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أكاديمية التطوير التربوي (واشنطن)

CARTELLE

AUDITING REPORT

AL-BASHIR HOSPITAL

SUBMITTED TO
A.E.D.
ACADEMY FOR EDUCATIONAL DEVELOPMENT
WATER EFFICIENCY AND PUBLIC INFORMATION
FOR ACTION (WEPIA)
Cooperative Agreement No. 278-A-00-00-00201-00

PERFORMED BY
CARTELLE

MAY, 2000

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SECTION ONE:

INTRODUCTION:

GENERAL VIEW ABOUT AL-BASHIR HOSPITAL:

Al-Bashir hospital was built during 1954 on a block of land of 210,000m^2.

Many buildings were added since then making the total land space building of 80,000m^2, it's located in the heart of old Amman city and serving around 500,000 citizen annually.

Bashir hospital considered, as one of the main hospitals in Amman and it's a good example on the public hospitals. As an example, during the year 1999, the in-patients stayed at Al-Bashir were around 62,000 patients, where the outpatients were around 423,000 adding to these figures the numbers of visitors.

The time, effort and cost of replacement to WSD devices at this hospital give a real indication to the time, effort and cost for any building in future.

Numbers of building are (11) buildings.

The various departments of Al-Bashir hospital:

1.	MEDICAL DEPARTMENTS	23
2.	OUT-PATIENT CLINICS (COMPLEX)	1
3.	EMERGENCY	9
4.	MANAGEMENT DEPARTMENTS	1
5.	KITCHENS & CAFFETERIAS	4
6.	LABORATORIES	1
7.	WAREHOUSES	12
8.	MANTENANCE WORKSHOPS	2
9.	PHARMACIES	2
10.	BLOOD BANK	1
11.	LAUNDRY	1
12.	DORMITORY	1
13.	NURSING SCHOOL	2
14.	OTHERS	13
TOTAL		73

TABEL (1)

SECTION TWO:

PURPOSE OF STUDY:

1. To identify the water consumption at each location and in each utility within the same location.

2. To identify the possibility of reducing the water consumption at each location by various means.

3. To identify the available water saving devices at each location, if any.

4. To utilize, modify and/or replace the available water saving devices, if available.

5. To recommend the best method of saving water that suits the requirements of that specific location, and, at the same time, fits within the available water system.

6. To recommend and qualify the suppliers, (local & foreign).

7. To determine the total cost of replacing, modifying, and/or utilizing the water saving devices.

8. After installation of water saving devices, reevaluate to identify efficiency, durability and feasibility of the recommended installed water saving devices.

SECTION THREE:

METHODOLOGY:

The method of survey was divided into three stages as follows:

- **Stage one:**

Visiting the "department of building" at the ministry of health, in order to obtain a layout sketch for the hospital buildings, and piping & instrumentation, in addition to any available statistical analysis or information regarding water situation.

- **Stage two:**

Visiting Al-Bashir hospital, in order to do an actual survey on the water consumption and audit the whole piping and sanitary ware fixtures actual situation.

In order to obtain accurate figures, a standard research form was prepared. A decision was taken to visit each and every sanitary ware fixture within any utility of Al-Bashir, for evaluation purposes.

Tools used were:

1. Flow volumetric flask.
2. Pressure gauge.
3. Water saving devices (various brands).

- **Stage three:**

Analyzing the data obtained in order to come out with suitable recommendations on how to conserve/save water.

Personnel involved in the survey team:

Cartelle's team:

- Dr. Hasan abdoh.
- Eng. Eman douglas.
- Eng. Izzat abdoh.
- Eng. Aseel jawhari.

Various meetings with key people and staff members took place for 5 consecutive days. Please see the "list of personnel interview" in appendix (I).

Period of survey:

A period of (8) working days from 22/5 – 31/5, (4) working days were field inspection and research at the location. One day on site for the qualification of different WSD, the other three days were performing analysis and writing the report at the offices.

SECTION FOUR:

BACKGROUND AND PREVIOUS STUDIES:

Al-Bashir hospital was qualified by the "WEPIA" demand survey team as a sample of a hospital that consumes > 500m^3 per quarter. Because Al-Bashir was built in 1954 with a lot of renovations and upgrading since then; it was a very good example of a case study for an accurate auditing.

The WEPIA survey team did visit the hospital site and obtained some information which were not enough or comprehensive as the sources of information was estimating more than giving documented or accurate facts.

The information obtained by the WEPIA team were not enough to calculate the volume of water consumed nor to evaluate the cost of WSD to be installed, the team identified a daily consumption rate of 811 m^3, while in this audit, the Cartelle team will identify the exact daily water consumption at Al-Bashir hospital in addition to the daily consumption at each department of the hospital.

SECTION FIVE:

AUDITING:

5.1. STAGE ONE: VISITING DEPARTMENT OF BUILDING:

THE CARTELLE TEAM STARTED THIS AUDIT BY VISITING THE DEPARTMENT OF BUILDINGS (D.O.B) AT THE MINISTRY OF HEALTH (M.O.H),. THE D.O.B IS RESPONSIBLE FOR THE APPROVAL OF THE ARCHITECTURAL DESIGN OF ANY M.O.H BUILDING IN JORDAN. AT THE SAME TIME, THE D.O.B IS RESPONSIBLE FOR THE SUPPLY OF ALL REQUIREMENTS OF ANY M.O.H BUILDING, SUCH AS PIPES, BOILERS, FURNITURE, MEDICAL APPLIANCES, ...etc.

THE PURPOSE OF THE VISIT WAS TO OBTAIN THE FOLLOWING INFORMATION AND MATERIALS:

1. ALL NECESSARY INFORMATION ABOUT AL-BASHIR BUILDINGS, SUCH AS: YEAR BUILT, AREA SPACE, INFRA- STRUCTURE, MAINTENANCE, AND ANY AVAILABLE STATISTICS.

2. THE LAYOUT SKETCH OF AL-BASHIR BUILDINGS.

THE TEAM MET THERE WITH THE FOLLOWING PERSONNEL:

1. ENG. RATIB MAGHNAM, WHOM WAS THE HEAD OF MAINTENANCE DEPARTMENT OF AL-BASHIR FOR (11) MONTHS UNTIL 22/5/2000.

2. ENG. MOHAMMAD OTOOM, MATERIAL ENGINEER, WHOM IS RESPONSIBLE FOR THE SUPPLY OF MATERIALS TO AL-BASHIR.

WE CAME TO REALIZE THAT EVEN THOUGH THE ENGINEERS AT THE "D.O.B" ARE AWARE OF W.S.D, NONE OF THEM HAVE RECOMMENDED THE APPLICATION OF W.S.D AT ANY HOSPITAL BUILDING.

