JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF AGRICULTURE, WATER MANAGEMENT AND FORESTRY
BOSNIA AND HERZEGOVINA

THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO CITY IN BOSNIA AND HERZEGOVINA

DRAFT FINAL REPORT

VOLUME Ⅲ : ASSESSMENT WORK REPORT (APPENDIX)

SEPTEMBER 1999

TOKYO ENGINEERING CONSULTANTS CO., LTD.
IN ASSOCIATION WITH
NIHON SUIDO CONSULTANTS CO., LTD.

THE FEASIBILITY STUDY
ON
THE WASTEWATER TREATMENT PLANT
OF
SARAJEVO CITY
IN
BOSNIA AND HERZEGOVINA

DRAFT FINAL REPORT

CONSTITUENT VOLUMES

VOLUME Ⅰ	SUMMARY REPORT
VOLUME Ⅱ	MAIN REPORT
VOLUME Ⅲ	ASSESSMENT WORK REPORT
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MINUTES OF MEETING

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 - 01

1. **DATE:** 01 June 1999 **TIME:** 10:00 AM

2. **VENUE:** WWTP Conference Rm., Butila

3. **ATTENDANCE LIST**

a.) Mr. K. Suzuki	JICA Study Team - Team Leader
b.) Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
c.) Mr. K. Ota	JICA Study Team - Electrical/Plant Design
d.) Mr. R. Despault	JICA Study Team - Structural/Facility Design
e.) Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning
f.) Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr., Mechanical Engineer
g.) Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
h.) Mr. E. Velagic	USB Kedly Doo - Director, Civil Engineer

4. **MINUTES OF MEETING**

Mr. K. Suzuki opened the meeting with the following issues clarified and agreed upon by both parties based on the agreed Terms of Reference (TOR).

a.) USB Kedly will start the inlet works and pump installation as soon as the pump (Capacity = 150 m^3/hr.) is delivered. Expected delivery is two days and pumping will begin this week (4 June 1999).
b.) Hydraulic tests will start by filling the Aeration Tank with water pumped from River Miljacka. Approximate duration of pumping to the Aeration Tank is 7 days @ 24 hrs. per day.
c.) To expedite the water filling of the tanks, pumping will be augmented by a spare pump with a capacity of 21 m^3/hr., and water supply from the fire hydrant if negotiations with ViK management will be favourable.
d.) Monitoring of the water level will be done after 48 hours of stabilisation period (2 days after filling the tanks with water). Water levels will be monitored for 48 hours.

e.) Mechanical testing of the 36 aerators will be done with the Aeration Tank full of water at 2 hours per aerator for a total period of 10days. Due to the limited power supply, testing will be carried out for 1 aerator at a time although preparatory works will be done on 4 aerators at the same time.

f.) An Inspection Sheet presented by Mr. Ota (please see attached) will be accomplished by USB Kedly on all the electro-mechanical tests.

g.) Stress strength testing of the Aeration Tank & Grit Chamber will be done soon after the hydraulic tests are completed. An institute to be confirmed by USB Kedly later will do laboratory tests on the core samples and other concrete structure tests.

h.) As per USB Kedly schedule, all works will be completed with a report of all the tests and investigations carried out due on 10 July 1999.

i.) USB Kedly will submit the detailed project schedule on 3 June 1999.

j.) Weekly project meeting will be held every Friday, @ 10:00 AM in WWTP Conference Room, Butila.

5. **NEXT MEETING:** 11 June 1999, Friday, @ 10:00 AM in WWTP Conference Room, Butila.

MR. K. SUZUKI
JICA Study Team

MR. S. CEMERLIC
USB Kedly Doo

INSPECTION SHEET

Date of inspection , , 1999

Weather

Equipment	Induction motor V kW pole Manufacturer ;		
Location		Facilities	

Result of inspection						
	Physical inspection			Functional inspection		
Degree of problem	Figure			Current		
	Stain/Corrosion			Rotating speed		
	Conductivity of stator coil			Others		
	Insulation resistance					
	Partial discharge					
	Vibration					
	Abnormal sound					
	Overheat					
Decision						

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 - 02

1. **DATE:** 11 June 1999 **TIME:** 10:00 AM

2. **VENUE:** USB Kedly Site Office @ WWTP, Butila

3. **ATTENDANCE LIST**

a.)	Mr. K. Suzuki	JICA Study Team - Team Leader
b.)	Mr. H. Takada	JICA Study Team – Structural/Architectural Design
c.)	Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
d.)	Mr. K. Ota	JICA Study Team - Electrical/Plant Design
e.)	Mr. R. Despault	JICA Study Team - Structural/Facility Design
f.)	Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning
g.)	Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr., Mechanical Engineer
h.)	Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
i.)	Mr. E. Velagic	USB Kedly Doo - Director, Civil Engineer

4. **MINUTES OF MEETING**

a.) Mr. R. Crisostomo opened the meeting @ 10:05 AM.

b.) Minutes of Meeting No. 06 – 01 was accepted without comments except for Item c.), wherein negotiations with ViK management on the use of the water from the fire hydrant has to be deleted.

c.) The progress of work was discussed based on the revised Work Schedule and Progress of Work (please see attached) presented by USB Kedly as follows:

- Preceding Tasks is almost 100% complete.
- Extraction of kerns for Facility 5 (Aeration Tank) is 65% complete.
- Extraction of kerns for Facility 3 (Aerated Grit Chamber) will commence on 15 June.
- Testing of all kern samples will commence 17 June.
- Locations of the underground pipelines were selected and excavation will start 14 June to be followed by mechanical tests of the steel pipelines on site.

- Water filling of Facility 4.2 (Primary Sedimentation Tank 2) will be completed by the end of the day. Monitoring of the water level will start on Monday after 2 days of stabilization. Measurement of the water level will be done twice a day (daytime and night time) to consider the percentage lost by evaporation. A Hydraulic Drain Test Data Sheet (please see attached) was presented by USB Kedly. USB Kedly will submit a Mechanical Data Sheet on Monday, 14 June.
- Water filling of Facility 4.1 (Primary Sedimentation Tank 1) will commence by 12-14 June and monitoring of the water level will follow after 2 days.
- Water filling of Facility 3 (Aerated Grit Chamber) will start on 17 June by pumping water from Facility 4.2 using Pump No.3 with a capacity of 50 m^3/hr. Thereafter, monitoring of the water level will follow.
- Water filling and testing of the other facilities will be done as scheduled. Pumping capacities will improve due to the proximity from the source.
- All hydraulic tests are expected to be completed by 6 July.
- Preparatory works of the aerators will commence on 14 June and testing will follow soon after the water filling of the Aeration Tank on 23 June.
- All works will be completed 9 July as scheduled.

5. OTHER MATTERS

a.) The proposal of dewatering the Raw Water Pumping Station wet well by USB Kedly to check the screw pumps bearing was called off due to the unavailability of funds.

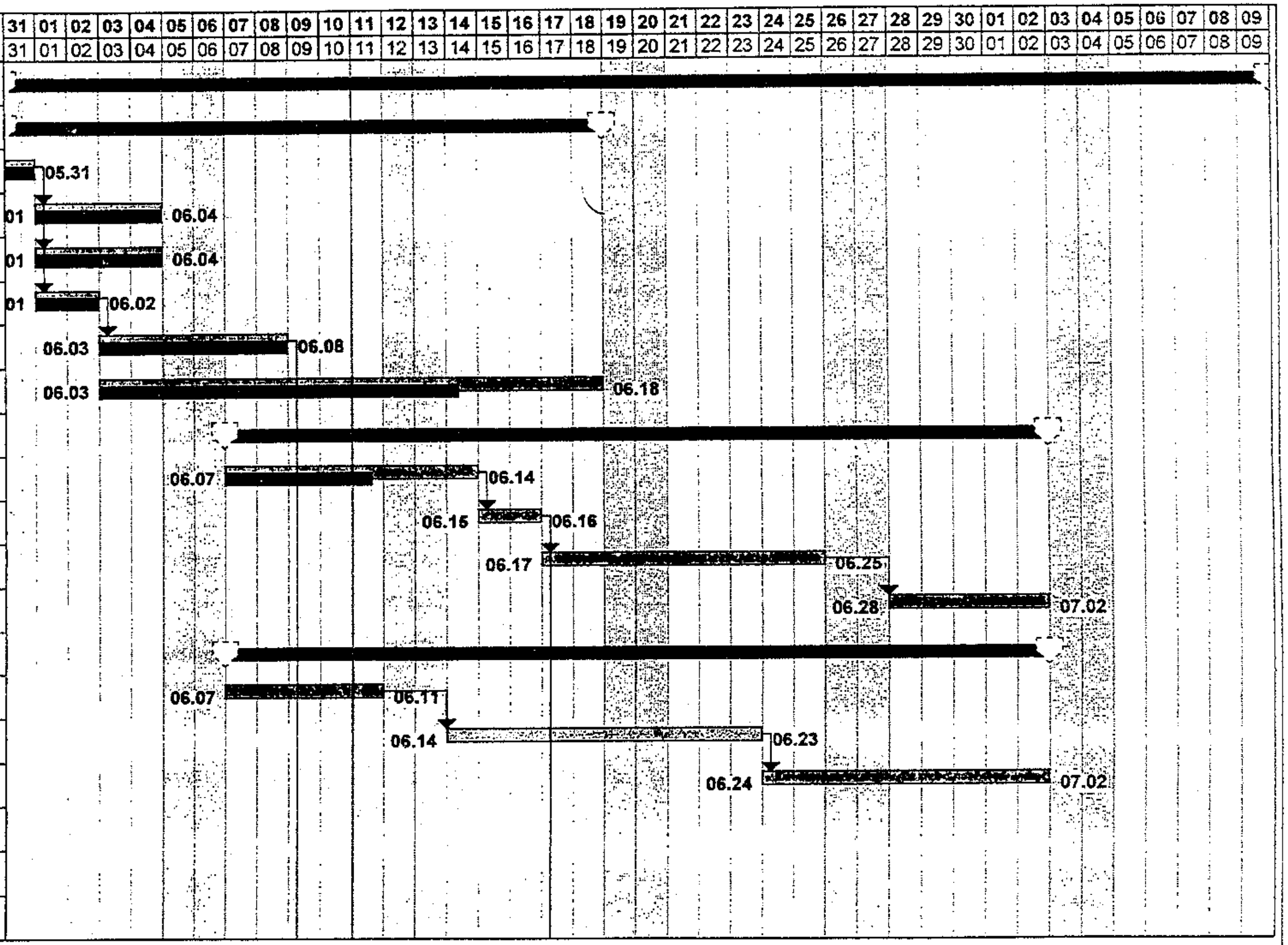
b.) Mr. K. Suzuki requested the USB Kedly officials to be present starting Monday 14 June during meetings with Degremont engineers at the WWTP site.

6. NEXT MEETING: 18 June 1999, Friday @ 10:00 AM in WWTP Site, Butila

MR. K. SUZUKI
JICA Study Team

MR. S. CEMERLIC
USB Kedly Doo

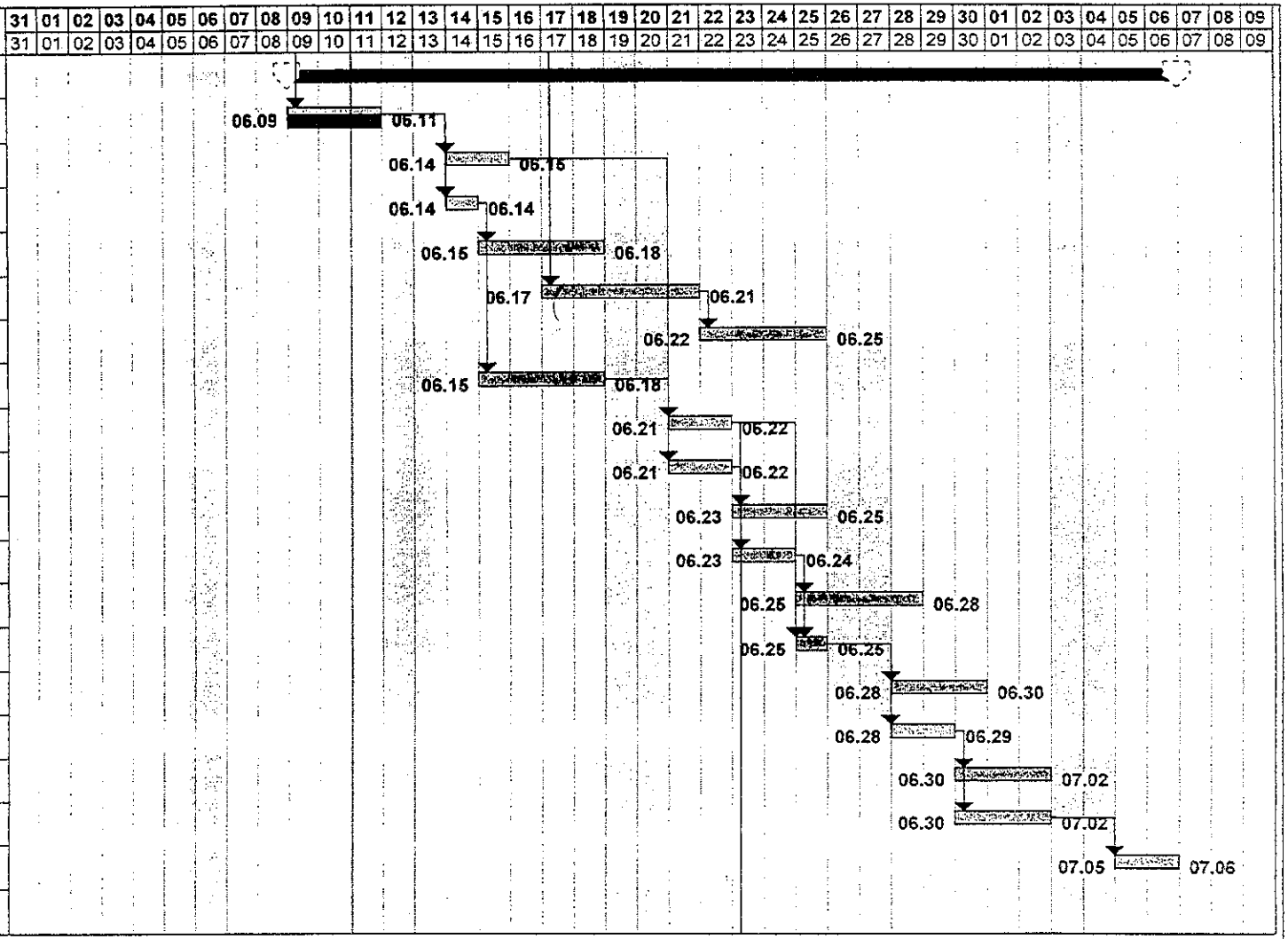
ID	Task Name
1	TOTAL PROJECT
2	A. PRECEDING TASKS
3	Nominate Project Team
4	Preparing detailed Project planing
5	Provide workshop, store, office
6	Provide HT equipment and material
7	Installation HT equipment and material
8	Blinding of output pipes of tanks
9	B. TANKS STRESS STRENGTH TESTING
10	Extraction of kerns for tank 5
11	Extraction of kerns for tank 3
12	Testing
13	Reporting
14	C. UNDERGROUND PIPELINES
15	Determination of 4 locations for testing
16	Pipes testing on 4 locations
17	Reporting
18	
19	
20	



