110	−12.4	0.3	8.6	Open
Pipe 218	90.8	20	110	10.0	0.4	17.1	Open
Pipe 220	95.2	25	110	20.0	0.5	20.8	Open
Pipe 221	241.8	20	110	5.0	0.2	4.7	Open
Pipe 222	139.8	20	110	5.0	0.2	4.7	Open
Pipe 223	104.2	200	110	3992.4	1.5	15.1	Open
Pipe 224	164.9	200	110	3957.4	1.5	14.9	Open
Pipe 225	66.8	25	110	29.7	0.7	43.2	Open
Pipe 226	153.6	20	110	10.0	0.4	17.1	Open
Pipe 227	124.5	20	110	10.0	0.4	17.1	Open
Pipe 228	207.9	50	110	46.0	0.3	3.3	Open
Pipe 229	371.6	25	110	26.0	0.6	33.8	Open
Pipe 230	302.6	20	110	10.0	0.4	17.1	Open
Pipe 231	127.9	20	110	10.0	0.4	17.1	Open
Pipe 232	131.6	20	110	10.0	0.4	17.1	Open
Pipe 233	150.9	20	110	10.0	0.4	17.1	Open
Pipe 235	146.6	20	110	10.0	0.4	17.1	Open
Pipe 236	149.2	50	110	157.8	0.9	32.6	Open
Pipe 237	212.7	50	110	137.8	0.8	25.4	Open
Pipe 238	83.3	50	110	107.8	0.6	16.1	Open
Pipe 4	116.7	50	110	−18.1	0.1	0.6	Open
Pipe 13	141.0	100	110	258.0	0.4	2.8	Open
Pipe 17	221.2	100	110	228.0	0.3	2.2	Open
Pipe 27	103.6	100	110	285.2	0.4	3.3	Open
Pipe 35	162.0	150	110	1428.8	0.9	9.2	Open
Pipe 39	110.7	150	110	1323.5	0.9	7.9	Open
Pipe 48	44.0	50	110	−54.2	0.3	4.5	Open
Pipe 49	102.2	100	110	285.2	0.4	3.3	Open
Pipe 54	144.4	100	110	285.2	0.4	3.3	Open
Pipe 24	4.3	100	110	285.2	0.4	3.3	Open
Valve 6	#N/A	200	#N/A	3747.1	1.4	26.7	Active
Valve 107	#N/A	100	#N/A	475.6	0.7	23.6	Active
Valve 108	#N/A	200	#N/A	3524.9	1.3	30.3	Active
Valve 111	#N/A	150	#N/A	676.0	0.4	35.9	Active
Valve 113	#N/A	150	#N/A	1323.5	0.9	33.6	Active
Valve 18	#N/A	100	#N/A	285.2	0.4	33.6	Active



参考資料－9　土壌の腐食性試験結果

（1）　腐食性判定結果

腐食性判定結果を次表に示す。点数が 10 点以上になると鋳鉄管に対しては腐食性を示すため防食対策が必要である。なお、参考のため、電喰土壌腐食ハンドブックの比抵抗値による腐食性を参考のため下表に示す。

腐食性の判定

	比抵抗値（Ω-cm）	Redox	硫酸塩	水分	pH 値	判定
タフィーラ県タフィーラ市（病院）R-1	1600～3400 やや激しい腐食度 0 点～8 点	無測定	痕跡 2 点	乾燥 0 点	強アルカリ性 腐食性 3 点	5～13 点
タフィーラ県タフィーラ市（病院）R-3（漏水頻繁発生箇所）	1600~3800 やや激しい腐食度 0 点～8 点	無測定	痕跡 2 点	乾燥 0 点	強アルカリ性 腐食性 3 点	5～13 点
ブセイラ R-2	1600～3200 やや激しい腐食度 0 点～8 点	無測定	痕跡 2 点	乾燥 0 点	強アルカリ性 腐食性 3 点	5～13 点