ONE PRIVATE SUPPLIER HAVE OFFERED HIS W.S.D AND QUOTED HIS PRICES BUT THEY WERE EXPENSIVE, AS INDICATED BY D.O.B.

AT THE SAME TIME, WE FOUND THAT THE D.O.B HAS ALREADY PERFORMED A STATISTICAL ANALYSIS THAT SHOWS THE ACTUAL WATER CONSUMPTION AT EACH PUBLIC HOSPITAL AND HEALTH CARE CENTER IN JORDAN. PLEASE SEE THE D.O.B'S ANALYSIS ATTACHED IN APPENDIX (I) OF THIS AUDIT REPORT. THIS ANALYSIS WAS DONE DURING 1999.

FROM THIS ANALYSIS, ONE CAN OBSERVE THE FOLLOWING:

1. THE HIGHEST WATER CONSUMERS AMONGST THE M.O.H HOSPITALS AND HEALTH CARE CENTERS ARE:

	HOSPITAL	M^3/DAY	NR. OF BEDS
a.	AL-BASHIR HOSPITAL	900 M^3/DAY	858
b.	AL-ZARQA HOSPITAL	150 M^3/DAY	294
c.	PRINCESS BADI'AH	119 M^3/DAY	204
d.	NATIONAL CENTER FOR PSYCHIATRY	100.5 M^3/DAY	280
e.	PRINCE FAISAL HOSPITAL	100 M^3/DAY	140

TABLE (2)

2. THE HIGHEST WATER CONSUMERS AMONGST THE M.O.H HOSPITALS AND HEALTH CARE CENTERS, PER BED/DAY:

	HOSPITAL	L/BED/DAY	NR. OF BEDS
a.	SAHAB MATERNITY HOSPITAL	1250 L	20
b.	AL-BASHIR HOSPITAL	1053 L	858
c.	AL-NADIM HOSPITAL	1046 L	86
d.	PRINCE FAISAL HOSPITAL	714 L	140
e.	PRINCESS RAYA HOSPITAL	640 L	64

TABLE (3)

3. THE TOTAL DAILY WATER CONSUMPTION AT THE PUBLIC HOSPITALS UNDER THE MINISTRY OF HEALTH WAS 1998 **M^3/DAY**. (THE HOSPITALS UNDER THE ROYAL MEDICAL SERVICES ARE NOT INCLUDED).

IT SHOULD BE POINTED OUT HERE THAT THE ANALYSIS OF THE AVERAGE DAILY CONSUMPTION PER BED COULD BE MISLEADING, SIMPLY BECAUSE THE ANALYST DIVIDED THE TOTAL DAILY WATER CONSUMPTION ON THE NUMBER OF BEDS ONLY, NEGLECTING FOLLOWING PARAMETERS:

a) NUMBER OF IN-PATIENTS,

DURING THE YEAR 1999, THE NUMBER OF IN-PATIENTS THAT STAYED AT AL-BASHIR WAS 62,015 PATIENTS. THE OCCUPATION RATE WAS 83%. THIS WAS INDICATED BY DR. ZUHAIR AL-TEEF, THE DIRECTOR OF AL-BASHIR HOSPITAL.

b) NUMBER OF OUT-PATIENTS,

THE NUMBER OF OUT-PATIENTS VISITING AL-BASHIR DURING THE YEAR 1999 WAS 423,972. THE OUT-PATIENT CLINICS DO HAVE THE BATHROOM FACILITIES. THERFORE, THERE IS A SUBSTANTIAL WATER CONSUMPTION THAT SHOULD BE TAKEN INTO CONSIDERATION.

c) NUMBER OF EMPLOYEES,

THE NUMBER OF EMPLOYEES AT AL-BASHIR IS 2600 EMPLOYEE, DIVIDED ON THREE SHIFTS AS FOLLOWS:

SHIFT	WORKING HOURS		NUMBER OF EMPLOYEES
	FROM	TO	
A	07:00a.m	03:00p.m	1560
B	11:00p.m	11:00p.m	520
C	07:00a.m	07:00a.m	520

d) NUMBER OF CLEANING AND MAINTENANCE PEOPLE,

AL-BASHIR HAVE CONTRACTED WITH TWO PRIVATE COMPANIES FOR CLEANING AND MAINTENANCE.

COMPANY	ACTIVITY	NUMBER OF EMPLOYEES
WE CARE	CLEANING SERVICES	1000
ABC	MAINTENANCE	100

e) NUMBER OF VISITORS ATTENDING TO THE HOSPITAL.

NO FIGURES WERE AVAILABLE AT THE HOSPITAL.

f) THE PUBLIC ATTITUDE,

PEOPLE IN CHARGE AT THE D.O.B AND AL-BASHIR REGULARILY COMPLAIN FROM THE DESTRUCTIVE ATTITUDE OF PATIENTS (IN-PATIENTS & OUT-PATIENTS) AND OF THE VISITORS, WHO USUALLY DO NOT CARE ABOUT ANY FACILITY AT THE HOSPITALS. ON THE CONTRARY, SOME OF THEM EVEN DESTROY SUCH FACILITIES OR STEAL THEM, AS WAS INDICATED TIO THE CARTELLE TEAM.

EVEN WHEN THERE IS A WATER LEAKAGE AT ANY SANITARY WARE FIXTURE OR PIPE THERE WILL STILL BE NO REPORTS COMING FROM ANY BODY, STAFF MEMBERS OR PATIENTS. AT THE SAME TIME, THE MAINTENANCE PEOPLE DO NOT CHECK EACH AND EVERY FACILITY ON REGULAR BASIS; THEY JUST ATTEND TO THE REPORTED BREAK DOWNS.

THE D.O.B QUALIFIES PRIVATE CONTRACTORS IN ORDER TO AWARD TO THEM THE CLEANING AND MAINTENANCE SERVICES CONTRACTS FOR ANY M.O.H BUILDING, PUBLIC HOSPITAL OR HEALTH CARE CENTER. FOR AL-BASHIR HOSPITAL, THE MAINTENANCE CONTRACT WAS AWARDED TO "ARAB BUSINESS CORPORATION, ABC". THE CLEANING SERVICE CONTRACT TO "WE CARE"

THE ABC EMPLOYS (100) PERSONNEL OUT OF WHICH (11) ARE TRAINED PLUMBERS, (9) ASSISTANT PLUMBERS AND (9) CENTRAL HEATING SPECIALISTS. THE REST ARE JUST NORMAL LABOUR HAND.