Project: WWT Sarajevo
Date: Fri 99.06.11

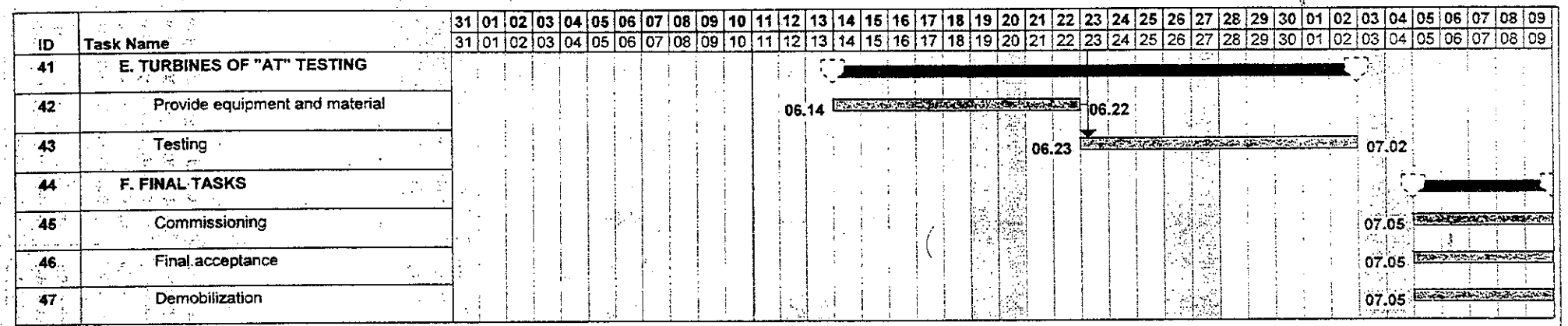
Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress

ID	Task Name
21	D. HYDRAULIC TEST OF TANKS
22	Tank 4.2 - water filling
23	Hydro test of tank 4.1
24	Tank 4.1 - water filling
25	Hydro test of tank 4.1
26	Tank 3 - water filling
27	Hydro test of tank 3
28	Tank 5.1 - water filling
29	Hydro test of tank 5.1
30	Tank 5.2 - water filling
31	Hydro test of tank 5.2
32	Tank 6.1 - water filling
33	Hydro test of tank 6.1
34	Tank 6.3 - water filling
35	Hydro test of tank 6.3
36	Tank 6.2 - water filling
37	Hydro test of tank 6.2
38	Tank 6.4 - water filling
39	Hydro test of tank 6.4
40	



Project: WWT Sarajevo
Date: Fri 99.06.11

Task — Summary — Rolled Up Progress
Progress — Rolled Up Task
Milestone — Rolled Up Milestone



Project: WWT Sarajevo
Date: Fri 99.06.11

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

PROGRAM OF FILLING OF TANKS

TANK No	Q=m3/h	START FILLING	DURATION h	END FILLING	CAPACITY m3	PUMP No	END DATE	LOCATION OF FILLING
4.2.	120	10h.9JUN	24		2880	2	ČET./THURSDAY	FROM RIVER
	120		24		2880	2	PET./FRIDAY	FROM RIVER
	60		24	10h.12JUN	1440	1	SUB./SATURDAY	FROM RIVER
	END FILLING:			**10h.12JUN**	**7200**		**SUB./SATURDAY**	
4.1.	60	10h.11JUN	24		1440	1	SUB./SATURDAY	FROM RIVER
	120		24		2880	2	NED./SUNDAY	FROM RIVER
	120		24	10h.14JUN	2880	2	PON./MONDAY	FROM RIVER
	END FILLING:			**10h.14JUN**	**7200**		**PON./MONDAY**	
5.1.	120	10h.14JUN	24		2880	2	UTOR./TUESDAY	FROM RIVER
	120		24		2880	2	SRIJ./WEDNESDAY	FROM RIVER
	120		24		2880	2	ČET./THURSDAY	FROM RIVER
	120		24	10h.18JUN	2880	2	PET./FRIDAY	FROM RIVER
	END FILLING:			**10h.18JUN**	**11520**		**PET./FRIDAY**	
	TOTAL FROM RIVER:			10h.18JUN	**25920**		**PET./FRIDAY**	FROM RIVER
5.2.	120	10h.18JUN	24		2880	2	SUB./SATURDAY	FROM TANK 4,1
	120		24		2880	2	NED./SUNDAY	FROM TANK 4,1
	120		24		2880	2	PON./MONDAY	FROM TANK 4,2
	120		24	10h.22JUN	2880	2	UTOR./TUESDAY	FROM TANK 4,2
	END FILLING:			**10h.22JUN**	**11520**		**UTOR./TUESDAY**	
6.1.	120	10h.22JUN	24		2880	2	SRIJ./WEDNESDAY	FROM TANK 5,1
	120		24	10h.24JUN	2880	2	ČET./THURSDAY	FROM TANK 5,1
				REZERV:	2100			
	END FILLING:			**10h.24JUN**	**7860**		**ČET./THURSDAY**	
6.3.	120	10h.24JUN	24		2880	2	PET./FRIDAY	FROM TANK 5,1
	120		24	10h.26JUN	2880	2	SUB./SATURDAY	FROM TANK 5,1
				REZERV:	2100			
	END FILLING:			**10h.26JUN**	**7860**		**SUB./SATURDAY**	
6.2.	120	10h.26JUN	24		2880	2	NED./SUNDAY	FROM TANK 6,1
	120		24		2880	2	PON./MONDAY	FROM TANK 6,1
	60	10h.28JUN	24	10h.29JUN	1440	1	UTOR./TUESDAY	FROM TANK 6,1
	END FILLING:			**10h.26JUN**	**7200**		**UTOR./TUESDAY**	
6.4.	60	10h.28JUN	24		1440	1	UTOR./TUESDAY	FROM TANK 6,3
	120		24		2880	2	SRIJ./WEDNESDAY	FROM TANK 6,3
	120		24	10h.01JUL	2880	2	ČET./THURSDAY	FROM TANK 6,3
	END FILLING:			**10h.01JUL**	**7200**		**CET./THURSDAY**	

HYDRAULIC TEST DRAIN TEST

DATA SHEET

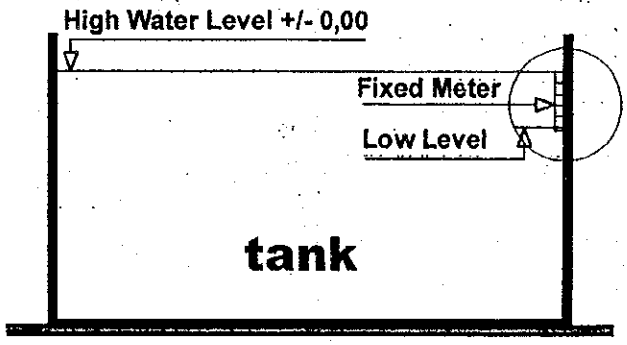
Object: **Tank N° 4.2 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m

Construcion material: Reinforced concrete

Measurement Scheme



N^0 of Measurement	Date of Measurement	Time	Measurement Level (cm)	Qa. drained m^3/day
1	11.06.99		0,00	0,00
2	12.06.99			
3	13.06.99			
4	14.06.99			
			Q_{middle}	

Reviewing:

Reviewer:

Sarajevo 14.06.99

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 - 03

1. **DATE:** 18 June 1999 **TIME:** 10:00 AM

2. **VENUE:** WWTP Conference Room, Butila

3. **ATTENDANCE LIST**

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E. Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. K. Suzuki	JICA Study Team - Team Leader
3.5 Mr. H. Takada	JICA Study Team – Structural/Architectural Design
3.6 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.7 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.8 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.9 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. **MINUTES OF MEETING**

4.1 Mr. K. Suzuki opened the meeting @ 10:05 AM.

4.2 Minutes of Meeting No. 06 – 01 was accepted without comments.

4.3 The Progress of Work was discussed based on the revised Work Schedule, Rev. 3 (please see attached) presented by USB Kedly as follows:

A. **Preceding Tasks.** 100% complete

B. **Tanks Stress Strength Test**

- Facility 3 (Aerated Grit Chamber) – extraction of concrete core samples, reinforcing bars and pH tests of concrete, 100% complete. Testing of the samples had started.

- Facility 5.1 (Aeration Tank 1) – extraction of concrete core samples, reinforcing bars, and pH tests of concrete, 100% complete. Testing of the samples had started.
- Facility 5.2 (Aeration Tank 2) – dewatering of the tank will be completed today. Extraction of concrete core samples, reinforcing bars and pH tests of concrete will soon follow.

C. **Underground Pipelines**

- 4 sites had been identified. USB Kedly started excavation yesterday of 1 of the sites. Excavation of the 4 sites will be completed next week. The type of tests to be conducted on the pipes will be discussed between the contractor and the Study Team soon.

D. **Hydraulic Tests of Tanks**

- Facility 4.2 (Primary Sedimentation Tank 2) – hydraulic test is 100% complete. Preliminary results were presented for comments and final results will be submitted soon after confirmation of the meteorology data from the institute.
- Facility 4.1 (Primary Sedimentation Tank 1) – water filling was stopped yesterday after confirmation from the study team due to the volume of leaks coming out from the walls as a result of the expansion joint failure. Monitoring of the drop in water level was done immediately.
- Facility 5.1 (Aeration Tank 1) - water filling had started yesterday and will continue until 21 June. Monitoring of the water level will soon follow.
- Facility 5.2 (Aeration Tank) - water filling will start 22 June and will lasts for 4 days. Monitoring of the water level will follow.
- Facility 6 (4 Final Sedimentation Tanks) - water filling will start 29 June. Tests will be completed by 9 July.

E. **Testing of the Aerators**

- Preparatory works will start tomorrow. Testing will commence on 21 June starting with the aerators at Facility 5.1. Tests will be completed by 9 July.

5. OTHER MATTERS

5.1 USB Kedly will start the cleaning of the inlet chamber and will attempt to close the sluice valve using the existing mechanism and with a hydraulic jack, where necessary. These works are in preparation for the dewatering of Facility 1 (Raw Water Pumping Station) wet well that will commence next week.

5.2 The JICA Study Team raised the concern on photo-documentation of all the

works to include the areas where leakages are evident.

5.3 The JICA Study Team requested the USB Kedly to provide a tool that could measure the thickness of the undercoat and finishing cover paint for the screw pumps.

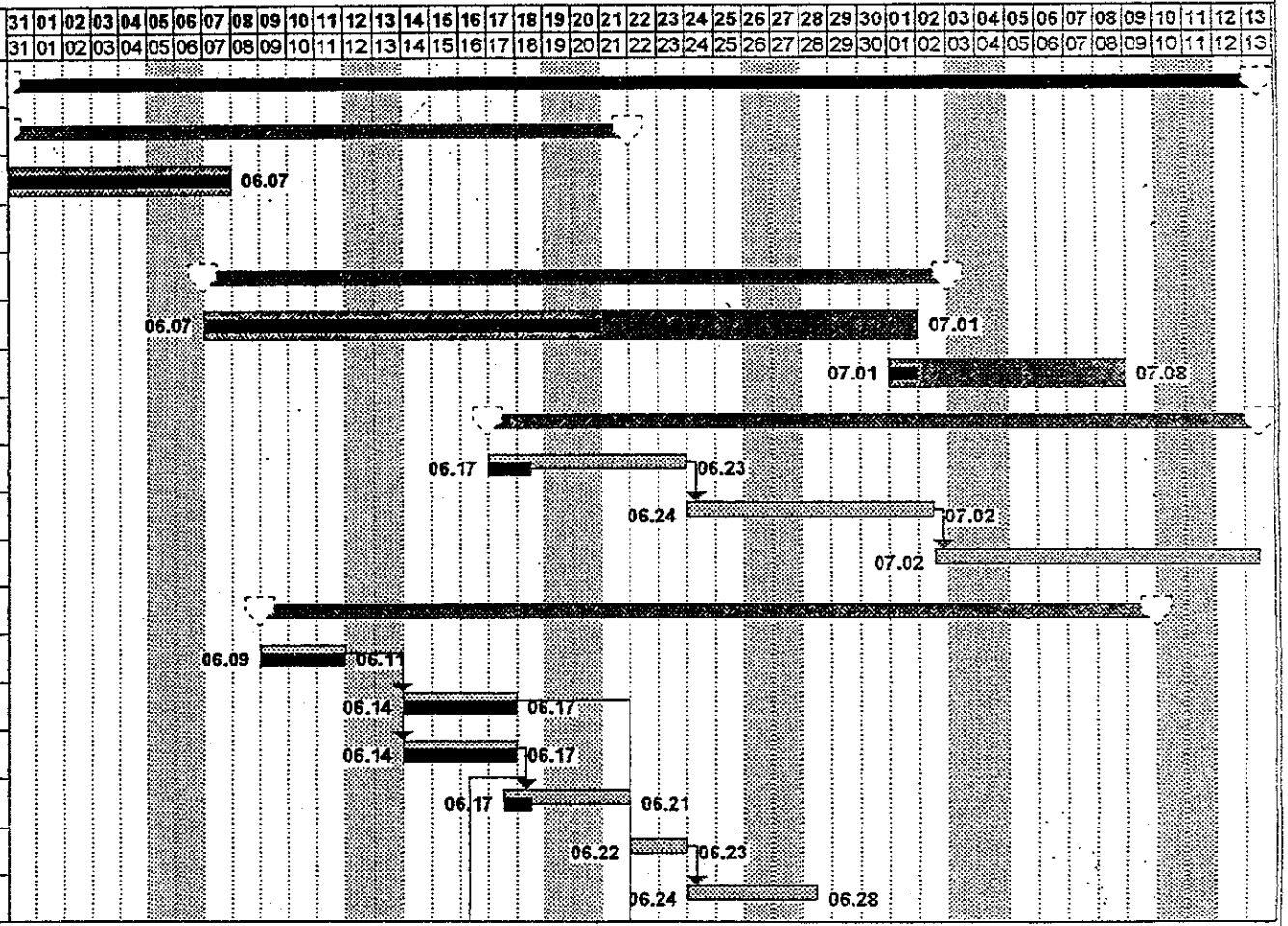
6. **NEXT MEETING:** 25 June 1999, Friday @ 10:00 AM in WWTP site, Butila.

Mr. K. SUZUKI
JICA Study Team

Mr. S. CEMERLIC
USB Kedly Doo

USB KEDLY DOO SARAJEVO

ID	Task Name
1	
2	A. PRECEDING TASKS
9	Prepareting,providing material,installation
10	
11	B. TANKS STRESS STRENGTH TESTING
16	Testing
17	Reportig
18	C. UNDERGROUND PIPELINES
19	Deter.of 4 loc. for excav. and testing
20	Pipes testing on 4 locations
21	Reporting
22	D. HYDRAULIC TEST OF TANKS
23	Tank 4.2 - water filling
24	Hydro test of tank 4.2
25	Tank 4.1 - water filling
26	Hydro test of tank 4.1
27	Tank 3 - water filling
28	Hydro test of tank 3