土壌比抵抗による腐食程度

腐食性	比抵抗値（Ω-cm）	例えの土壌
激しい	０～１，０００	腐葉土　沼地
やや激しい	１，０００～５，０００	畑（誘導性薬品のある場所）
中程度	５，０００～１０，０００	一般土壌　黒土　畑
小程度	１０，０００～１００，０００	乾燥土　小石まじりの土
極めて小程度	１００，０００以上	火山灰　砂利層

電蝕土壌腐食ハンドブックより

（2）　腐食性試験結果

Electrical Resistivity Survey

An electrical resistivity survey was conducted along the axis, assigned by the project study team, and as indicated on the drawings as required utilizing the Wenner configuration with the following spacings a = 1m, 2m, 3m, 4m and 5m. This implies the following depths of penetration (h) = 0.6m, 1.2m, 1.8m, 2.4m and 3m in successive order.

This resistivity meter measures the voltage difference between the potential electrode pair in response to an "AC" current (= 200mA; 10-40-Hz) driven into the ground via the pair of current electrodes. The

resistance between the potential electrodes is determined via an interval bridge circuit in which a resistance is altered using potentiometer to give the same output voltage as measured across the potential electrodes. The "ρa" for the ground under the center (ground) electrode is then calculated from the measured resistance which in turn depends on the electrode geometrical factor this being "a" for a Wenner configuration.

The complete ERP field equipment consists of:

1. A YEW 3244 Resistivity Meter Box containing an AC potentiometer, a voltmeter and galvanometer.
2. Five steel electrodes each 10 cm in length.
3. External 12 V-DC/30 AH Car Storage liquid battery.
4. Two 330m and two 110m measuring lead wires.

The specifications of the YEW Resistivity Meter are:

Range 0-30 ohm; 0.5 ohm/division
(Multiplier dials: x0.01, x1.0, x10).

Accuracy : ± 1% of full scale value below 10 ohms.
± 3% of indicated value between 10-30 ohms.

O/P Voltage: Setting dials 150,300 and 600 V-DC.

Current : Up to 200 mA.

Frequency : 10-40 Hz.

The measured resistance at each electrode spacing represents the average resistance of the earth material between the earth's surface and a depth equal to about 2/3 of the current electrode spacing. At all measuring points both the electric current (I) and the voltage (V) were changed and the resistance was calculated

As R (ohms) = V (volt) / I (ampere)……..(1)

Laboratory testing on three samples from test pits were assigned by the project study team. The laboratory tests include the soil corrosive testing to aid in checking the corrosive potential of soil along the proposed pipelines route. The laboratory tests were conducted according to the following Standards:

No.	Type of Tests	Reference Standards	Number of Tests
1.	Moisture Content Determination	ASTM D 2216	3
2.	Chloride Content of Soil	BS: 1377, Part 3	3
3.	Sulphate Content of Soil	BS: 1377, Part 3	3
4.	pH value of Soil	BS: 1377, Part 3	3

(1) Results of Tafieleh

Soil Resistivity Measurement
At T.P. 1A / Along Axis R1-R1

Axis	Electrodes Spacing a (m)	Electrodes Depth, B (cm)	Voltage (V)	Current (mA)	Resistance Readings (R)	Specific Earth Resistance {(Ω-m)
	1	10	12.0	150	2.5	16
	2	10	12.0	140	2.0	25
	3	10	12.0	160	1.8	34
	4	10	12.0	130	1.0	25
	5	10	12.0	100	0.5	16

Soil Resistivity Measurement
At T.P. 2A / Along Axis R2-R2

Axis	Electrodes Spacing a (m)	Electrodes Depth, B (cm)	Voltage (V)	Current (mA)	Resistance Readings (R)	Specific Earth Resistance {(Ω-m)
	1	10	12.0	140	3.0	19
	2	10	12.0	130	2.0	25
	3	10	12.0	160	1.7	32
	4	10	12.0	140	0.75	19
	5	10	12.0	100	0.5	16