5.2. STAGE TWO: VISITING AL-BASHIR HOSPITAL:

THE CARTELLE TEAM WAS ACCOMPANIED BY "ENG. MOHAMMED OTOOM" , WHO WAS OF A GREAT ASSISTANCE IN THE FIELD RESEARCH AS HE WAS WITH THE TEAM DURING DAY ONE. MR. OTOOM INTRODUCED THE TEAM TO THE PEOPLE IN CHARGE AT THE VARIOUS DEPARTMENTS OF AL-BASHIR.

5.2-1 WATER SOURCE AND SUPPLY:

WATER IS SUPPLIED FROM THE MUNICIPALITY. THERE ARE THREE WATER RESERVOIRES AT AL-BASHIR, ONE MAIN WITH 400m^3 CAPACITY, TWO STAND-BY RESERVOIRES WITH THE CAPACITY OF 200m^3 EACH.

THE WATER IS PUMPED FROM THE RESERVOIRES TO THE WATER TANKS ON TOP OF THE ROOFS OF THE HOSPITAL BUILDINGS. TWO PUMPS AVAILABLE ARE WITH THE CAPACITY OF $75m^3$/HR EACH, PUMPING THROUGH 2" DIA. PIPES.

THE TOTAL NUMBER OF WATER TANKS IS 325, WITH TWO DIFFERENT CAPACITIES OF 1&2 m^3. NO SPECIFIC NUMBER OF TANKS WAS GIVEN FOR EACH CAPACITY DUE TO THE IN-AVAILABILITY OF SOME PERSONNELS RESPONSIBLE FOR KEEPING THE KEYS OF THE DOORS TO SOME OF THE ROOFS.

THE WATER FEEDING TO THE HOSPITAL UTILITIES IS BY GRAVITY EXCEPT FOR THE DENTAL DEPARTMENT WHICH NEEDS A CERTAIN PRESSURE FOR THE DENTAL MAIN STATIONS.

THE RANGE OF PRESSURE AT AL-BASHIR VARIOUS BULDINGS IS BETWEEN 0.2 - 0.95 bar. THE PRESSURE DEPENDS ON THE FLOOR LEVEL AND THE NUMBER OF LEVELS AT THE SAME BUILDING. THE HIGHER THE WATER TANK THE HIGHER IS THE PRESSURE.

1. FOR THE (4) STORY BUILDING, (INCLUDING GROUND FLOOR).

FLOOR LEVEL	RANGE OF PRESSURE (BAR)	FLOW RATE L/MIN
GR. FLOOR	0.75 – 0.95	8-13
1ST FLOOR	0.55 – 0.80	
2ND FLOOR	0.45 – 0.65	
3RD FLOOR	0.2 – 0.35	

2. FOR THE (3) STORY BUILDING (INCLUDING GROUND FLOOR).

FLOOR LEVEL	RANGE OF PRESSURE (BAR)	FLOW RATE L/MIN
GR. FLOOR	0.55 – 0.80	8-13
1ST FLOOR	0.45 – 0.65	
2ND FLOOR	0.20 – 0.35	

3. FOR THE (2) STORY BUILDING (INCLUDING GROUND FLOOR).

FLOOR LEVEL	RANGE OF PRESSURE (BAR)	FLOW RATE L/MIN
GR. FLOOR	0.45 – 0.65	8-13
1ST FLOOR	0.20 – 0.35	

4. FOR THE SINGLE STORY BUILDING.

FLOOR LEVEL	RANGE OF PRESSURE (BAR)	FLOW RATE L/MIN
GR. FLOOR	0.20 – 0.35	8-13

5. PREFABRICATED BUILDINGS (NURSES DORMITORY)

FLOOR LEVEL	RANGE OF PRESSURE (BAR)	FLOW RATE L/MIN
ALL	2.5 BAR	>13

THE REASON FOR THE VARIATION OF PRESSURE BEING QUITE WIDE IS THE POSSIBLE LEAKAGE IN THE PIPE LINES, CLOGGING IN SOME VALVES AND FAUCETS, AND THE VARIETY OF DIFFERENT TYPES OF FAUCETS, MIXERS AND SHOWER HEADS.

5.2-2 THE MAINTENANCE DEPARTMENT:

THE MAINTENANCE DEPARTMENT AT AL-BASHIR HOSPITAL IS ONLY RESPONSIBLE FOR SUPERVISING AND MONITORING THE MAINTENANCE CONTRACTORS.

THE CONTRACTOR COMPANY RESPONSIBLE FOR THE MAINTANENCE OF AL-BASHIR IS THE "ABC". THE CARTELLE TEAM WAS RECEIVED BY ENG. MONTASER QUMSEYEH, THE SITE ENGINEER, WHO OFFERED ALL NECESSARY INFORMATION AND EXTENDED HIS ASSISTANCE.

THE (ABC) WAS AWARDED THE CONTRACT OF MAINTENANCE FOR AL-BASHIR DURING MARCH 1999 FOR THREE YEARS. SINCE THEN, THEY HAD TO DO A LOT OF CHANGES IN THE WATER PIPELINES, VALVES, AND SANITARY WARE FIXTURES, EITHER BY REPLACING OR REPARING THEM. THIS ALL IS DUE TO THE AGING OF THE PIPLINES AND FIXTURES, OR THE MISUSE OR VANDALISM. SOME OF THOSE WERE INSTALLED 20-25 YEARS BACK.

THE MAINTENANCE PEOPLE SUFFER FROM THE DESTRUCTIVE ATTITUDE AND VANDALISM OF AL-BASHIR VISITORS (IN-PATIENTS, OUT-PATIENS AND VISITORS). THIS CAN BE TRANSLATED BY THE NUMBER OF SANITARY WARE FITTINGS REPLACED (WHOLELY AND PARTIALLY) FROM MARCH 1999 TO MAY 2000, WHICH WAS AS FOLLOWS:

ITEM WHICH WERE INSTALLED	PERIOD	QUANTITY
PIPES WITH DIFFERENT DIAMETERS (0.5", 0.75", 1", 1.5" & 2")	1/3/99 – 20/6/00	4422LM (737 X 6m)
MIXERS	1/3/99 – 20/6/00	329 ITEMS
FAUCETS	1/3/99 – 20/6/00	254 ITEMS
FLUSH SYSTEMS (5LITER PLASTIC CONTAINER)	1/3/99 – 20/6/00	380 ITEMS
SPARE PARTS FOR FAUCETS & MIXERS.	1/3/99 – 20/6/00	550 ITEMS
WATER TANKS $2m^3$	1/3/99 – 20/6/00	105 ITEMS

TABLE (4)

ONE OF THE MAIN PROBLEMS IN THE WATER LOSS WAS THE FLIPPER OF THE MAIN RESERVOIR, WHICH WAS OUT OF FUNCTION. AT MANY TIMES THE MUNICIPALITY WATER SUPPLY WAS PUMPED INTO THE RESERVOIRE NON-STOP WHILE THE RESERVOIRE IS OVER-FLOODED. THE MAINTENANCE PEOPLE HAVE TO CONTACT THE MUNICIPALITY EACH TIME ASKING FOR A SHUT-OFF OF THE WATER SUPPLY.