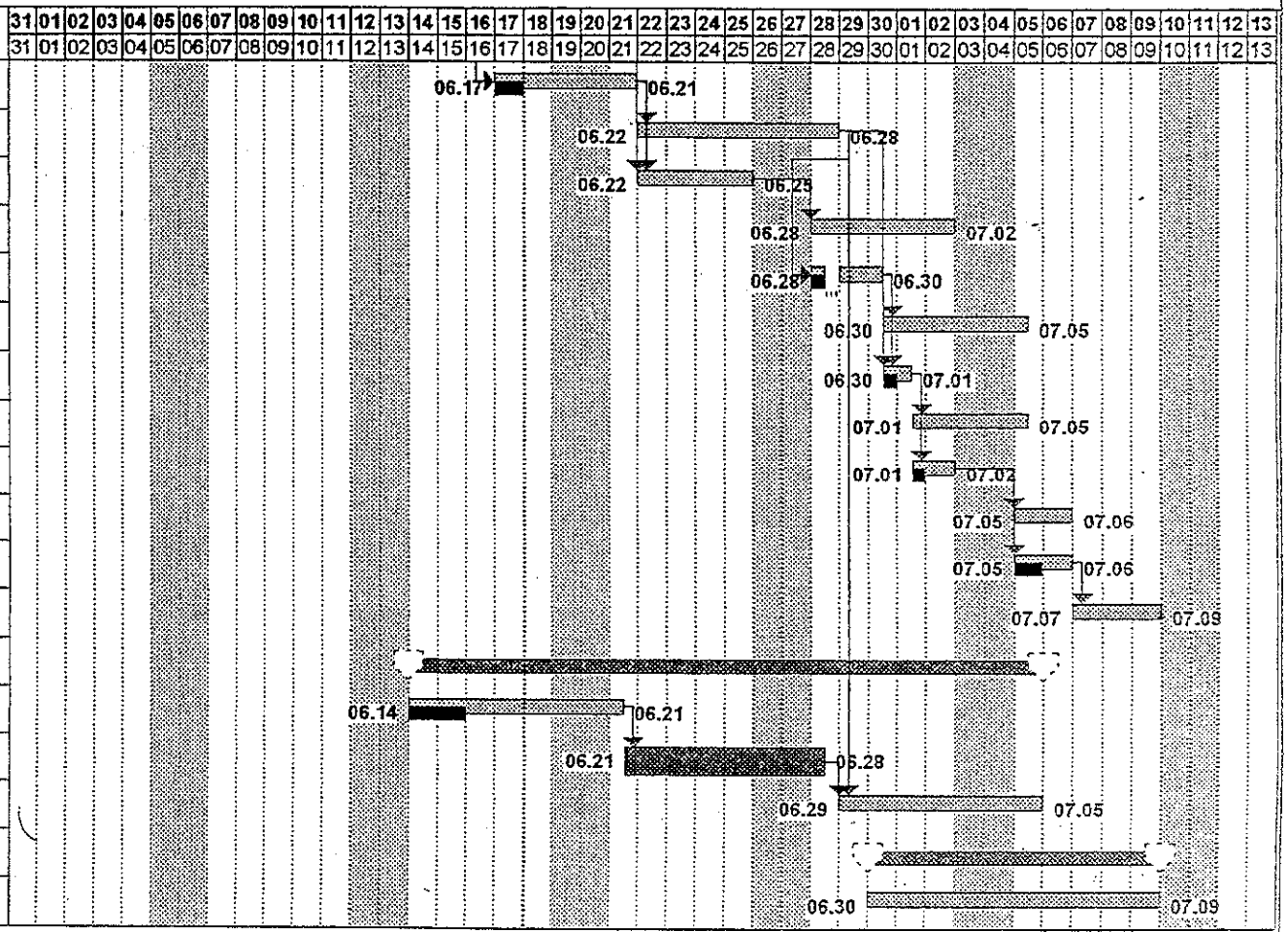
Project: WWT Sarajevo
Date: Fri 99.06.18

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary
Split
Rolled Up Split

Page 1

USB KEDLY DOO SARAJEVO

ID	Task Name
29	Tank 5.1 - water filling
30	Hydro test of tank 5.1
31	Tank 5.2 - water filling
32	Hydro test of tank 5.2
33	Tank 6.1 - water filling
34	Hydro test of tank 6.1
35	Tank 6.3 - water filling
36	Hydro test of tank 6.3
37	Tank 6.2 - water filling
38	Hydro test of tank 6.2
39	Tank 6.4 - water filling
40	Hydro test of tank 6.4
41	E. TURBINES OF "AT" TESTING
42	Provide equipment and material
43	Testing turbins in tank ~~5.2~~ 5.1
44	Testing turbins in tank 5,1
45	F. FINAL TASKS
46	Commissioning

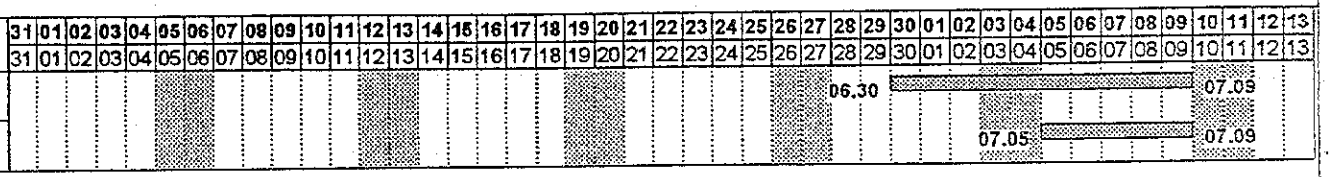


Project: WWT Sarajevo
Date: Fri 99.06.18

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary
Split
Rolled Up Split

USB KEDLY DOO SARAJEVO

ID	Task Name
47	Final acceptance
48	Demobilization



Project: WWT Sarajevo
Date: Fri 99.06.18

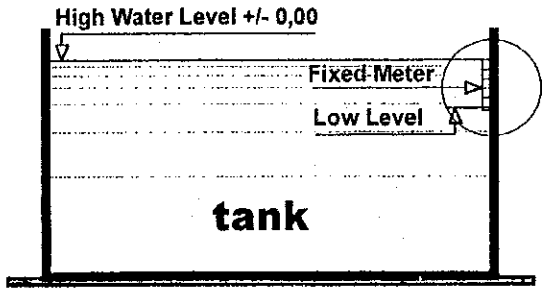
Task		Rolled Up Task		Project Summary	
Progress		Rolled Up Milestone		Split	
Milestone		Rolled Up Progress		Rolled Up Split	
Summary		External Tasks			

HYDRAULIC TEST DRAIN TEST

DATA SHEET

Object:	**Tank N° 4.2 – Primary Sedimentation Tank**
Capacity:	7.150,00 m^3
Construction form:	Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2
Construcion material:	Reinforced concrete

Measurement Scheme



N^0 of Measurement	Date of Measurement	Time h	Daily Drain (mm)	Daily Drain Allowable (mm)	Drain Factor
1	13.06.99	0	0,00	0,86	
2	14.06.99	24	29,30	0,86	34,07
3	15.06.99	48	22,98	0,86	26,72
4	16.06.99	72	29,27	0,86	34,04
5	17.06.99	96	26,87	0,86	31,24
		Middle Value:	**27,11**	**0,86**	**31,52 > 1,00**

*Note: For above dada, see next page

Reviewing: *Tank Hydraulic test drain test is negative. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Reviewer for USB KEDLY:

Posavec Franjo

Sarajevo 17.06.99

CONCRETE BASIN HYDRAULIC DRAIN TEST / *ISPITIVANJE PROPUSTLJIVOSTI BETONSKIH BAZENA*

Date /*Datum 17.06.* 1999

Object/*Objekat*	Item / *Oznaka*	Dimension *Dimenzije*	Volume *Zapremina*	Material *Materijal*
Primary Sedimentation Tank *Primarni Taložnik*	4.2	D = 55 m H = 3,01 m	7,150.00 m^3	Concrete *beton*

Result of measurement /*Rezultati mjerenja*					
No. of measurement Broj mjerenja	Date of measurement Datum mjerenja	Time of measurement Vrijeme mjerenja	Water level Nivo vode	Diference razlika	
				cm	hour/sati
1.	13. 6. 1999	11^{06}	32,8 cm	1,2	8^{41}
2.	13. 6. 1999	19^{47}	34,0 cm		
3	14. 6. 1999	9^{00}	35,5 cm	1,5	13^{13}
4.	14. 6. 1999	16^{00}	36,2 cm	0,7	7^{00}
5.	15. 6. 1999	9^{00}	37,8 cm	1,6	17^{00}
6.	15. 6. 1999	16^{00}	38,2 cm	0,3	17^{00}
7.	16. 6. 1999	8^{45}	40,70 cm	0,5	17^{15}
8.	16. 6. 1999	16^{05}	41,00	0,3	7^{20}
9.	16. 6. 1999	21^{15}	41,40	0,4	3^{15}
10	16. 6. 1999	7^{00}	42.00	0,6	9^{45}

Temperature / Temperatura

	Date/datum	Time/Vrijeme	Temperature
Air temparature/ Temparatura zraka	15.6.99	9	25°C
Water temparature/ Temparatura vode	15.6.99	17^{00}	22°C
Air temparature/ Temparatura zraka	16.6.99	9	21°C
Water temparature/ Temparatura vode	16.6.99	9	22°C

USB KEDLY
Site manager/Rukovodilac gradilišta

Posavec Franjo dipl. ing.

Object: Tank No 4.2. - Primary Sedimentation Tank

1. Calculation of Daily Evaporation from Tank Water Surface

1.1. Function $E = 3,206(1-0,52*0,01pa)(1+0,167w)(V-v)$

0,202755906

1.2. Measurement Data

No	Description	Unit	Date (D1) 10h.06.11	E1 *(cm)*	Date (D2) 10h.06.12	E2 *(cm)*	Date (D3) 10h.06.13	E3 *(cm)*	Date (D4) 10h.06.14	E4 *(cm)*
a	Water temperature (tw)	*(C)*	22,000	**3,206**	22,000	**3,206**	22,000	**3,206**	22,000	**3,206**
b	Max. vapor pressure (V)	*(cm)*	0,206	(1-0,52*0,01pa)	0,205	(1-0,52*0,01pa)	0,205	(1-0,52*0,01pa)	0,205	(1-0,52*0,01pa)
c	Air temperature (ta)	*(C)*	26,000	**0,626**	24,000	**0,646**	24,000	**0,636**	23,000	**0,617**
d	Relative humidity	*(%)*	60,000	(1+0,167w)	58,000	(1+0,167w)	62,000	(1+0,167w)	65,000	(1+0,167w)
e	Vapor pressure (v)	*(cm)*	0,203	**2,837**	0,201	**2,670**	0,200	**3,004**	0,203	**2,837**
f	Wind velocity (w)	*(km/h)*	11,00	(V-v)	10,00	(V-v)	12	(V-v)	11	(V-v)
g	Barometric pressure (pa)	*(cm)*	72,000	**0,003**	68,000	**0,004**	70,000	**0,005**	73,660	**0,002**
		E *(cm)*	10h.06.11	**0,02**	10h.06.12	**0,02**	10h.06.13	**0,03**	10h.06.14	**0,01**

2. Calculation of Max. Allowable Daily Drain from Tank

2.1. Function $\Delta h_{max} = (Tc/Ta): k = 3010:3500 = 0,86\ mm$

a/ *Tc = 7150,00 m3 - Total capacity of tank*

b/ *Ta = DxDx3,14/4 - Surface of the tank - 2375 m2*

c/ *Tc/Ta = 7150/2375 m - middle depth of the tank - 3,01 m*

d/ *k = 7days x 500 - Factor - 3500*

3. Calculation of Daily Drain from Tank

No of Meas.	Data of Measurement	Time of Meas.(h)	Time Cor. Factor	Measurement Level (cm)	Δhm mm	Evaporation (E) (mm)	Δhmax (mm)	H-drained (mm) 6x4-7	Factor-D 9/8.
1	2	3	4	5	6	7	8	9	10
1	13.06.99	11h06m	1,000	32,80		0,00		0,00	
2	14.06.99	9h00m	1,086	35,50	27	0,02	0,86	29,30	34,07
3	15.06.99	9h00m	1,000	37,80	23	0,02	0,86	22,98	26,72
4	16.06.99	8h45m	1,011	40,70	29	0,03	0,86	29,27	34,04
5	17.06.99	9h45m	0,960	43,50	28	0,01	0,86	26,87	31.24
							Middle-V:	**27,11**	31,52

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 - 04

1. **DATE:** 25 June 1999 **TIME:** 10:00 AM

2. **VENUE:** WWTP Conference Room, Butila

3. **ATTENDANCE LIST**

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.5 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.6 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.7 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.8 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. **MINUTES OF MEETING**

4.1 Mr. R. Crisostomo opened the meeting @ 10:10 AM.

4.2 Minutes of Meeting No. 06 – 03 was accepted without comments.

4.3 The Progress of Work was discussed based on the revised Work Schedule, Rev. 4 (please see attached) presented by USB Kedly as follows:

C. **Preceding Tasks.** 100% complete

D. **Tanks Stress Strength Test**

- Extraction of concrete core samples, reinforcing bars and pH tests for Facility 3 & 5 is 100 % complete.
- Testing of the samples is 100% complete.
- The result of the tests will be completed by 02 July.

C. **Underground Pipelines**

- Excavation of the 4 sites selected is 100% complete. Taking of 4 pipe samples is in progress and will be completed at the end of the week.
- Samples will be tested on 4 parameters such as (a) corrosion, (b) wall thickness of the pipe, (c) pipe material, (d) pipe diameter, and (e) encrustation.
- The result of the tests will be completed by 02 July.

D. **Hydraulic Tests of Tanks**

- Hydraulic tests for Facility 4 (Primary Sedimentation Tank 1 & 2) is 100% complete. Results were presented for comments from the Study Team.
- Facility 5.1 (Aeration Tank 1) - water filling was completed this morning. Monitoring of the water level will be done to check the drop of the water level caused by the leaks in the wall between Tank 1 & 2 and the external wall of the Tank 1. Monitoring will also be done when both Tank 1 & 2 are filled with water.
- Facility 5.2 (Aeration Tank 2) – water filling will start at 1:00 PM today until 29 June. Monitoring of the water level will soon follow.
- Facility 6.1 & 6.3 (Final Sedimentation Tank 1 & 3) – simultaneous water filling of these tanks will start 01 July for 2 days. Tests will be completed by 07 July.
- Facility 6.2 & 6.4 (Final Sedimentation Tank 2 & 4) – simultaneous water filling of these tanks will commence on 05 July for 2 days. Tests will be completed by 09 July.

E. **Testing of the Aerators**

- Preparatory works is 100% complete.
- A figure showing the aerators to be tested as recommended by USB Kedly based on the criteria of selection such as (a) mechanical and electrical soundness, (b) structural safety and stability was presented. The total number of aerators to be tested will be confirmed soon after the final inspection to be made right after this meeting.
- Testing of the aerators in Facility 5.1 will start at 1:00 PM today. Each aerator will be tested for 2 hours continuous operation. Data and information to be monitored include (a) bearing temperature, (b) vibration, (c) speed/rotation, and (d) noise.
- Testing of the aerators in Facility 5.2 will commence right after the water filling is completed on 30 June.

5. OTHER MATTERS

5.1 The JICA Study Team raised the concern on photo-documentation of all the

works to include the areas where leakages are evident, especially the division wall of the aeration tank

5.2 The JICA Study Team again requested the USB Kedly to provide a tool that could measure the thickness of the undercoat and finishing cover paint for the screw pumps.

5.3 The JICA Study Team requested with a list to USB Kedly on data and information regarding unit cost of construction and repair of facilities.

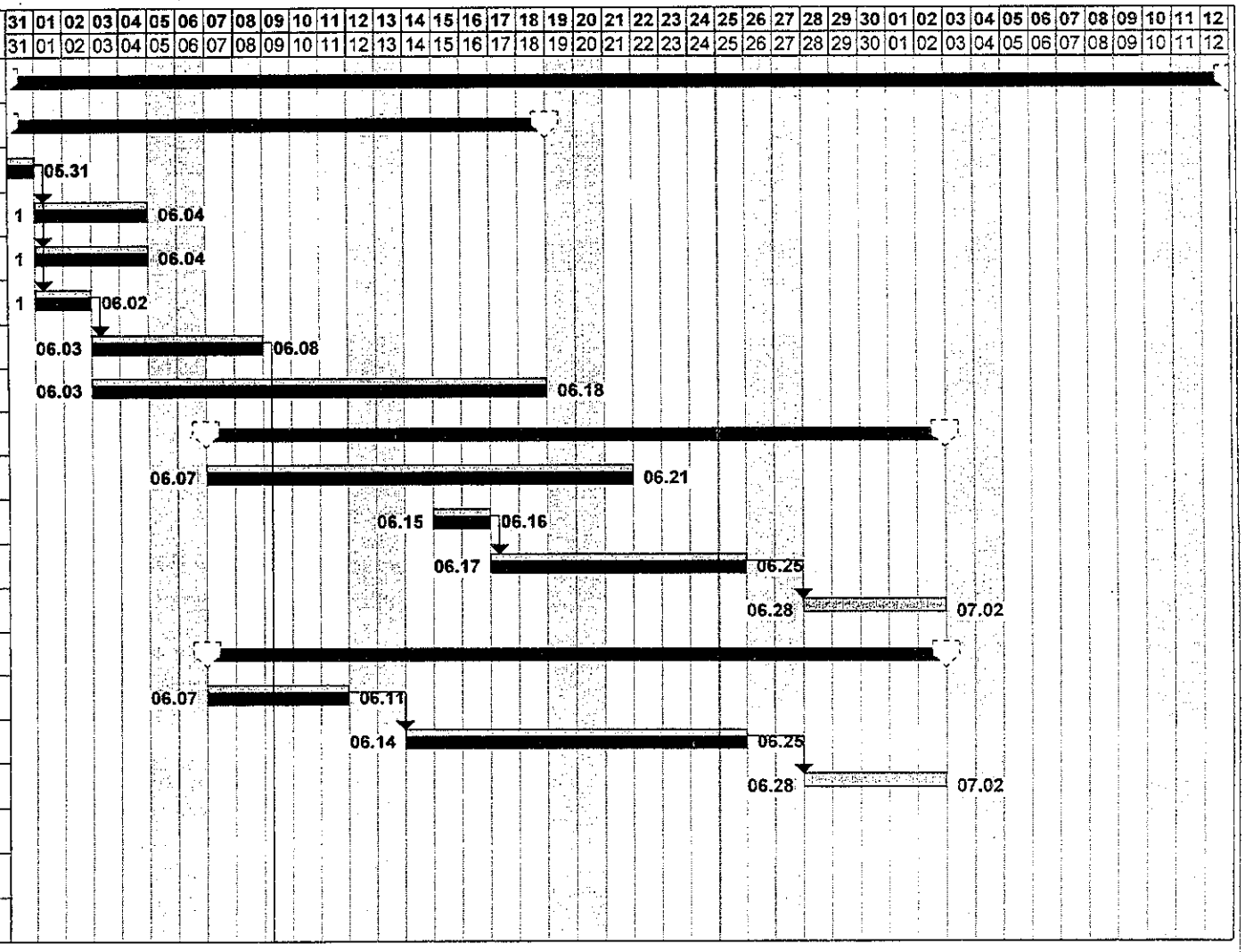
5.4 The USB Kedly will a arrange a meeting with the JICA Study Team regarding architectural standards and specification in BiH.