Soil Resistivity Measurement
At T.P. 3A / Along Axis R3-R3

Axis	Electrodes Spacing a (m)	Electrodes Depth, B (cm)	Voltage (V)	Current (mA)	Resistance Readings (R)	Specific Earth Resistance {(Ω-m)
	1	10	12.0	140	3.5	22
	2	10	12.0	130	2.7	34
	3	10	12.0	150	2.0	38
	4	10	12.0	140	1.0	25
	5	10	12.0	140	0.5	16

Summary sheets of laboratory tests results are tabulated in Figure (3).

GEOTECHNICAL ENGINEERING & MATERIALS TESTING CO.
Summary of Tests Results

Site Investigation
For
The Project Of Rehabilitation And Expansion Of
Water Facilities
In Southern Governorates Of Tafieleh And Ma'an / Jordan
(For Tafieleh Site)

Job No. : S2010/C20/06-F2

Test Pit No.	Depth (m)	Moisture Content (%)	Grain Size Analysis				Atterberg Limits			Chloride (Cl) (%)	Sulphate (SO_4) (%)	pH value	Remarks
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL (%)	PL (%)	PI (%)				
TP 1A	1.0	3.6								0.0732	0.0355	9.182	
TP 2A	1.0	4.2								0.0576	0.0320	9.132	
TP 3A	1.0	3.3								0.0512	0.0213	8.991	

G.E.M.T

FIGURE 3

(2) Results of Ma'an

Soil Resistivity Measurement
At T.P. 3 / Along Axis R1-R1

Axis	Electrodes Spacing a (m)	Electrodes Depth, B (cm)	Voltage (V)	Current (mA)	Resistance Readings (R)	Specific Earth Resistance {(Ω-m)
	1	10	12.0	150	3.0	19
	2	10	12.0	130	1.5	19
	3	10	12.0	150	1.0	19
	4	10	12.0	140	0.5	13
	5	10	12.0	140	0.15	5

Soil Resistivity Measurement
At T.P. 5 / Along Axis R2-R2

Axis	Electrodes Spacing a (m)	Electrodes Depth, B (cm)	Voltage (V)	Current (mA)	Resistance Readings (R)	Specific Earth Resistance {(Ω-m)
	1	10	12.0	130	5.0	31
	2	10	12.0	100	3.0	38
	3	10	12.0	100	1.0	19
	4	10	12.0	110	0.05	1.3
	5	10	12.0	140	0.01	0.3

Soil Resistivity Measurement
At T.P. 6 / Along Axis R3-R3

Axis	Electrodes Spacing a (m)	Electrodes Depth, B (cm)	Voltage (V)	Current (mA)	Resistance Readings (R)	Specific Earth Resistance {(Ω-m)
	1	10	12.0	130	4.5	28
	2	10	12.0	100	3.5	44
	3	10	12.0	150	2.0	38
	4	10	12.0	140	1.0	25
	5	10	12.0	140	0.5	16

Summary sheet of laboratory tests results are tabulated in Figure (3).

GEOTECHNICAL ENGINEERING & MATERIALS TESTING CO.
Summary of Tests Results

Site Investigation
For
The Project Of Rehabilitation And Expansion Of
Water Facilities
In Southern Governorates Of Tafieleh And Ma'an / Jordan
(For Ma'an Site)

Job No. : S2010/C20/06-F1

Test Pit No.	Depth (m)	Moisture Content (%)	Grain Size Analysis				Atterberg Limits			Chloride (Cl) (%)	Sulphate (SO_4) (%)	pH value	Remarks
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL (%)	PL (%)	PI (%)				
TP 3	1.0	3.5								2.9080	0.9514	8.413	
TP 5	1.0	1.9								0.7477	0.4473	8.478	
TP 6	1.0	5.9								0.3435	0.0213	8.569	

G.E.M.T **FIGURE 3**