RECENTLY, THE MAINTENANCE TEAM WAS ABLE TO ELIMINATE THIS PROBLEM. NO ESTIMATIONS WERE GIVEN REGARDING THE WATER LOSS.

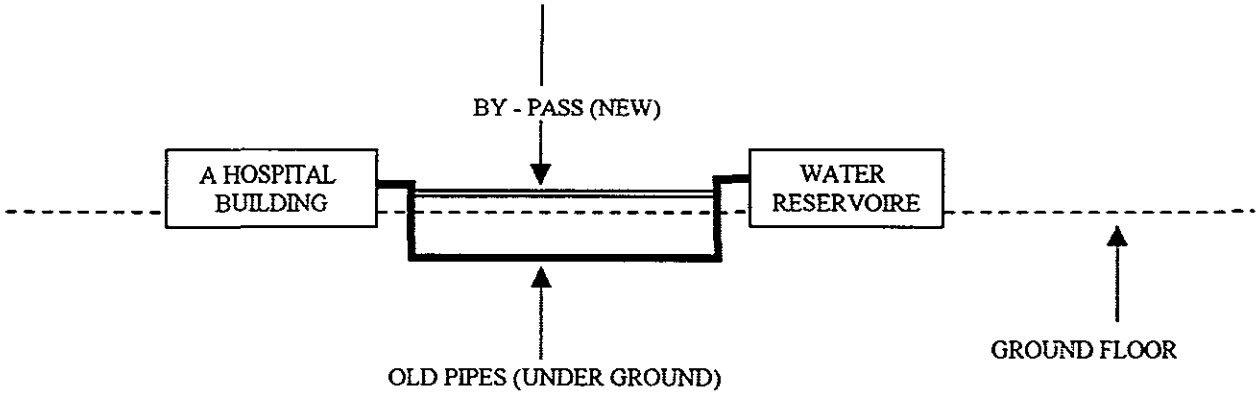
5.2-3 WATER PIPING AND INSTRUMENTATION,

IT WAS NOTICED THAT LESS THAN 20% OF THE WATER PIPES ARE ABOVE THE GROUND LEVEL AND 80% UNDER GROUND. THEREFORE, NO ACCURATE FIGURES ARE AVAILABLE IN ORDER TO IDENTIFY/DETECT THE PERCENTAGE OF LEAKING PIPES.

ALTHOUGH THE MAINTENANCE PEOPLE ARE CONTINUOUSLY WORKING ON REPARING THE PIPELINES AND REPLACING THE DEFFECTED PARTS, IT IS STILL NOTICED THAT THE NUMBER OF DEFFECTED PIPES IS STILL INCREASING. THEREFORE, IT IS ESSENTIAL TO REPLACE THE WHOLE WATER PIPE NETWORK RATHER THAN BATCH.

THERE WAS NO DOCUMENTED LAY-OUT FOR THE WATER PIPES NETWORK AVAILABLE AT THE MAINTENANCE DEPARTMENT. A LOT OF PIPES BRANCHING FROM THE MAIN PIPING NETWORK LEAD TO AN UN-KNOWN OUTLET. ONE CAN SEE ONE PART OF A PIPE ABOVE THE GROUND LEVEL, BUT THE REST OF IT IS UNDER GROUND.

WHENEVER THERE IS A PROBLEM WITH THE WATER SUPPLY TO A CERTAIN DEPARTMENT BECAUSE OF THE PIPELINES, THE MAINTENANCE PEOPLE WOULD MAKE A NEW CONNECTION FROM THE MAIN PIPE LINE TO THIS DEPARTMENT, NEGLECTING THAT THEY SHOULD SHUT OFF THE WATER SUPPLY TO THE PROBLEMATIC SECTION OF PIPES. THIS IS CALLED BY-PASSING THE PROBLEM. PLEASE SEE THE SKETCH BELOW.



5.2-3.a. LEAKAGE INSPECTION,

AS THE WATER CONSUMPTION WAS INDICATED TO BE 800 – 900 m^3/DAY WHICH IS A FIGURE THAT EXCEEDS ANY KIND OF CALCULATION FOR A HOSPITAL WITH THE SAME SIZE, THE CARTELLE TEAM HAD TO CHECK THE VARIOUS SITES IN WHICH THERE COULD BE A POSSIBLE WATER LEAKAGE:

1. WATER RESERVOIRES:

IN ORDER TO CHECK ANY POSSIBLE LEAKAGE WITHIN THE RESERVOIRE, WE TURNED THE INLETS AND OULETS OFF FOR 2 HOURS EVERY TWO HOURS BETWEEN (9a.m.) UNTIL (5P.m) AND CHECKED THE LEVEL OF WATER WHICH INDICATED NO CHANGE AT ALL. THERE WAS NO LOSS OF WATER FROM THE RESERVOIRES.

2. WATER PIPELINE NETWORK:

THERE WAS NO ACCURATE ESTIMATION ABOUT THE LEAKAGE PERCENTAGE WITHIN THE PIPELINE NETWORK, THIS IS DUE TO THE REASONS DESCRIBED EARLIER IN THIS SECTION.

ON THE OTHER HAND, THE MAINTENANCE PEOPLE HAVE EMPHASIZED THAT THE PIPE LEAKAGE PROBLEMS ACTUALLY EXIST. THEY ONLY REPAIR THE VISIBLE DEFECTED PIPES OR THE REPORTED ONES.

3. SANITARY WARE FIXTURES:

THE LEAKAGE RATE WAS AS FOLLOWS:

FIXTURE	SINKS	TOILET FLUSH	SHOWER	URINAL	SCRUB
LEAKAGE ATE	7%	12%	8%	1%	N/A

FROM THE ABOVE TABLE, ONE CAN NOTICE THAT THE TOILET FLUSHES AND SHOWERS HAVE THE HIGHTEST PERCENTAGE OF LEAKAGE AMONGST THE OTHER SANITARY WARE FIXTURES, THIS IS DUE TO THE MIS-USE OF SUCH FIXTURES AND THE LOW QUALITY FIXTURES INSTALLED.