6. **NEXT MEETING:** 02 July 1999, Friday @ 10:00 AM in WWTP site, Butila.

Mr. K. SUZUKI
JICA Study Team

Mr. S. CEMERLIC
USB Kedly Doo

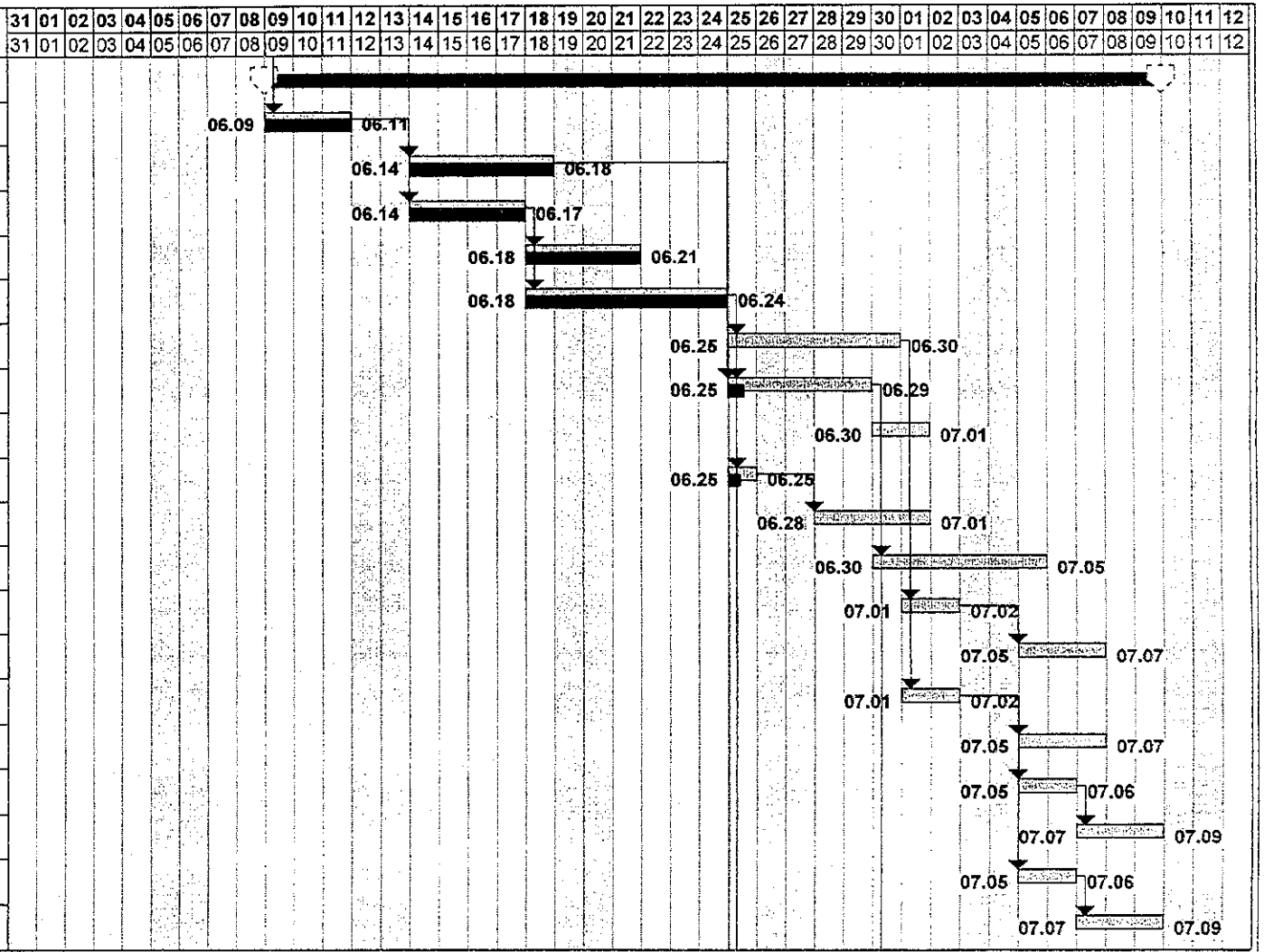
ID	Task Name
1	**TOTAL PROJECT**
2	**A. PRECEDING TASKS**
3	Nominate Project Team
4	Preparing detailed Project planing
5	Provide workshop, store, office
6	Provide HT equipment and material
7	Installation HT equipment and material
8	Blinding of output pipes of tanks
9	**B. TANKS STRESS STRENGTH TESTING**
10	Extraction of kerns for tank 5
11	Extraction of kerns for tank 3
12	Testing
13	Reporting
14	**C. UNDERGROUND PIPELINES**
15	Determination of 4 locations for testing
16	Excavation and pipes testing on 4 locations
17	Reporting
18	
19	
20	



Project: WWT Sarajevo
Date: Fri 99.06.25

Task — Summary — Rolled Up Progress
Progress — Rolled Up Task
Milestone — Rolled Up Milestone

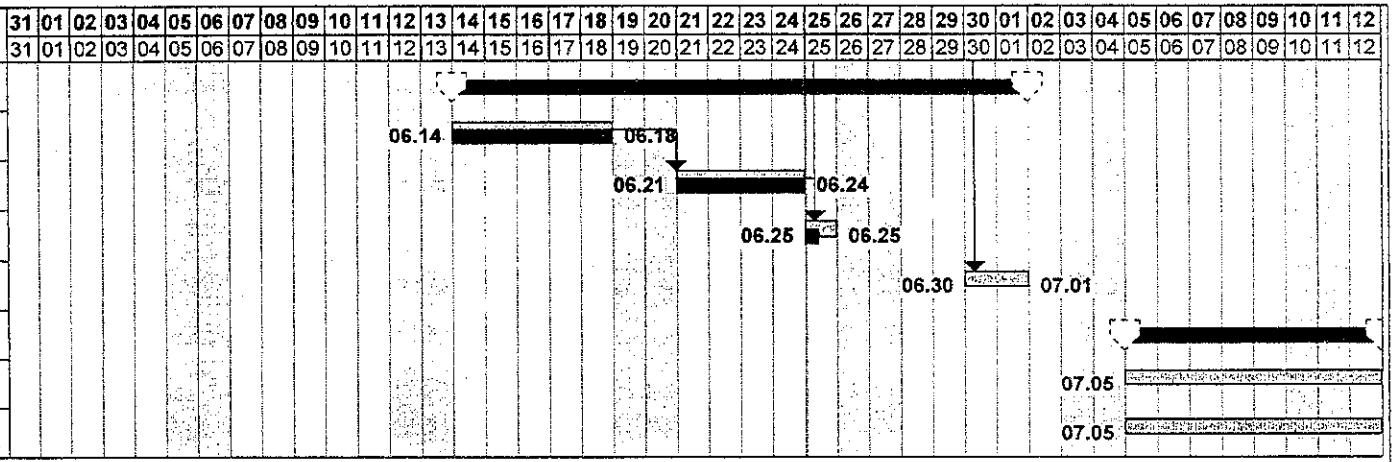
ID	Task Name
21	D. HYDRAULIC TEST OF TANKS
22	Tank 4.2 - water filling
23	Hydro test of tank 4.2
24	Tank 4.1 - water filling
25	Hydro test of tank 4.1
26	Tank 5.1 - water filling
27	Hydro test of tank 5.1
28	Tank 5.2 - water filling
29	Removing water from "1" and testing
30	Tank 3 - water filling
31	Hydro test of tank 3
32	Hydro test of tank 5.2
33	Tank 6.1 - water filling
34	Hydro test of tank 6.1
35	Tank 6.3 - water filling
36	Hydro test of tank 6.3
37	Tank 6.2 - water filling
38	Hydro test of tank 6.2
39	Tank 6.4 - water filling
40	Hydro test of tank 6.4



Project: WWT Sarajevo
Date: Fri 99.06.25

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

ID	Task Name
41	**E. TURBINES OF "AT" TESTING**
42	Provide equipment and material
43	Prepararing equipment for testing
44	Testing 5 aerators from tank 5.1
45	Testing 5 aerators from tank 5.2
46	**F. FINAL TASKS**
47	Reporting and final acceptance
48	Commissioning



Project: WWT Sarajevo
Date: Fri 99.06.25

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

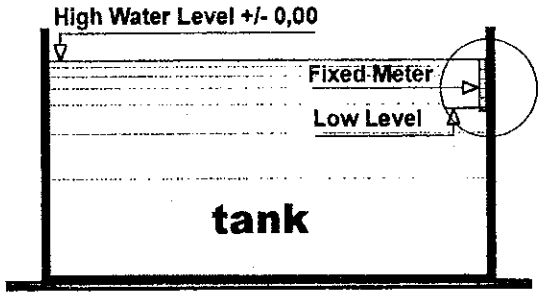
Object: **Tank N° 4.2 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material: Reinforced concrete

Measurement Scheme



N⁰ of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Drain (mm) (4-5)	Daily Drain Allowable (mm)	Drain Factor (6:7)
1	2	3	4	5	6	7	8
1	13.06.99	0	0,00			0,86	
2	14.06.99	24	29,32			0,86	34,09
3	15.06.99	48	23,00			0,86	26,74
4	16.06.99	72	29,32			0,86	34,08
5	17.06.99	96	26,88			0,86	31,26
				Middle Value:		**0,86**	**31,52 > 1,00**

*Note: For above dada, see next page

Test Result: *Tank Hydraulic test drain test is negative. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.17.99

Tested by:

Ekrem Velagić B.Sc.

1. Calculation of Max. Allowable Daily Drain from Tank

Function **Dhmax=(Tc/Ta): k = 3010:3500 = 0,86 mm**

a/ Tc = 7150,00 m3 - Total capacity of tank

b/ Ta = DxDx3,14/4 - Surface of the tank - 2375 m2

c/ Tc/Ta = 7150/2375 m - middle depth of the tank - 3,01 m

d/ k = 7days x 500 - Factor - 3500

2. Calculation of Daily Drain from Tanks

2.1. Tank No 4.2 - Primary Sedimentation Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	Time Corection Factor kt	Measurement Level (cm)	Δhm mm	Δhmk 4x6 mm	Evaporation and Rain (E-R) (mm)	D-drained 7.-8 (mm)	Dhmax (mm)	Factor-D 9/8.
1	2	3	4	5	6	7	8	9	10	11
1	13.06.99	11h06m	1	32,8			0	0		
2	14.06.99	9h00m	1,086	35,5	27	29,32	0,02	29,30	0,86	34,09
3	15.06.99	9h00m	1	37,8	23	23,00	0,02	22,98	0,86	26,74
4	16.06.99	8h45m	1,011	40,7	29	29,32	0,03	29,29	0,86	34,08
5	17.06.99	9h45m	0,96	43,5	28	26,88	0,01	26,87	0,86	31,26
							Middle value-V:	**27,11**	**0,86**	**31,52**

A - 27

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

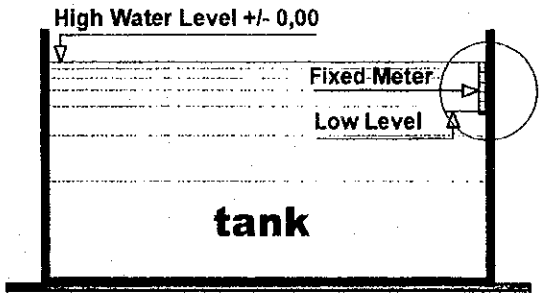
Object: **Tank N° 4.1 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material: Reinforced concrete

Measurement Scheme



N^0 of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Drain (mm) (4-5)	Daily Drain Allowable (mm)	Drain Factor (6:7)
1	2	3	4	5	6	7	8
1	13.06.99	0	0,00			0,86	
2	14.06.99	24	50,27			0,86	58,43
3	15.06.99	48	43,08			0,86	50,07
4	16.06.99	72	58,00			0,86	67,41
5	17.06.99	96	25,53			0,86	29,67
				Middle Value:		**0,86**	**51,39 > 1,00**

*Note: For above dada, see next page

Test Result: *Tank Hydraulic test drain test is negative. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.25.99

Tested by:

Ekrem Velagić B.Sc.

2.2. Tank No 4.1 - Primary Sedimentation Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	Time Corection Factor kt	Measurement Level (cm)	Δhm mm	Δhmk 4x6 mm	Evaporation and Rain (E-R) (mm)	D-drained 7.-8 (mm)	Dhmax (mm)	Factor-D 9/8.
1	2	3	4	5	6	7	8	9	10	11
1	18.06.99	9h35m	1	91,5			0	0		
2	19.06.99	11h50m	0,914	86,0	55	50,27	0,02	50,25	0,86	34,09
3	20.06.99	9h30m	1,077	82,0	40	43,08	0,02	43,06	0,86	26,74
4	21.06.99	9h30m	1,000	76,2	58	58,00	0,03	57,97	0,86	34,08
5	22.06.99	9h00m	1,021	73,7	25	25,53	0,01	25,52	0,86	31,26
							Middle value-V:	**44,20**	**0,86**	**51,39**

A - 29

INSPECTION SHEET FOR INSULATION RESISTANCE

-KONTROLNI LIST ZA OTPOR IZOLACIJE-

1. **Date of Testing**/*Datum ispitivanja*: **19.06.1999.**

2. **Data of Instrument using for measurement**/*Podatci o instrumentu za ispitivanje*:

2.1. Type/*Tip*: **Instalation Tester LEM**
2.2. N^0: **JO 33712 DB CE A185606111**
2.3. Producer/*Proizvođać:* **NORMA, Austria**

3. **Data of Equipment tested**/*Podatci o testiranoj opremi*:

Equipment/ *Oprema*	**Induction motor/** *Indukcioni motor*	**Voltage/** *Napon:*	**Power/** *Snaga:*	**Current/** Struja:	cos φ	n/min
Aerator N^0: **A1**		**380 V 50 Hz**	**37 kW**	**70 A**	**0,87**	**1465**
		Number/*Broj*:	**FL 256280**	Lot as	**VJULJ 225 S4**	**1/1980**
	Manufacturer/ *Proizvođač*	**CEM - Cie Electro- Mecanique, France**				
Location/ *Lokacija*	**Aeration tank No. 5.1**					

4. **Test Data**/*Podatci o ispitivanju:*

A – Test insulation resistance between spools;
B - Test insulation resistance between spools and ground;
C - Test of continuous of spools:

	A	MOhm
1.	W2 - U2	> 100
2.	W2 - V2	> 100
3.	U2 - V2	> 100

	B	MOhm
4.	W2 - N	> 100
5.	U2 - N	> 100
6.	V2 - N	> 100

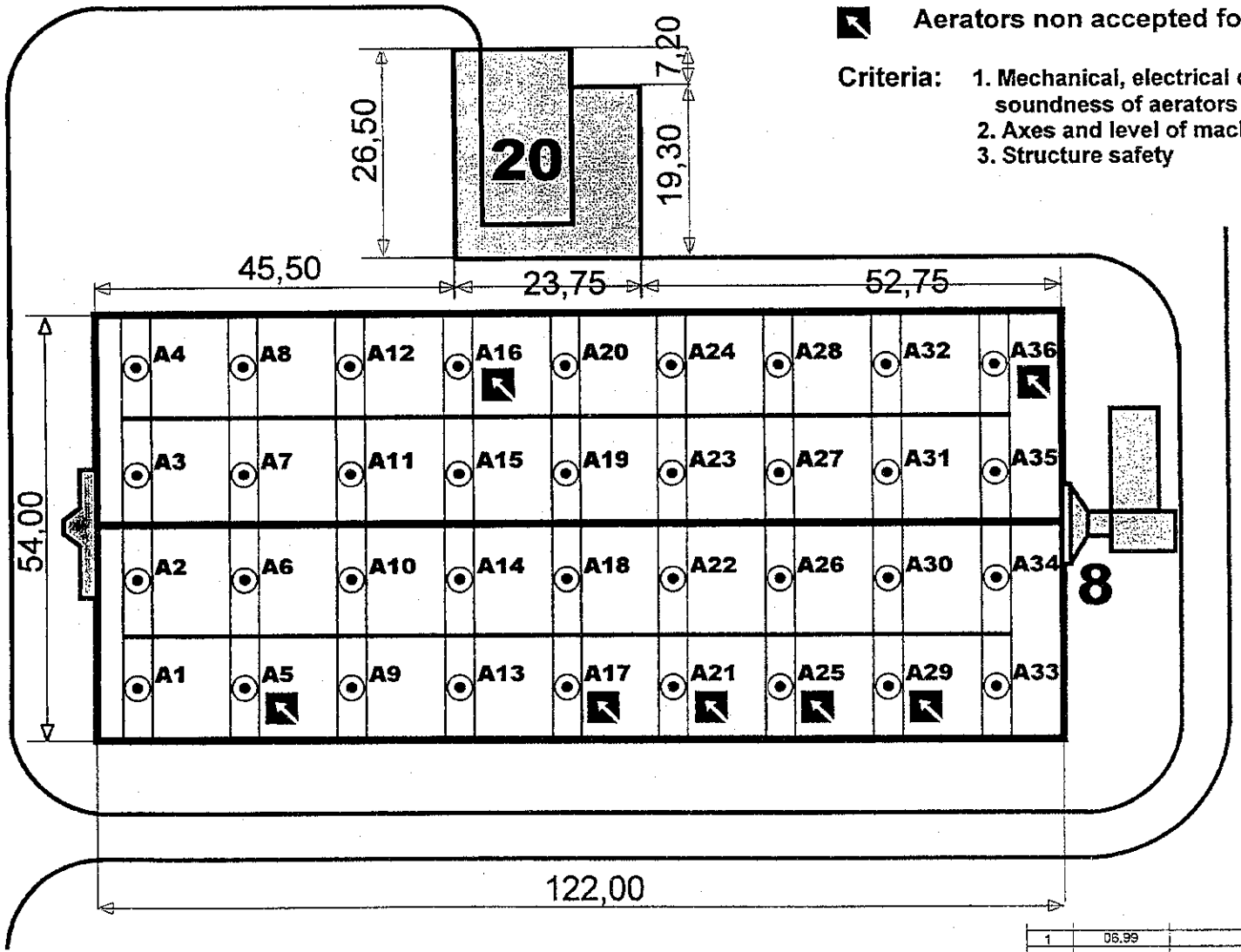
	C	MOhm
7.	U1 - U2	0,00
8.	V1 - V2	0,00
9.	W1 - W2	0,00

5. **Test Result**/*Rezultati testa*: ***A and B: > 0,38 MOhm (1000 Ohm/V); C ~ 0,00 Mohm;***

Test is positive

Tested by:

Posavac Franjo B.Sc.



REV.	DATE	IZMJENE	CRTAO	ODOBRIO
1	06.99			

THE WASTE WATER TREATMENT PLANT OF SARAJEVO CITY CLIENT : JICA STUDY TEAM	AERATION TANK -SCHEME OF AERATORS FOR TESTING-
USB KEDLY	5114 | 00 | 00 | 102 REV.1

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 - 05

1. **DATE:** 02 July 1999 **TIME:** 10:00 AM

2. **VENUE:** WWTP Conference Room, Butila

3. **ATTENDANCE LIST**

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. K. Suzuki	JICA Study Team – Team Leader
3.5 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.6 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.7 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.8 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.9 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. **MINUTES OF MEETING**

4.1 Mr. K. Suzuki opened the meeting @ 10:05 AM.

4.2 Minutes of Meeting No. 06 – 04 was accepted without comments.

4.3 The Progress of Work was discussed based on the revised Work Schedule, Rev. 5 (please see attached) presented by USB Kedly as follows:

A. **Preceding Tasks.** 100% complete

B. **Tanks Stress Strength Test**

- Extraction of concrete core samples, reinforcing bars and pH tests for Facility 3 & 5 is 100% complete.
- Testing of the samples is 100% complete.
- Reporting of the results will be completed by 9 July.

C. **Underground Pipelines**

- Testing of the 4 pipe samples is 100% complete.
- The report should include items such as pipe earth cover, and depth of ground water level.
- Reporting of the results will be completed by 9 July.

D. **Hydraulic Tests of Tanks**

- Hydraulic tests for Facility 4 (Primary Sedimentation Tank 1 & 2) is 100% complete. Comments of the Study Team were incorporated in the preliminary test results.
- Hydraulic tests for Facility 5.1 (Aeration Tank 1) is 100% complete. Preliminary test results were presented to the Study Team (please see attached).
- Water filling of Facility 5.2 will be completed today. Tests will be completed by 06 July.
- Hydraulic tests for Facility 3 (Aerated Grit Chamber) is 100% complete. Preliminary test results were presented to the Study Team (please see attached).
- Facility 6.1 & 6.3 (Final Sedimentation Tank 1 & 3) – simultaneous water filling of these tanks will start 07 July for 2 days. Tests will be completed by 12 July.
- Facility 6.2 & 6.4 (Final Sedimentation Tank 2 & 4) – simultaneous water filling of these tanks will commence on 09 July for 2 days. Tests will be completed by 15 July.

E. **Testing of the Aerators**

- Preparatory works is 100% complete.
- Testing of 9 aerators in Facility 5.1 was completed.
- Testing of 10 aerators in Facility 5.2 will start tomorrow and will be completed by Monday 05 July.
- The total number of aerators was finally confirmed after a thorough site inspection of each aerator by the Study Team and USB Kedly.
- Criteria of selection for the testing of the aerators include (a) mechanical and electrical soundness, (b) structural safety and stability.
- Broken coupling and worn out rubber gasket were found in a large number of aerators. USB Kedly will confirm the availability of the above spare parts.

5. OTHER MATTERS

5.1 The Study Team requested USB Kedly to make an inventory of the sluice gates

in Facility 3 (Aerated Grit Chamber) and Facility 5 (Aeration Tank). Information and data such as (a) manufacturer, (b) model, (c) technical specifications, and (d) existing condition will be included in the inventory. A report will be submitted to the Study Team with appropriate recommendations.

5.2 The Study Team requested for the negatives of all the photo-documentation of the field assessment done by USB Kedly and the Institute for Material Testing.

5.3 The USB Kedly will submit to the Study Team a Letter of Request for Time Extension next week.

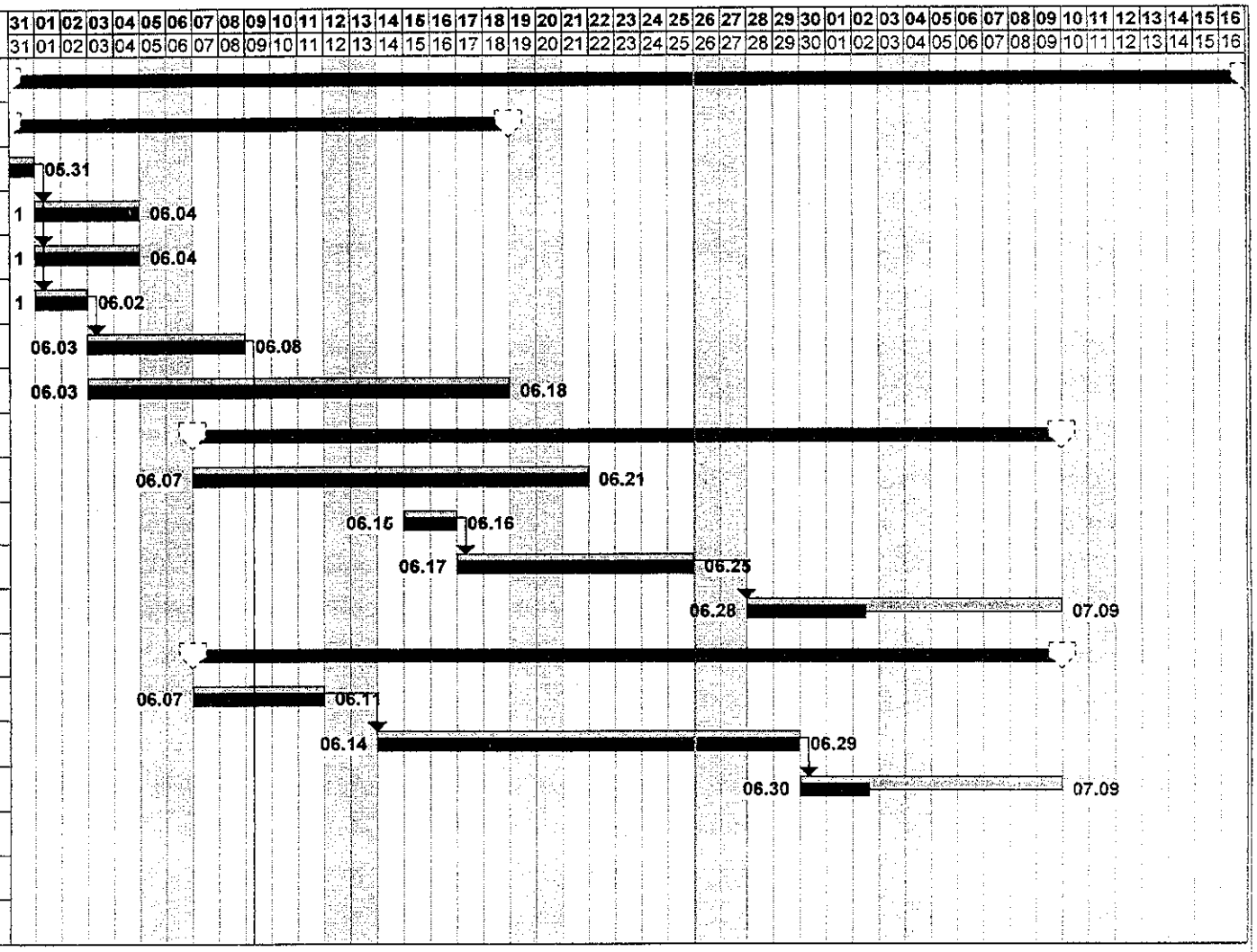
5.4 The USB Kedly requested to the Study Team to facilitate the arrangement of the 2nd Payment. The Study Team acknowledged the request and promised to take positive action.

6. NEXT MEETING: 09 July 1999, Friday @ 10:00 AM in WWTP site, Butila.

Mr. K. SUZUKI
JICA Study Team

Mr. S. CEMERLIC
USB Kedly Doo

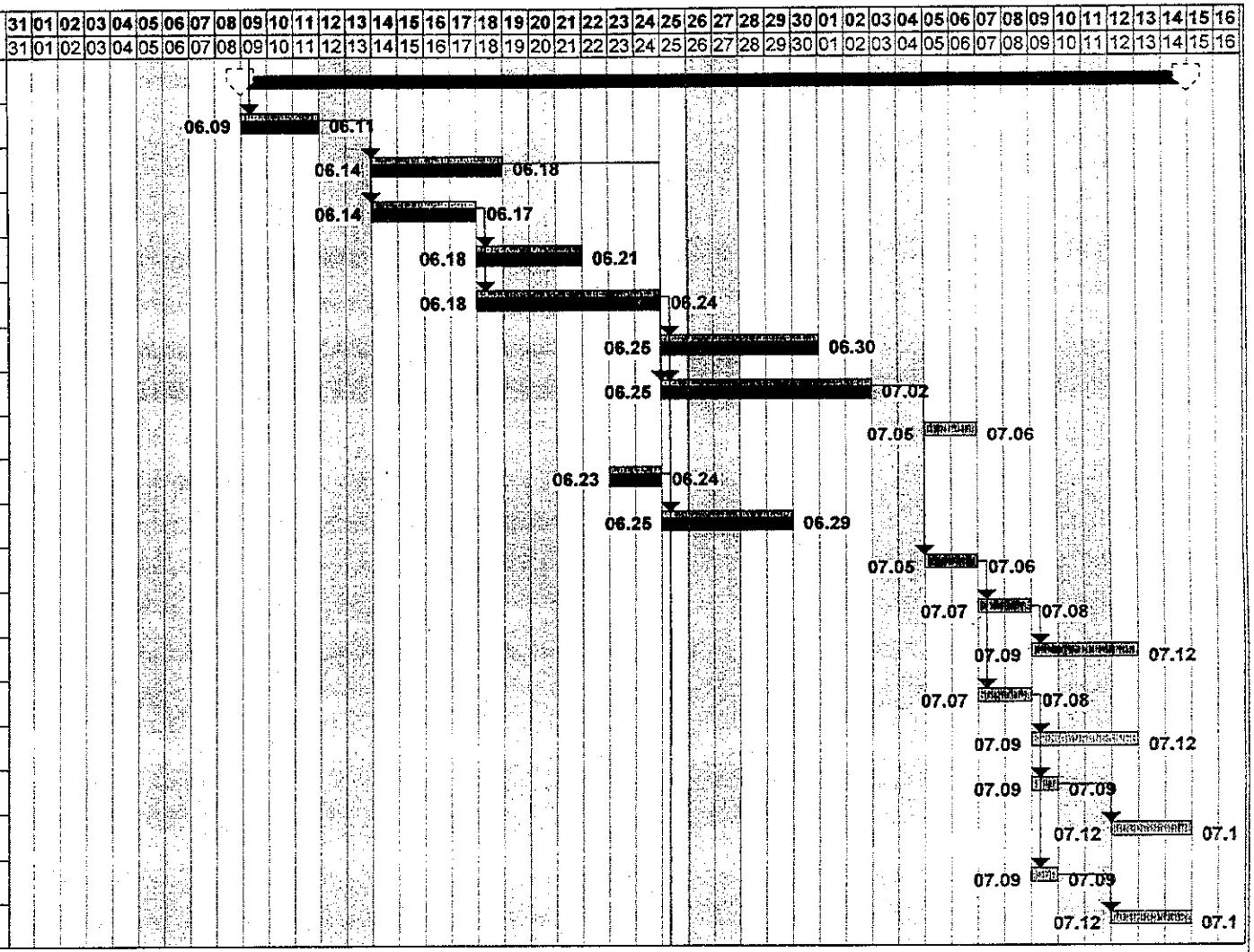
ID	Task Name
1	**TOTAL PROJECT**
2	**A. PRECEDING TASKS**
3	Nominate Project Team
4	Preparing detailed Project planing
5	Provide workshop, store, office
6	Provide HT equipment and material
7	Installation HT equipment and material
8	Blinding of output pipes of tanks
9	**B. TANKS STRESS STRENGTH TESTING**
10	Extraction of kerns for tank 5
11	Extraction of kerns for tank 3
12	Testing
13	Reporting
14	**C. UNDERGROUND PIPELINES**
15	Determination of 4 locations for testing
16	Excavation and pipes testing on 4 locations
17	Reporting
18	
19	
20	