5.2-3.b. BRAND NAMES OF THE AVAILABLE SANITARY WARE FIXTURES AT AL-BASHIR HOSPITAL:

FIXTURES	QTY.	BRA ND	ORIGIN
MIXERS		• STELLA • OTHERS	• ITALY • CHINA
FAUCETS		• NO NAME • NO NAME	• TURKY • CHINA
SHOWER HEADS		• BANAN • OTHERS	• LOCAL • CHINA
FLUSH SYSTEMS: • TURKISH GRARITY TANKS • WESTERN	29	• ASTRA (PLASTIC) • AKROS (PLASTIC) • CAST – IRON (NO NAME) CERAMIC	• BRAZIL • BRAZIL • ? • LOCAL MADE
TOILET WASHING HOSES	150	• NO NAME	• CHINA

5.2.4. NUMBERS OF SANITARY WARE FIXTURES AT EACH DEPARTMENT OF AL-BASHIR HOSPITAL:

5.2.4.a. MEDICAL DEPARTMETNS OF AL-BASHIR, IN PATIENTS:

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
1.	INTERNAL MDICINE CONSISTING OF THE FOLLOWING WARDS:	168	23	20	12	10	-	-
	GENERAL INTERNAL MEDECINE							
	PULMONARY							
	UROLOGY & DIALYSIS							
	NEUROLOGY							
	ENTEROLOGY							
	CARDIOLOGY							
	ENDOCRENOLOGY							
	C.C.U							

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
2.	SURGERY CONSISTING OF THE FOLLOWING WARDS:	226	50	10	19	15	12	-
	GENERAL SURGERY							
	PAEDIATRIC SURGERY							
	URO-SURGERY							
	NEURO-SURGERY							
	CARDIO-SURGERY							

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
3.	PAEDIATRICS CONSISTING OF THE FOLLOWING WARDS	162	25	20	5	12	-	-
	PREMATURE							
	THALASSEMIA							

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
4.	MATERNITY & GYNACOLGY	144	51	30	16	17	2	

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
5.	EMERGENCY COSISTING OF THE FOLLOWING WARDS:		61	39	7	7	-	5
	CHECK - UP	36						
	SURGERY	52						
	I.C.U	8						
	X-RAY							
	LABORATORY							
TOTAL		96						

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
6.	ORTHOPEDIC & ORTHO – SURGERY	52	12	12	8	-	4	-

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
7.	OPHTHALMOLOGY	50	13	10	8	7	2	-

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
8.	EAR, NOSE & THROAT	32	18	-	5	13	2	-

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
9.	RADIO-THERAPY	37	9	5	6	4	2	-

NR.	WARD	NR. OF BEDS	SINKS	TOILETS		SHOWER	SCRUB	URINALS
				TURKESH	WESTERN			
10.	BURNS & PLASTIC SURGERY	20	19	4	6	4	4	-

TOTAL NUMBER WITHIN THE MEDICAL DEPARTMENTS (EXCL. EMERGERNCY)	**871**	**281**	**150**	**92**	**89**	**28**	**5**

TABLE (5)

5.2.4.b. MEDICAL DEPARTMENTS OF AL-BASHIR, OUT PATIENTS

NR.	WARD	SINKS	TOILETS		SHOWER	SCRUB	URINALS
			TURKESH	WESTERN			
1.	REHABILITATION & PHYSIO-THERAPY	30	-	30	14	-	-
2.	OUT-PATIENT CLINIC	54	10	5	-	-	-
3.	DENTISTRY	10	6	4	-	-	-
TOTAL NUMBER WITHIN THE MEDICAL DEPARTMENTS		94	16	39	14	-	-

TABLE (6)

5.2.4.c. MEDICAL SUPPORT DEPARTMENTS:

NR.	WARD	SINKS	TOILETS		SHOWER	SCRUB	URINALS
			TURKESH	WESTERN			
1.	X-RAY	4	4	2	2	-	-
2.	LABORATORY	20	-	12	-	-	6
3.	SUPPLY & WAREHOURSE	4	6	2	1	-	-
4.	PHARMACY	1	1	-	-	-	-
5.	BLOOD BANK	16	7	-	-	-	-
TOTAL NUMBER WITHIN THE CLINICAL SUPPORT DEPARTMENTS		45	18	16	3	-	6

TABLE (7)

5.2.4.d. HOSPITAL SUPPORT DEPARTMENTS:

NR.	WARD	SINKS	TOILETS		SHOWER	URINALS
			TURKESH	WESTERN		
1.	NUTRITION / KITCHENS	36	8		-	2
2.	MAINTENANCE	-	-	-	-	-
3.	SECURITY	2	2	-	-	-
4.	COMMUNICATION	1	1	-	-	-
5.	TRANSPORTATION	1	1	-	-	-
6.	DIRECTORATE	16	-	12	-	4
7.	NURSERY	1	4	-	-	-
8.	FORENSIC	4	5	-	5	-
TOTAL NUMBER WITHIN THE HOSPITAL SUPPORT DEPARTMENTS		61	21	12	5	6

TABLE (8)

5.2.4.e. OTHER UTILITIES:

NR.	WARD	SINKS	TOILETS		SHOWER	URINALS
			TURKESH	WESTERN		
1.	MOSQUE	8	3	-	-	2
2.	LIBRARY (WITH DIRECTORATE)	-	-	-	-	-
3.	CANTINE	-	-	-	-	-
4.	BOILERS	-	-	-	-	-
5.	LAUNDRY	-	-	-	-	-
TOTAL NUMBER WITHIN THE NON-CLINICAL DEPARTMENTS		8	3	-	-	2

TABLE (9)

5.2.4.f. NURSING SCHOOL:

NR.	WARD	SINKS	TOILETS		SHOWER	URINALS
			TURKESH	WESTERN		
1.	NURSING SCHOOL	38	18	12	7	-
2.	NURSING DORMITORY	41	19	18	30	-
	TOTAL	79	37	30	37	-

TABLE (10)

THE TOTAL NUMBER OF SANITARY WARE FIXTURES AT AL-BASHIR HOSPITAL:

FIXTURE	SINKS	TOILETS		SHOWER	SCRUBS	URINALS
		TURKEISH	WESTERN			
TOTAL	568 *	245	189	148	28	19

TABLE (11)

* AROUND 170 UNITS ARE FAUCETS AND THE OTHER 398 ARE MIXERS.

ADDITIONAL SANITARY WARE FIXTURES:

AUXILIARY FAUCETS NEXT TO TURKISH TOILETS	145
MANUAL DOUCHE NEXT TO TOILETS	85
COOLERS FOR DRINKING WATER	96

TABLE (12)

5.2.5 QUALITY AND QUANTITY OF STERLIZATION UNITS AT AL-BASHIR.

THE TABLE BELOW SHOWS THE BRAND NAME, MODEL AND CAPACITY OF THE STERLIZATION UNITS AVAILABLE AT EACH DEPARTMENT.

#	DEPARTMENT	BRAND NAME	MODEL	CAPACITY
1.	SURGERY OPERATIONS	SCHAERER GETTINGE NANIWA	4582/4580 GE 669 EC1 N15-E0-MATIC	$1m^3$ 400L 200L
2.	GENERAL SURGERY	LEQUEUX ASTELL HEARSON	LX409	300L 100L
3.	EAR, NOSE & THROAT	CONSOLIDATED		350L
4.	BURNS & PLASTIC SURYGERY	CASTLE	MLC3533	300L
5.	OPHTHAL MOLOGY	LEQUEUX	1979	300L
6.	MATERNITY & GYNACOLGY	HATACHANA HATACHANA	1350 LE-1 1980 LE-1	350L $1\ m^3$
7.	EMERGENCY	HIURA SCHAERER SCHAERER CASTLE CONSOLIDATED	AUTOMATIC STEAM 4582/4580 4582/4580 H/C3533 -	300L $1m^3$ $1m^3$ 300L 400L
TOTAL NO. OF STERLIZATION UNITS				**15 UNITS**
THE TOTAL WATER CONSUMPTION AT THESE UNITS				**7.3 m^3**

TABLE (13)

5.2.6 THE ACTUAL ANNUAL WATER CONSUMPTION FOR THE YEARS 97, 98, 99:

THERE ARE SEVEN WATER METERS FEEDING THE BUILDINGS OF AL-BASHIR, ONE MAIN AND SIX AUXILIARIES. THE MAIN METER FEEDS INTO THE MAIN WATER RESERVOIRE. THE OTHER SIX METERS ARE DIRECTLY CONNECTED TO THE WATER TANKS OVER THE ROOFS OF BUILDINGS, PLEASE SEE TABLE BELOW:

DESCRIPTION	YEAR 97		YEAR 98		YEAR 99		(3) YEARS AVEREGE	
	YEARLY	DAILY	YEARLY	DAILY	YEARLY	DAILY	YEARLY	DAILY
MAIN METER	**157,892 m^3**	**432.5 m^3**	**169,496 m^3**	**464.4 m^3**	**172,728 m^3**	**473.3 m^3**	**166,705 m^3**	**456.726 m^3**
OTHER METERS: • BLOOD BANK • REHABILITATION. • LABS. • DEVELOPMENT. • OPHTHAL MOLOGY. • OUT PATIENT CLINIC.	6,205 m^3	17.0 m^3	6,570 m^3	18.0 m^3	6,351 m^3	17.4 m^3	6,375.4 m^3	17.46 m^3
TOTAL	**164,097 m^3**	**449.5 m^3**	**176,066 m^3**	**482.4 m^3**	**179.079 m^3**	**490.7 m^3**	**173,080.4 m^3**	**474.20 m^3**

TABLE (14)

MAJOR CONSUMPTION OF WATER PER DEPARTMENT AT AL-BASHIR:

LAUNDRY	**15 m^3**
DIALYSIS	**40 m^3**
REHABILITATION – PHYSIOTHERAPY	**20 m^3**
KITCHEN	**15 m^3**
FORENSIC	**15 m^3**
BURNS	**10 m^3**
STERILIZATION UNITS	**7.5 m^3/DAY**
REST OF THE HOSPITAL	**357.5 m^3**
TOTAL	**480 m^3**

TABLE (15)

BY THE END OF 99, A DECISION WAS MADE AT AL-BASHIR'S MANAGEMENT NOT TO WASH THE FLOORS WITH WATER BUT TO WIPE-OFF THE FLOORS WITH DETERGENTS AND ANTISEPTICS.

TO CHECK THE RELIABILITY OF THE DATA WHICH WAS ACQUIRED FROM THE VARIOUS DEPARTMENTS OF AL-BASHIR, AN ACTUAL FIELD MONITORING OF THE MAIN METER WAS PERFORMED FOR A PERIOD OF FOUR DAYS. THE READINGS WERE AS FOLLOWS:

DAY & DATE	TIME	MAIN METER READING	DAILY CONSUMPTION m^3/DAY	OTHER METERS m^3/DAY	TOTAL DAILY CONSUMP
MONDAY 29.5.00	10:30	130639	400	16.10	416.10
SUNDAY 28.5.00	10:30	130239	396	19.30	415.30
SATURDAY 27.5.00	10:30	129843	449	16.50	465.50
FRIDAY 26.5.00	10:30	129394	408	18.00	426.00
THURSDAY 25.5.00	10:30	128986			

TABLE (16)

SECTION SIX:

DATA ANALYSIS:

6.1 SANITARY FIXTURES BY QUALITY AND BRAND:

FIXTURES	BRA ND	ORIGIN
MIXERS	• STELLA • OTHERS	• ITALY • CHINA
FAUCETS	• NO NAME • NO NAME	• TURKY • CHINA
SHOWER HEADS	• BANAN • OTHERS	• LOCAL • CHINA
FLUSH SYSTEMS: • TURKISH GRAVITY TANKS • WESTERN	• ASTRA (PLASTIC) • AKROS (PLASTIC) • CAST – IRON (NO NAME) CERAMIC	• BRAZIL • BRAZIL • ? • LOCAL MADE
TOILET WASHING HOSES	• NO NAME	• CHINA

TABLE (17)

- All sanitary ware fixtures used are of cheap quality.
- Break downs in the sanitary ware fixtures happen due to:

  ~ vandalism.
  ~ no available regular maintenance program.
  ~ no maintenance, due to no reports.

The ministry of health qualified the quality of fixture based upon the appearance and price. Neither an actual physical testing was done to prove the quality, nor any certification for quality or guarantee was requested from suppliers in order to guarantee the performance.

6.1.1. THE FAUCETS AND MIXERS:

ONE CAN NOTICE THAT THE INNER PARTS OF THE FAUCETS AND MIXERS ARE POORLY MADE AND THAT THEY ARE SUSCEPTIBLE TO DAMAGE, EVEN IF THE CASUE OF DAMAGE IS MINOR.

THE RUBBER SEAL USED FOR THE CLOSE-UP IS OF POOR QUALITY THAT EITHER BECOMES VERY HARD IN HOT WATER OR LOSES ELASTICITY. THIS LEADS TO LEAKAGE OF WATER.

6.1.2. SHOWER HEADS:

THE SHOWER HEADS ARE THE OLD CHROMATED STEEL CAP WITH SIEVE-LIKE WATER OUTLET. THIS QUALITY CANNOT BE CLEANED FROM THE SOLID PARTICLES THAT CLOGG THE HOLES OF THE SHOWER HEAD. AT THE SAME TIME, IT IS EASY TO DISMANTLE WITHOUT TOOLS, AS ANY ONE COULD UNSCREW IT WITH BARE HANDS. IT WAS NOTICED THAT MANY OF THEM ARE CLOGGED, RUSTED OR TAKEN AWAY.