Project: WWT Sarajevo
Date: Sat 99.06.26

Task — Summary — Rolled Up Progress
Progress — Rolled Up Task
Milestone — Rolled Up Milestone

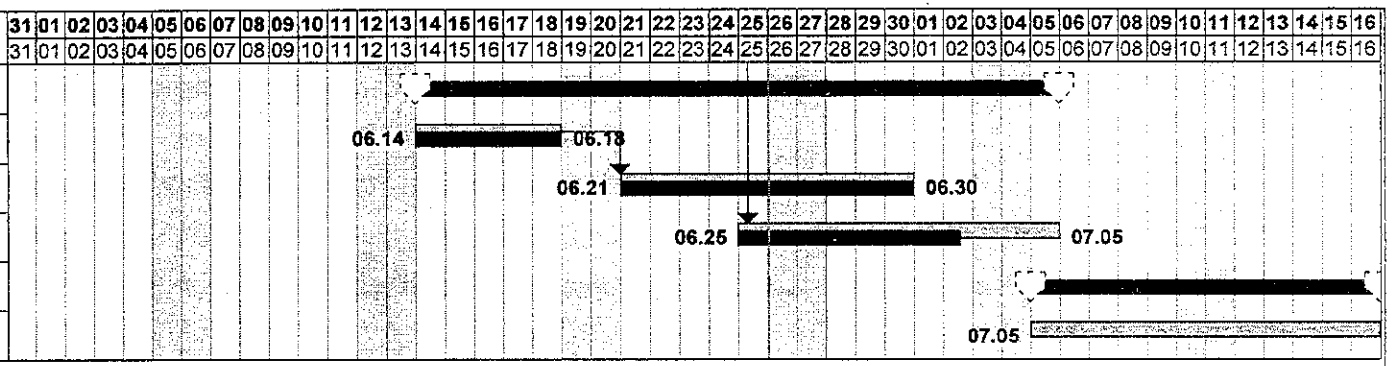
ID	Task Name
21	D. HYDRAULIC TEST OF TANKS
22	Tank 4.2 - water filling
23	Hydro test of tank 4.2
24	Tank 4.1 - water filling
25	Hydro test of tank 4.1
26	Tank 5.1 - water filling
27	Hydro test of tank 5.1
28	Tank 5.2 - water filling
29	Removing water from "1" and testing
30	Tank 3 - water filling
31	Hydro test of tank 3
32	Hydro test of tank 5.2
33	Tank 6.1 - water filling
34	Hydro test of tank 6.1
35	Tank 6.2 - water filling
36	Hydro test of tank 6.2
37	Tank 6.3 - water filling
38	Hydro test of tank 6.3
39	Tank 6.4 - water filling
40	Hydro test of tank 6.4



Project: WWT Sarajevo
Date: Sat 99.06.26

Task — Summary — Rolled Up Progress
Progress — Rolled Up Task
Milestone — Rolled Up Milestone

ID	Task Name
41	**E. TURBINES OF "AT" TESTING**
42	Provide equipment and material
43	Prepararing equipment for testing
44	Testing of aerators
45	**F. FINAL TASKS**
46	Reporting and final acceptance



Project: WWT Sarajevo
Date: Sat 99.06.26

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

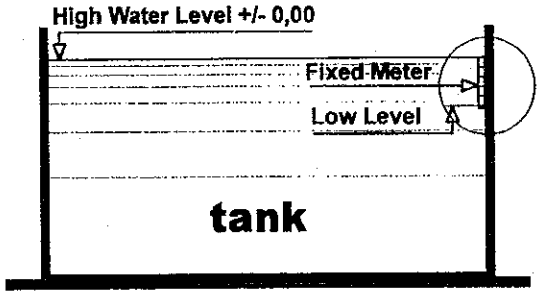
Object: **Tank N° 4.2 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material: Reinforced concrete

Measurement Scheme



N^0 of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	13.06.99	0	0,00			0,86	
2	14.06.99	24	29,32	0,02	29,30	0,86	34,09
3	15.06.99	48	23,00	0,02	22,98	0,86	26,74
4	16.06.99	72	29,32	0,03	29,29	0,86	34,08
5	17.06.99	96	26,88	0,01	26,87	0,86	31,26
				Average Value:		**0,86**	**31,52 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.17.99

Tested by:

Ekrem Velagić B.Sc.

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

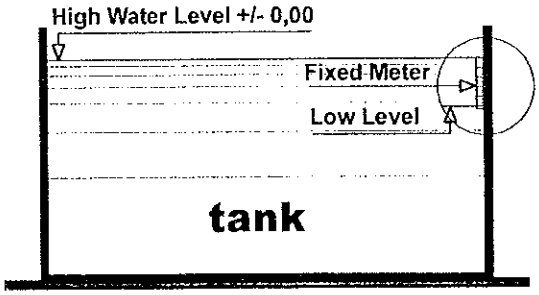
Object: **Tank Nº 4.2 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material: Reinforced concrete

Measurement Scheme



N⁰ of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	13.06.99	0	0,00			0,86	
2	14.06.99	24	29,32	0,02	29,30	0,86	34,09
3	15.06.99	48	23,00	0,02	22,98	0,86	26,74
4	16.06.99	72	29,32	0,03	29,29	0,86	34,08
5	17.06.99	96	26,88	0,01	26,87	0,86	31,26
				Average Value:		**0,86**	**31,52 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.17.99

Tested by:

Ekrem Velagić B.Sc.

1. Calculation of Max. Allowable Daily Leakage from Tank, Dh max

Function **Dhmax=(Tc/Ta): k = 3010:3500 = 0,86 mm per day**

where:

a) Tc = 7150,00 m3 - Total capacity of tank

b) Ta = DxDx3,14/4 - Surface of the tank - 2375 m2

c) Tc/Ta = 7150/2375 m - average depth of the tank - 3,01 m

d) k = 7days x 500 - Factor - 3500

2. Calculation of Daily Drain from Tanks

2.1. Tank No 4.2 - Primary Sedimentation Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	13.06.99	11h06m	1	32,8			0,0	0		
2	14.06.99	9h00m	1,086	35,5	27	29,32	0,02	29,30	0,86	34,07
3	15.06.99	9h00m	1	37,8	23	23,00	0,02	22,98	0,86	26,72
4	16.06.99	8h45m	1,011	40,7	29	29,32	0,03	29,29	0,86	34,06
5	17.06.99	9h45m	0,96	43,5	28	26,88	0,01	26,87	0,86	31,24
							Average value-V:	**27,11**	**0,86**	**31,52**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

1. Calculation of Max. Allowable Daily Leakage from Tank, Dh max

Function **Dhmax=(Tc/Ta): k = 3010:3500 = 0,86 mm per day**

where:

a) Tc = 7150,00 m3 - Total capacity of tank

b) Ta = DxDx3,14/4 - Surface of the tank - 2375 m2

c) Tc/Ta = 7150/2375 m - average depth of the tank - 3,01 m

d) k = 7days x 500 - Factor - 3500

2. Calculation of Daily Drain from Tanks

2.1. Tank No 4.2 - Primary Sedimentation Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	13.06.99	11h06m	1	32,8			0	0		
2	14.06.99	9h00m	1,086	35,5	27	29,32	0,02	29,30	0,86	34,07
3	15.06.99	9h00m	1	37,8	23	23,00	0,02	22,98	0,86	26,72
4	16.06.99	8h45m	1,011	40,7	29	29,32	0,03	29,29	0,86	34,06
5	17.06.99	9h45m	0,96	43,5	28	26,88	0,01	26,87	0,86	31,24
							Average value-V:	**27,11**	**0,86**	**31,52**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

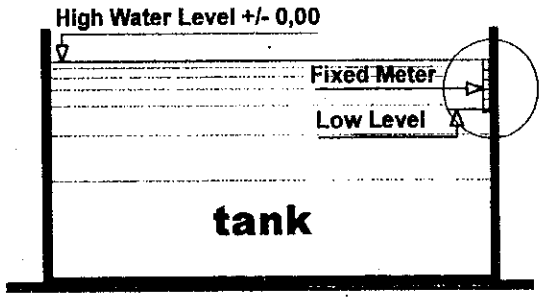
Object: **Tank N° 4.1 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material: Reinforced concrete

Measurement Scheme



N^0 of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D" (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	18.06.99	0	0,00			0,86	
2	19.06.99	24	50,27	0,02	50,25	0,86	58,43
3	20.06.99	48	43,08	0,02	43,06	0,86	50,07
4	21.06.99	72	58,00	0,03	57,97	0,86	67,41
5	22.06.99	96	56,16	0,01	56,15	0,86	65,28
				Average Value:		**0,86**	**60,30 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.22.99

Tested by:

Ekrem Velagić B.Sc.

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

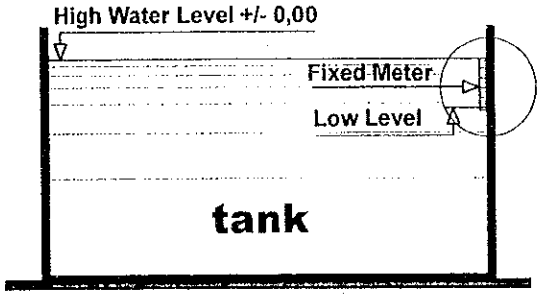
Object: **Tank N° 4.1 – Primary Sedimentation Tank**

Capacity: 7.150,00 m^3

Construction form: Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material: Reinforced concrete

Measurement Scheme



N⁰ of Measurement	Date of Measurement	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D" (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	18.06.99	0	0,00			0,86	
2	19.06.99	24	50,27	0,02	50,25	0,86	58,43
3	20.06.99	48	43,08	0,02	43,06	0,86	50,07
4	21.06.99	72	58,00	0,03	57,97	0,86	67,41
5	22.06.99	96	56,16	0,01	56,15	0,86	65,28
				Average Value:		**0,86**	**60,30 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.22.99

Tested by:

Ekrem Velagić B.Sc.

2.2. Tank No 4.1 - Primary Sedimentation Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	18.06.99	9h35m	1	91,5			0	0		
2	19.06.99	11h50m	0,914	86,0	55	50,27	0,02	50,25	0,86	58,43
3	20.06.99	9h30m	1,077	82,0	40	43,08	0,02	43,06	0,86	50,07
4	21.06.99	9h30m	1,000	76,2	58	58,00	0,03	57,97	0,86	67,41
5	22.06.99	9h00m	1,021	70,7	55	56,16	0,01	56,15	0,86	65,28
							Average value-V:	**51,86**	**0,86**	**60,30**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

2.2. Tank No 4.1 - Primary Sedimentation Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	18.06.99	9h35m	1	91,5			0	0		
2	19.06.99	11h50m	0,914	86,0	55	50,27	0,02	50,25	0,86	58,43
3	20.06.99	9h30m	1,077	82,0	40	43,08	0,02	43,06	0,86	50,07
4	21.06.99	9h30m	1,000	76,2	58	58,00	0,03	57,97	0,86	67,41
5	22.06.99	9h00m	1,021	70,7	55	56,16	0,01	56,15	0,86	65,28
							Average value-V:	**51,86**	**0,86**	**60,30**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

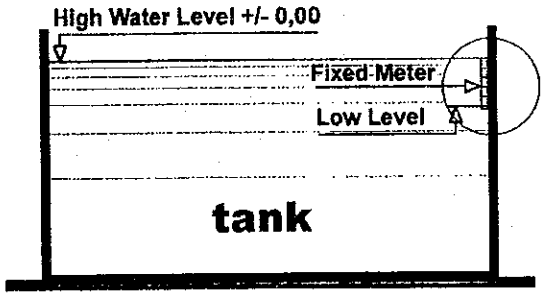
Object: **Tank N° 3 – Aerated grit chamber**

Capacity: 1.200,00 m^3

Construction form: Squore

Construcion material: Reinforced concrete

Measurement Scheme



N° of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D" (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	300,00	0,02	299,98	0,86	348,81
3	27.06.99	48	205,70	0,02	205,68	0,86	239,17
4	28.06.99	72	169,42	0,03	169,39	0,86	196,96
5	29.06.99	96	166,53	0,01	166,52	0,86	193,63
				Average Value:		**0,86**	**244,64 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.29.99

Tested by:

Ekrem Velagić B.Sc.

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

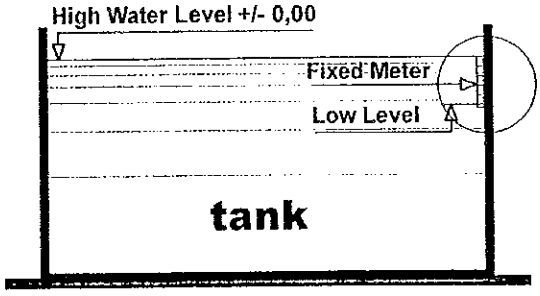
Object: **Tank N° 3 – Aerated grit chamber**

Capacity: 1.200,00 m^3

Construction form: Squore

Construcion material: Reinforced concrete

Measurement Scheme



N° of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D" (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	300,00	0:02	299,98	0,86	348,81
3	27.06.99	48	205,70	0:02	205,68	0,86	239,17
4	28.06.99	72	169,42	0:03	169,39	0,86	196,96
5	29.06.99	96	166,53	0:01	166,52	0,86	193,63
				Average Value:		**0,86**	**244,64 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.29.99

Tested by:

Ekrem Velagić B.Sc.

2.3. Tank No 3 - Aerated grit chamber

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	25.06.99	8h30m	1	90,0			0	0		
2	26.06.99	8h30m	1	120,0	300	300,00	0,02	299,98	0,86	348,81
3	27.06.99	5h30m	1,1428	138,0	180	205,70	0,02	205,68	0,86	239,17
4	28.06.99	7h00m	0,941	156,0	180	169,42	0,03	169,39	0,86	196,96
5	29.06.99	7h30m	0,9796	173,0	170	166,53	0,01	166,52	0,86	193,63
							Average value-V:	**210,39**	**0,86**	**244,64**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

2.3. Tank No 3 - Aerated grit chamber

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	25.06.99	8h30m	1	90,0			0	0		
2	26.06.99	8h30m	1	120,0	300	300,00	0,025	299,98	0,86	348,81
3	27.06.99	5h30m	1,1428	138,0	180	205,70	0,02	205,68	0,86	239,17
4	28.06.99	7h00m	0,941	156,0	180	169,42	0,03	169,39	0,86	196,96
5	29.06.99	7h30m	0,9796	173,0	170	166,53	0,01	166,52	0,86	193,63
							Average value-V:	**210,39**	**0,86**	**244,64**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

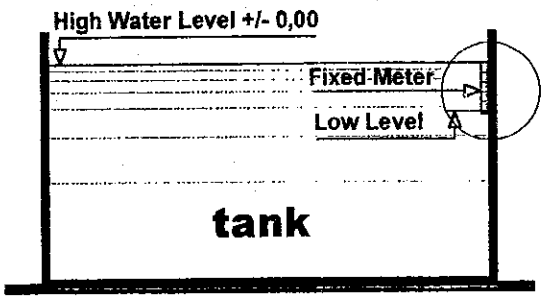
Object: **Tank N° 5.1 – Aeration Tank**

Capacity: 12.000,00 m^3

Construction form: Squore

Construcion material: Reinforced concrete

Measurement Scheme



N^0 of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D" (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	258,30	0,02	258,28	0,86	300,33
3	27.06.99	48	219,03	0,02	219,01	0,86	254,66
4	28.06.99	72	184,60	0,03	184,57	0,86	214,62
				Average Value:		**0,86**	**256,53 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.28.99

Tested by:

Ekrem Velagić B.Sc.