6.1.3. FLUSH SYSTEMS:

a. THE CAST IRON FLUSH SYSTEMS ARE ALL RUSTED FROM THE INNER SIDE. THE PIPES ARE RUSTED TOO AND MOST OF THEM LEAK DUE TO THE AGING (15-20 YEARS OLD). BUT THE FLUSH VOLUME IS HIGH, 13 LITER PER FLUSH. RECENTLY, MOST OF THE CAST IRON FLUSH SYSTEMS WERE REPLACED BY 5 LITER PLASTIC ONES.

b. THE PLASTIC FLUSH SYSTEMS ARE VERY POOR QUALITY, BREAK DOWN VERY EASILY. THAT EXPLAINES THE NUMBER OF REPLACED PLASTIC FLUSH SYSTEMS WITHIN ONE YEAR (380 UNITS). ALTHOUGH THOSE SYSTEMS ARE CONSIDERED W.S.D DUE TO THE LOW CONTAINER CAPACITY (5 LITERS), STILL ONE CAN CONSIDER THEM **WATER WASTING DEVICES** DUE TO THE VERY FAST BREAK DOWNS AND LEAKAGES. AT THE SAME TIME, THE FLUSHING EFFECT IS BAD WHICH MEANS THAT THE NEED FOR DOUBLE FLUSH IS ALWAYS REQUIRED. THE PERCENTAGE OF PLASTIC FLUSH SYSTEMS IS **56%** OF THE WHOLE FLUSH SYSTEMS AVAILABLE AT AL-BAHSIR.

c. CERAMIC FLUSH SYSTEMS:

THE CAPACITY IS BETWEEN 9-13 LITERS, ALL LOCAL MADE. THE FLUSHING POWER IS QUITE POOR. LEAKAGES ARE ALWAYS THERE. THE PERCENTAGE OF THE CERAMIS FLUSH SYSTEMS IS AROUND 44%.

IT WAS AS NOTICED THAT MANY OF THE FLUSH SYSTEMS EITHER LEAK OR OUT OF FUNCTION. AT THE EMERGENCY DEPARTMENT 90% OF THEM WERE TOTALLY OUT OF FUNCTION.

ONE CAN NOTICE FROM ALL ABOVE FLUSHING SYSTEMS THAT THERE ARE THREE THINGS IN COMMON:

- **POOR QUALITY.**
- **LOW FLUSHING POWER.**
- **HIGH WATER CONSUMPTION DUE TO HIGH VOLUME OF CONTAINER CAPACITY OR DUE TO THE NEED FOR DOUBLE FLUSH.**

6.1.4. **URINALS:**

95% OF THE URINALS WERE FOUND OUT OF SERVICE. THE 5% FOUND IN SERVICE DO LEAK.

6.2 . ANALYSIS ON THE DAILY NUMBER OF PEOPLE ATTENDING TO AL-BASHIR:

THE TABLE BELOW SHOWS THE NUMBER OF PEOPLE ATTENDING AL-BASHIR DURING THE YEAR 1999.

	YEARLY	DAILY	%MALE	%FEMALE
IN-PATIENTS	62,019	170	35	65
OUT-PATIENTS	423,972	1162	45	55
EMMPLOYEES	2,600	2600	50	50
WE CARE CO. EMPLOYEES (CLEANING) CO.	1,000	1000	70	30
A.B.C EMPLOYEES (MAINTENANCE) CO.	100	100	98	2
TOTAL	489,961	5032	59.6	40.4

TABLE (18)

	ANNUAL	DAILY	%MALE	%FEMALE
TOTAL NUMBER OF PATIENTS	485991	1332	40	60
TOTAL NR. OF EMPLOYEES INCLUDING THE MAINTENANCE AND CLEANING PEOPLE	3700	3700	72.7	27.3

TABLE (19)

RATIO OF EMPLOYEES TO PATIENTS (3700/1332)	2.8:1

TABLE (20)

ONE CAN SEE FROM THE ABOVE TABLES THAT PATIENTS ARE REPRESENTING ONLY ONE THIRD OF THE PEOPLE ATTENDING TO AL-BASHIR.

IT WAS ESTIMATED BY AL-BASHIR MANAGEMENT THAT THE AVERAGE NUMBER OF PERSONS ACCOMPANYING PATIENTS IS ONE PERSON PER OUT-PATIENT AND (2) VISITORS PER IN-PATIETNT:

6.3. ANALYSIS ON THE WATER CONSUMPTION,

6.3.1. IT'S INDICATED IN SECTION 5.1 THAT THE STATISTICAL ANALYSIS DONE BY D.O.B SHOWED A DAILY WATER CONSUMPTION OF 900m^3/DAY. THE CARTELLE TEAM FOUND THAT THE ACTUAL DAILY CONSUMPTION IS AROUND 500m3/DAY.

6.3.2. THE AVERAGE DAILY WATER CONSUMPTION / BED IS 555.3 L/BED WHICH IS WITHIN THE INTERNATIONAL STANDARDS OF WATER CONSUMPTION FOR HOSPITALS "400 – 500 L/BED/DAY".

6.3.3. FROM THE SECTION 5.2.7, ONE COULD NOTICE THAT THREE MAJOR DEPARTMENTS ARE MAJOR CONSUMERS OF WATER, WHICH ARE:

1. **DIALYSIS.**
2. **LAUNDRY**
3. **PHYSIOTHERAPY.**

1. THE DIALYSIS DEPARTMENT,

THE INCOMING WATER INTO THE DIALYSIS DEPARTMENT SHOULD BE REVERSE-OSMOSIS (**R.O.**) QUALITY WATER. IN ORDER TO PRODUCE **20 m^3** R.O. WATER, **40 m^3** SHOULD GO THROUGH THE R.O. SYSTEM. **20 m^3** OF WATER WILL BE WASTED.

THE ABOVE VALUE OF 20 m^3 R.O. WATER USED IN THE DIALYSIS DEPARTMENT WAS CALCULATED BASED UPON THE FOLLOWING DATA:

FLOW RATE OF DIALYSIS SYSTEM, PER PATIENT	120L/HR
TREATMENT PERIOD FOR EVERY PATIENT	4HRS
EVERY PATIENT NEEDS	0.48m^3
No. OF PATIENTS / SHIFT	20 PATIENTS.
No. OF DAILY SHIFTS	TWO SHIFTS
TOTAL: 0.48m^3 X 20 PATIENTS X 2 SHIFTS	**19.20m^3**

IN ADDITION, THE THREE DIALYSIS SYSTEMS NEED TO BE MAINTAINED DAILY AND CLEANED WITH R.O. WATER, EACH NEEDS A QAUNTITY OF 240L. WHICH MEANS THAT AN ADDITIONAL WATER QUANTITY OF ABOUT 0.72m^3 IS DISCHARGED DAILY WITHOUT MAKING ANY ADVANTAGE OF RECYCLING/ REUSING IT.