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

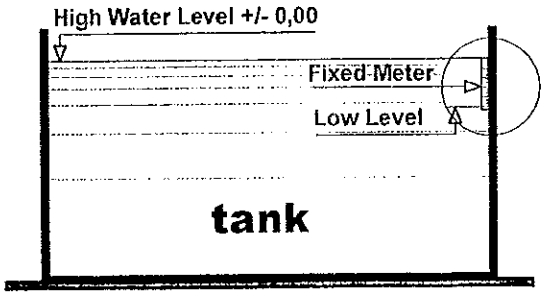
Object: **Tank Nº 5.1 – Aeration Tank**

Capacity: 12.000,00 m^3

Construction form: Squore

Construcion material: Reinforced concrete

Measurement Scheme



N⁰ of Measure ment	Date of Measure ment	Time (h)	Measure-ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D" (6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	258,30	0,02	258,28	0,86	300,33
3	27.06.99	48	219,03	0,02	219,01	0,86	254,66
4	28.06.99	72	184,60	0,03	184,57	0,86	214,62
				Average Value:		**0,86**	**256,53 > 1,00**

*Note: For above dada, see next pages

Test Result: *Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.*

Sarajevo 06.28.99

Tested by:

Ekrem Velagić B.Sc.

2.4. Tank No 5.1 - Aeration Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	25.06.99	13h00m	1	200,0			0	0		
2	26.06.99	8h30m	1,23	179,0	210	258,30	0,02	258,28	0,86	300,33
3	27.06.99	7h30m	1,043	158,0	210	219,03	0,02	219,01	0,86	254,66
4	28.06.99	9h30m	0,923	138,0	200	184,60	0,03	184,57	0,86	214,62
							Average value-V:	**220,62**	**0,86**	**256,53**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

2.4. Tank No 5.1 - Aeration Tank

No of Meas.	Data of Measurement	Time of Measurement (h)	24h Correction Factor kt	Measurement Level (cm)	Δhm mm	Δhmk (4)x(6) mm	Evaporation and Rain (E-R) (mm)	D-loss (7)-(8) (mm/day)	Dhmax (mm/day)	Factor-D (9)/(8)
(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)
1	25.06.99	13h00m	1	200,0			0	0		
2	26.06.99	8h30m	1,23	179,0	210	258,30	0,02	258,28	0,86	300,33
3	27.06.99	7h30m	1,043	158,0	210	219,03	0,02	219,01	0,86	254,66
4	28.06.99	9h30m	0,923	138,0	200	184,60	0,03	184,57	0,86	214,62
							Average value-V:	**220,62**	**0,86**	**256,53**

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 - 06

1. **DATE:** 09 July 1999 **TIME:** 1:00 PM

2. **VENUE:** WWTP Conference Room, Butila

3. **ATTENDANCE LIST**

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. K. Suzuki	JICA Study Team – Team Leader
3.5 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.6 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.7 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.8 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.9 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. **MINUTES OF MEETING**

4.1 Mr. R. Crisostomo opened the meeting @ 1:00 PM.

4.2 Minutes of Meeting No. 06 – 05 was accepted with comments on Item 5.3 to be deleted. The total project schedule has been clarified to be 60 days and not 45 days as previously reported. Therefore, the request for time extension by USB Kedly is absurd.

4.3 The Progress of Work was discussed based on the revised Work Schedule, Report No. 5 (please see attached) presented by USB Kedly as follows:

A. **Preceding Tasks.** 100% complete

B. **Tanks Stress Strength Test**

- Extraction of concrete core samples, reinforcing bars and pH tests for Facility 3 & 5 is 100% complete.

- Testing of the samples is 100% complete.
- Reporting of the results is completed and will be incorporated in the final report.

C. **Underground Pipelines**

- Testing of the 4 pipe samples is 100% complete.
- Reporting of the results is completed and will be incorporated in the final report.
- Repair of the pipelines has started 08 July and will be completed next week.

D. **Hydraulic Tests of Tanks**

- Hydraulic tests for Facility 4 (Primary Sedimentation Tank 1 & 2) is 100% complete. Reporting of the results is completed and will be incorporated in the final report.
- Hydraulic tests for Facility 5.1 (Aeration Tank 1) is 100% complete. Reporting of the results is completed and will be incorporated in the final report.
- Hydraulic tests for Facility 5.2 (Aeration Tank 2) is on-going and is expected to be completed on Monday.
- Hydraulic tests for Facility 3 (Aerated Grit Chamber) is 100% complete. Reporting of the results is completed and will be incorporated in the final report.
- Facility 6.1 & 6.3 (Final Sedimentation Tank 1 & 3) – simultaneous water filling of these tanks started 08 July for 2 days. Tests will be completed by 14 July.
- Facility 6.2 & 6.4 (Final Sedimentation Tank 2 & 4) – simultaneous water filling of these tanks will commence on 12 July for 2 days. Tests will be completed by 16 July.

E. **Testing of the Aerators**

- Preparatory works is 100% complete.
- Testing of 19 aerators in Facility 5.1 and 5.2 (Aeration Tanks) is completed.
- The total number of aerators was finally confirmed after a thorough site inspection of each aerator by the Study Team and USB Kedly.
- Criteria of selection for the testing of the aerators include (a) mechanical and electrical soundness, (b) structural safety and stability.
- Broken coupling and worn out rubber gasket were found in a large number of aerators. USB Kedly will confirm the availability of the above spare parts.

- Preliminary report was submitted to the JICA Study Team for comments.

5. OTHER MATTERS

5.1 As per request of the JICA Study Team the USB Kedly started the inventory of the sluice gates on Facility 3 and 5 and is expected to be completed next week. Results will be incorporated in the final report.

5.2 As per request of the JICA Study Team the negatives for all the photo-documentation of the field assessment done by USB Kedly and the Institute for Material Testing will be given together with be final report.

5.3 The USB Kedly submitted to the JICA Study Team the acknowledgement receipt of the 2nd Payment.

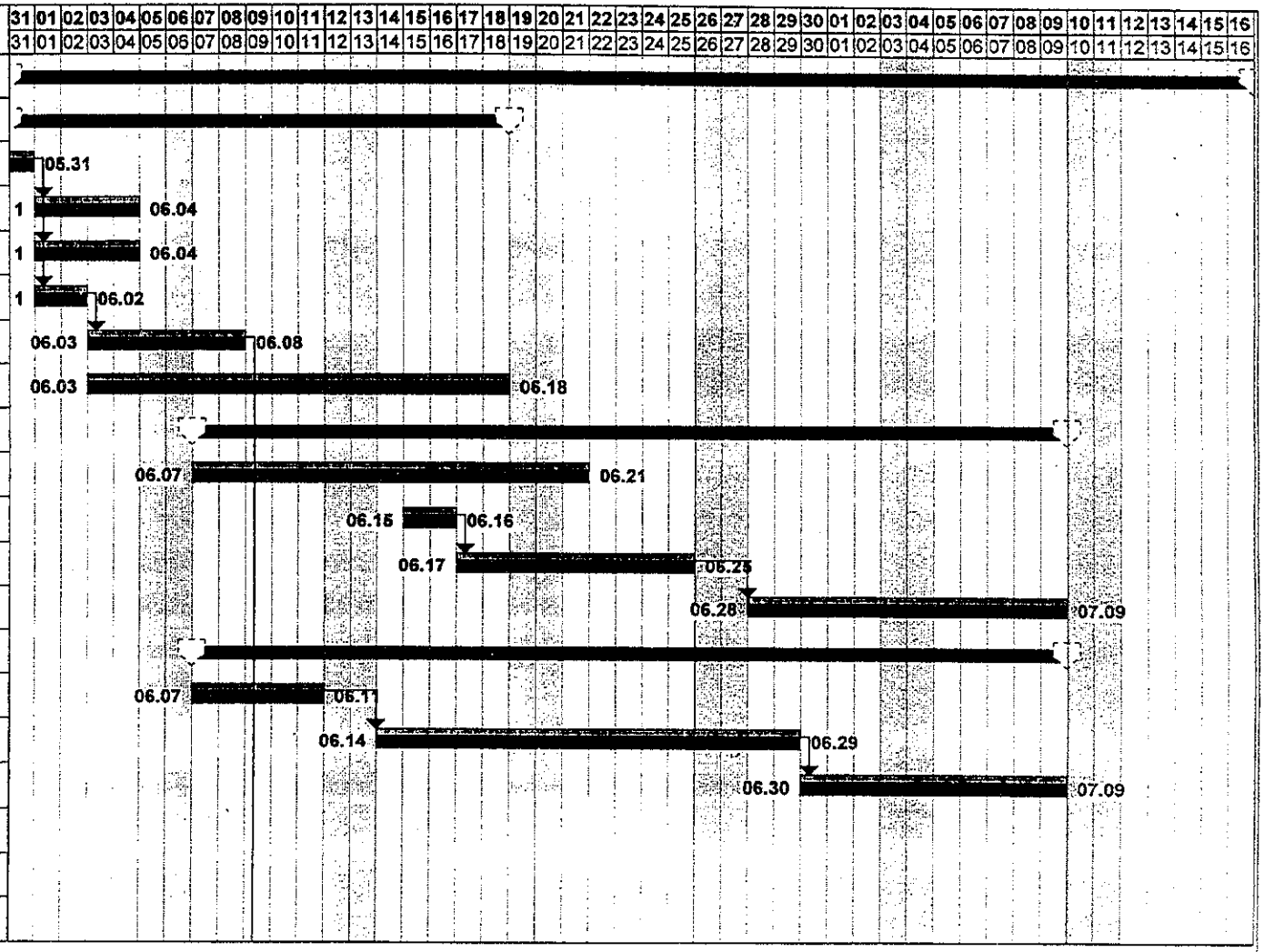
5.4 The USB Kedly submitted an inspection sheet of the aerators for the Study Team's comments.

6. NEXT MEETING: 19 July 1999, Monday @ 10:00 AM, WWTP Conference Room, Butila.

Mr. K. SUZUKI
JICA Study Team

Mr. S. CEMERLIC
USB Kedly Doo

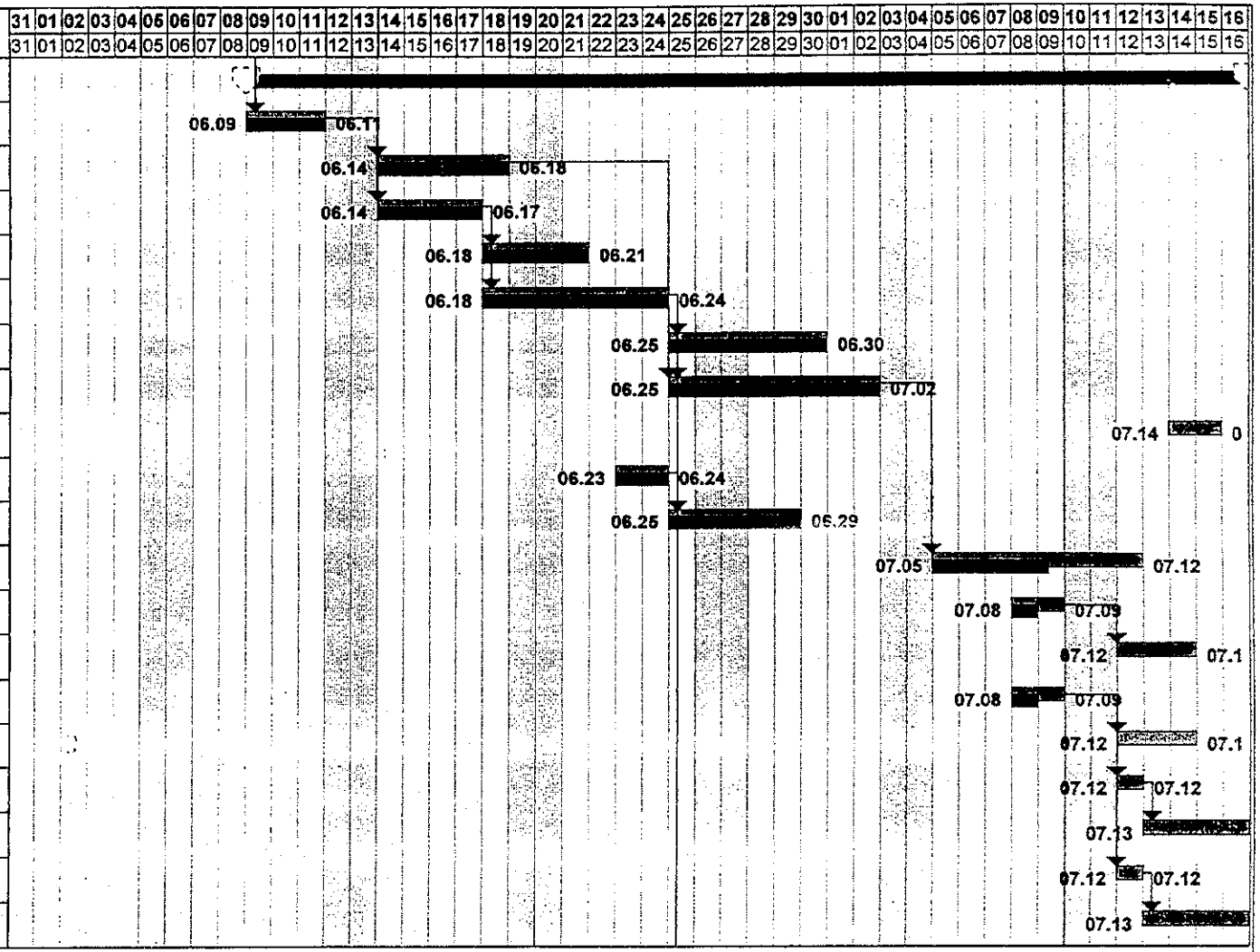
ID	Task Name
1	TOTAL PROJECT
2	A. PRECEDING TASKS
3	Nominate Project Team
4	Preparing detailed Project planing
5	Provide workshop, store, office
6	Provide HT equipment and material
7	Installation HT equipment and material
8	Blinding of output pipes of tanks
9	B. TANKS STRESS STRENGTH TESTING
10	Extraction of kerns for tank 5
11	Extraction of kerns for tank 3
12	Testing
13	Reporting
14	C. UNDERGROUND PIPELINES
15	Determination of 4 locations for testing
16	Excavation and pipes testing on 4 locations
17	Reporting
18	
19	
20	



Project: WWT Sarajevo
Date: Sat 99.07.10

Task — Summary — Rolled Up Progress
Progress — Rolled Up Task
Milestone — Rolled Up Milestone

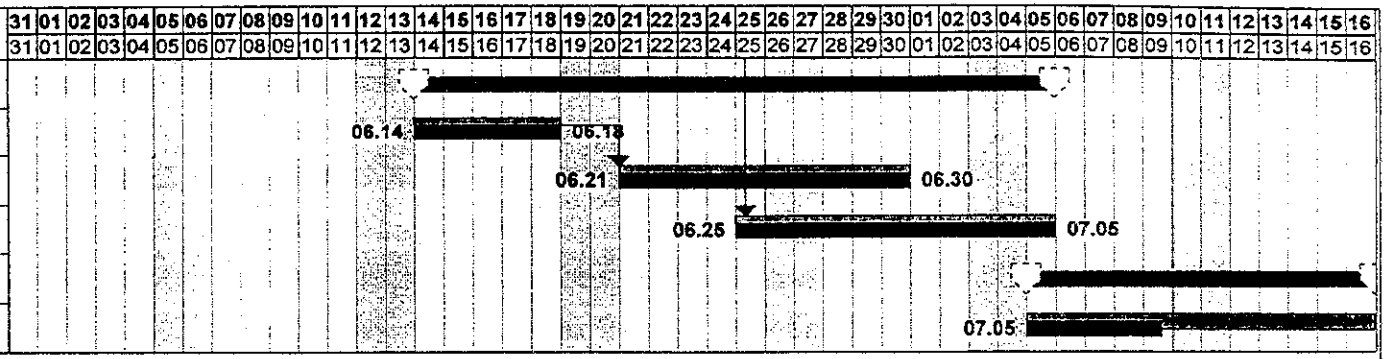
ID	Task Name
21	D. HYDRAULIC TEST OF TANKS
22	Tank 4.2 - water filling
23	Hydro test of tank 4.2
24	Tank 4.1 - water filling
25	Hydro test of tank 4.1
26	Tank 5.1 - water filling
27	Hydro test of tank 5.1
28	Tank 5.2 - water filling
29	Removing water from "1" and testing
30	Tank 3 - water filling
31	Hydro test of tank 3
32	Hydro test of tank 5.2
33	Tank 6.1 - water filling
34	Hydro test of tank 6.1
35	Tank 6.3 - water filling
36	Hydro test of tank 6.3
37	Tank 6.2 - water filling
38	Hydro test of tank 6.2
39	Tank 6.4 - water filling
40	Hydro test of tank 6.4



Project: WWT Sarajevo
Date: Sat 99.07.10

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

ID	Task Name
41	**E. TURBINES OF "AT" TESTING**
42	Provide equipment and material
43	Prepararing equipment for testing
44	Testing of aerators
45	**F. FINAL TASKS**
46	Reporting and final acceptance



Project: WWT Sarajevo
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AERATION TURBINE TEST LOAD INSPECTION SHEET

1. GENERAL

Date of testing: **19. 06.1999.** *Time of testing:* **12 30 – 14 30**

2. INSTRUMENT USED FOR MEASUREMENT (See Attachment)

3. EQUIPMENT TESTED DATA

AERATION TURBINE	**N° A1**	
Location:	**Aeration tank N° 5.1.**	
Aeration turbine type: **Fixed position surface aerator**	*Manufacturer:* **DEGREMONT**	*Materials (Shaft/Rotor):* **carbon steel/carbon steel**
Service: **air supply for biological treatment**	*Duty:* **permanent**	*Corrosive protection:* **epoxi painted**
Turbine diametar: **2300,00 mm?**	Installation: ***out door***	*Turbine speed:* **51,9 tr/min**

Elektro Motore:			
Electromotore type: **Induction motor**	*Manufacturer:* **CEM-Cie Electro-Mecanique, France**		*Manufacturer type:*
Manufacturer number: **FL 256280**	*Production Year:* **1980**		*Lot :* **VJULJ 225 S4 1/1980**
Voltage: **380V; 50Hz** | *Power:* **37 kW**	Current: **70 A**	*Cos φ:* **0,87**	*n/min:* **1465**
Service: **turbine drive**	*Installation:* **out door**		*Duty:* **permanent**

Coupling:		
Coupling type: **Periflex**	*Manufacturer:* **TEXROPE France**	*Manufacturer type:*

Gear Box:		
Gear box type: **2 step vertical shaft**	*Manufacturer:* **Hansen Patent France**	*Manufacturer type:* **NE 36 AN**
Manufacturer number: **E 10663**	*Production Year:* **1980**	*Ratio:* **1465/51,9/28,528**
Service: **turbine drive**	*Installation:* **out door**	*Duty:* **permanent**

3. TEST DATA

Description	*Unit*	**GEAR BOX**	**ELECTRO MOTORE**
Figure:			
Corrosion:	%		
Insulation resistance:		/	
Terminals:		/	
Abnormal Sound:			
Bearings:			
Shafts:			/
Gears:			/
Electricity:	A	/	
Speed:	O/min		
Vibration:	µm		/
Oil temperature:			
El. mot.overheating:		/	
Anchor bolts:			/

4. TEST RESULT:

Verified by:

Test is Pass

Posavac Franjo B.Sc.

AGREEMENT ON
SITE SURVEY AND ASSESSMENT
OF THE SARAJEVO WWTP
BETWEEN
JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING
NO: 06 – 07

1. **DATE:** 19 July 1999 **TIME:** 10:00 PM

2. **VENUE:** WWTP Conference Room, Butila

3. **ATTENDANCE LIST**

3.1 Mr. S. CEMERLIC	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. E VELAGIC	USB Kedly Doo - Director, Civil Engineer
3.3 Mr. K. SUZUKI	JICA Study Team – Team Leader
3.4 Mr. H. TAKADA	JICA Study Team - Structural/Architectural Design
3.5 Mr. H. SAKAI	JICA Study Team - Mechanical/Plant Design
3.6 Mr. K. OTA	JICA Study Team - Electrical/Plant Design
3.7 Mr. R. DESPAULT	JICA Study Team - Structural/Facility Design
3.8 Mr. R. CRISOSTOMO	JICA Study Team - Facility Design/O&M Planning

4. **MINUTES OF MEETING**

4.1 Mr. K. SUZUKI opened the meeting @ 1:00 AM with special thanks to the USB Kedly acknowledging their cooperation and performance in carrying out all the works as per the contract.

4.2 Minutes of Meeting No. 06 – 06 was accepted.

4.3 All works as per the Agreement made and signed on the 25th May 1999 by and between the JICA Study Team and USB Kedly Doo is completed.

4.4 The USB Kedly presented and explained briefly the contents of the Final Report (Elaboration of the Testing). They also presented 8 copies of the Report done by the Institute for Materials and Structures, Faculty of Civil Engineering, University Sarajevo on the tests they did on the Aerated Grit Chamber, Aeration Tank and Underground Pipelines.

4.5 Mr E. VELAGIC and Mr. K. SUZUKI signed the Certificate of Final Acceptance (please see attached) for and in behalf of USB Kedly Doo and JICA Study Team,

and in behalf of USB Kedly Doo and JICA Study Team, respectively. Included in the Certificate is an invoice in the amount of DEM 2,800.00 for payment of the additional works done by the contractor which were not originally part of the Scope of Work. The JICA Study Team agreed to pay the said amount.

4.6 The USB Kedly started the restoration and cleaning of the tested facilities, and the repair of the underground pipelines. Completion of the above works is expected after two weeks.

4.7 The JICA Study Team finally accepted the completion of works done by USB Kedly.

Mr. K. SUZUKI
JICA Study Team

Mr. S. CEMERLIC
USB Kedly Doo

THE CERTIFICATE OF FINAL ACCEPTANCE

According to the Agreement made and signed on the 25th of May 1999 by and between the JICA Study Team for the Feasibility Study on the Wastewater Treatment Plant of Sarajevo City in Bosnia and Herzegovina and USB KEDLY DOO Sarajevo, we herewith declare as follows:

1. The work on the field survey and assessment of the Sarajevo WWTP carried out by USB Kedly doo Sarajevo was started on the 31.05.1999 and finished on the 16.07.1999,

2. The work is finished successfully and in compliance with the Agreement specification,

3. USB KEDLY during the Work carried out the Additional works and services according to requests of JICA Study Team as follows:

   - Cutting of pipes on 4 locations, supplying new pieces, welding pipes and isolation of pipes,
   - Discharging water from raw water pump station tank within 3 days with 2 pumps,
   - Preparing additional photo documentation,
   - Improving necessary instruments for aerators testing,
   - Testing and inspection of machines coating color,
   - Inspection of sluice gates with reporting,
   - Preparing and finalizing of local cost investigation report,

   for the Total additional Sum of 2,800.00 DEM

This Certificate is drown up entitling USB KEDLY to the relevant payments.

Sarajevo, 19th of July 99
(place and date)

FOR AND BEHALF OF:

USB KEDLY DOO, Sarajevo

"USB KEDLY DOO" SARAJEVO

Mr. Ekrem VELAGIĆ, Manager

FOR AND BEHALF OF:

JICA Study Team

19.07.99

Mr. Kaoru SUZUKI, Team Leader

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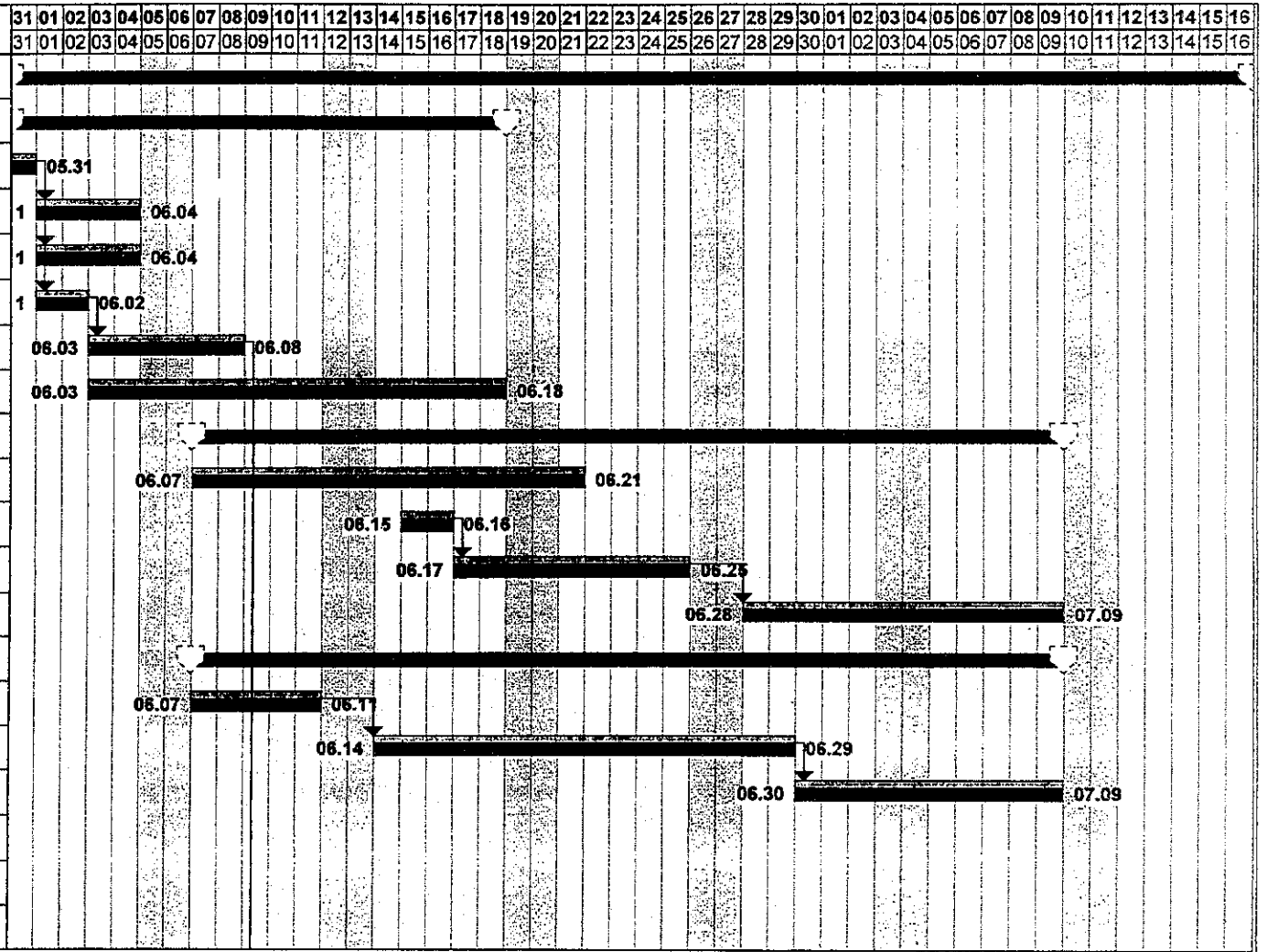

Project: WWT Sarajevo
Date: Thu 99.07.22

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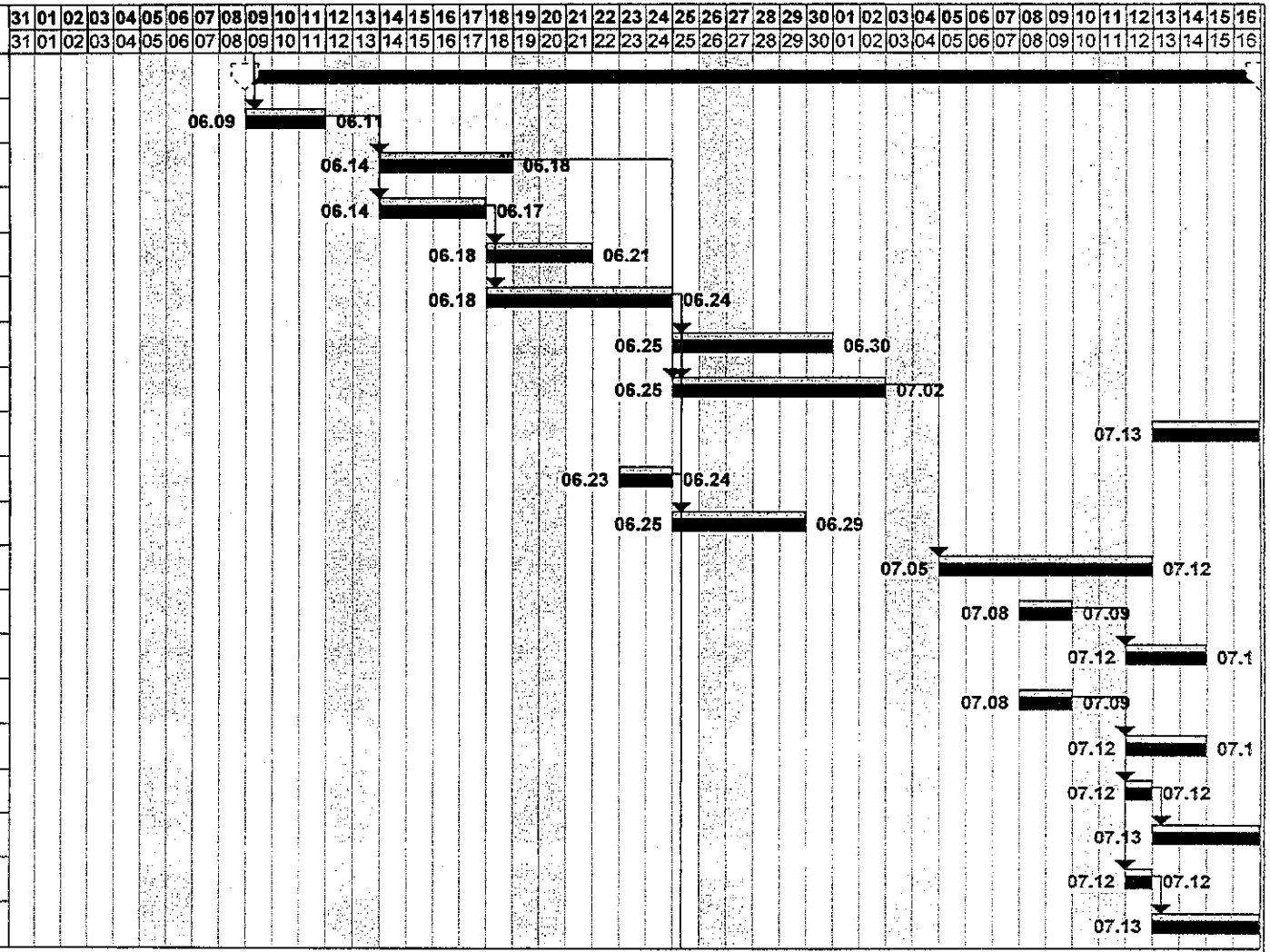

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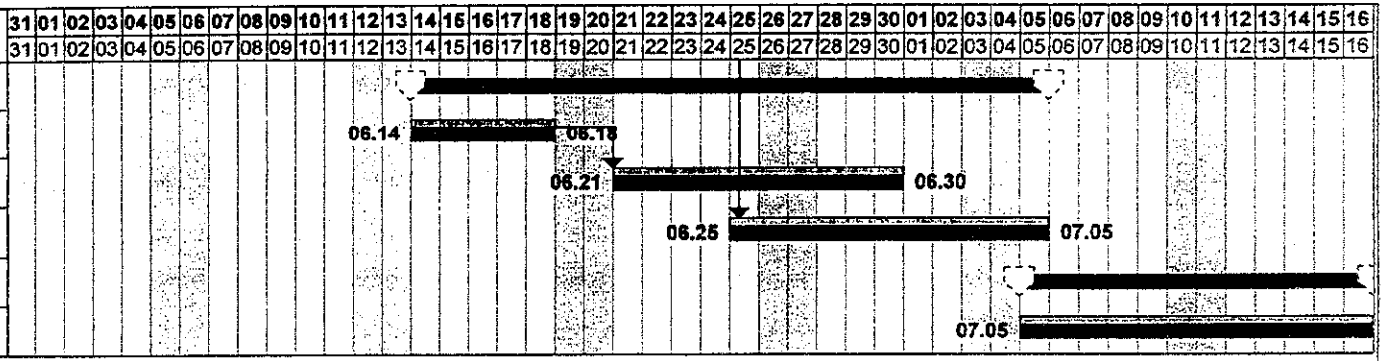

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