2. THE LAUNDRY,

THERE ARE SIX WASHING MACHINE, EVERY WASHING MACHINE CONSUMES 120L/HR. THOSE MACHINES WORK 20HRS DAILY, WHICH MEANS:

6 X 120 L/HR X 20 HRS/DAY = 14.4m^3 /DAY. = 15m^3 /DAY

3. THE PHYSIOTHEERAPY DEPARTMENT:

THE MAJOR CONSUMPTION AT THIS DEPARTMENT IS THROUGH THE WATER BATHES. ALTHOUGH THERE ARE SHOWERS AT THIS DEPARTMENT FOR PATIENTS TO CLEAN UP BEFORE AND AFTER THE TREATMENT.

THE WATER BATHES CAPACITIES:

WATER BATH CAPACITY	NUMBER OF BATHS	TOTAL BATHS CAPACITY
2.0m^3	3	6m^3
1.5m^3	2	3m^3
0.5m^3	2	1m^3
TOTAL		**10m^3**

ABOVE BATHS ARE DRAINED TWICE DAILY MAKING THE WATER CONSUMPTION OF 20m^3 DAILY.

6.3.4. FROM SECTION 5.2.3.a, ONE CAN EXPECT THAT THE SOURCES OF WATER LEAKAGE ARE WITH THE PIPING NETWORK AND BY THE SANITARY WARE FIXTURES. AS FOR THE WATER RESERVOIRE, A FIELD INSPECTION WAS DONE ON THE RESERVOIRE, AND IT WAS FOUND THAT THERE IS NO LEAKAGE.

6.3.5. STEAM BOILERS:

6.3.5.1. THE CENTRAL HEATING STEAM BOILERS ARE 30 UNITS. THE WATER CONSUMED IS AS FOLLOWS:

QUNATITY OF WATER PER BLOW DOWN	30m^3
NUMBER OF BLOW DOWNS PER YEAR	2 TIMES
QUANTITY OF WATER CONSUMPTION PER YEAR	60m^3

6.3.5.2. LAUNDRY STEAM BOILERS: TWO BOILERS, ONE WITH THE CAPACITY OF 2TONS AND ANOTHER WITH THE CAPACITY OF 300KGS.

6.3.5.3. STERLISATION UNITS, THE TOTAL NUMBER OF UNITS IS 15 UNITS WHICH CONSUME THE TOTAL QUANTITY OF AROUND 7.5m^3 /DAY.

6.3.6. ESTIMATED DAILY WATER CONSUMPTION PER ONE IN-PATIENT:

SANITARY WARE FIXTURE	FLOW RATE (L/min OR VOLUME)	DURATION OF USAGE (MINUTES)	CONSUMPTION PER USAGE (LITERS)	FREQUENCY OF DAILY USAGE (TIMES)	TOTAL DAILY CONSUMPTION PER PERSON (LITERS)
SHOWER	8L/MIN	5	40	1.5	60
FAUCET	8L/MIN	2	16	5	80
FLUSH	9(VOLUME)	2	9	2	18
URINALS*	NA				
TOTAL WATER CONSUMPTION PER IN-PATIENT PER DAY					**158.0L**

* 95% OF URINALS ARE OUT OF SERVICE "BROKEN DOWN".

6.3.7. ESTIMATED DAILY WATER CONSUMPTION PER ONE OUT-PATIENT:

SANITARY WARE FIXTURE	FLOW RATE (L/min OR VOLUME)	DURATION OF USAGE (MINUTES)	CONSUMPTION PER USAGE (LITERS)	GREQUENCY OF DAILY USAGE (TIMES)	TOTAL DAILY CONSUMPTION PER PERSON (LITERS)
FAUCET	8L/MIN	1	8	1	8
FLUSH	9(VOLUME)	1	9	1	9
TOTAL WATER CONSUMPTION PER OUT-PATIENT PER DAY					**17L**

6.3.8. ESTIMATED DAILY WATER CONSUMPTION PER EMPLOYEE:

SANITARY WARE FIXTURE	FLOW RATE (L/min OR VOLUME)	DURATION OF USAGE (MINUTES)	CONSUMPTION PER USAGE (LITERS)	GREQUENCY OF DAILY USAGE (TIMES)	TOTAL DAILY CONSUMPTION PER PERSON (LITERS)
FAUCET	8L/MIN	2	16	2	32
FLUSH	9(VOLUME)	1	9	1.5	13.5
TOTAL WATER CONSUMPTION PER EMPLOYEE PER DAY					**45.5L**

6.3.9. TOTAL DAILY WATER COSNUMPTION BY PERSON (PATIENTS AND EMPLOYEES):

	NO. OF DAILY IN-PATIENT	DAILY WATER CONSUMPTION PER	TOTAL DAILY WATER CONSUMPTION
IN-PATIENT	170	158.0L	26860L
OUT-PATIENT	1162	17	19754L
EMPLOYEES (INCLUDING THE MAINTENANCE AND CLEANING PEOPLE)	3700	45.5	168350L
TOTAL DAILY CONSUMPTION			**214964L**
			214.964m^3

TABLE (25)

THE ABOVE REPRESENTS 45% OF THE AVERAGE DAILY WATER CONSUMPTION AT AL-BASHIR.

6.3.10. TOTAL WATER CONSUMPTION

DIALYSIS	40 m^3
REHABILITATION – PHYSIOTHERAPY	20 m^3
KITCHEN	15 m^3
FORENSIC	15 m^3
LAUNDRY	15 m^3
BURNS	10 m^3
STERILIZATION UNITS	7.5 m^3
PATIENTS AND EMPLOYEES	223.5 m^3
OTHERS (??)	**134.5 m^3**
TOTAL	**480 m^3**

TABLE (26)

FROM THE ABOVE, ONE CAN NOTICE THAT THE ACTUAL WATER (USED) IS 346m^3/DAY, BUT THE WATER CONSUMED IS 480 m^3/DAY, WHICH MAKE THE ESTIMATED WATER LOSS AROUND 134.5M^3/DAY. PART OF THIS VOLUME IS DEFINITELY USED IN OTHER UNFORSEEN PHASES OF CONSUMPTION, BUT IT IS OBVIOUS THAT THE MAJORITY OF IT IS LOST THROUGH THE LEAKAGE OF THE PIPILENS AND THE SANITARY WARE FIXTURES. THIS VOLUME REPRESENTS 28% OF THE WATER CONSUMPTION AT AL-BASHIR.

SECTION SEVEN:

RECOMMENDATIONS:

7.1 GENERAL:

1. Writing to the ministry of water and irrigation (MWI) in order to qualify a "water saving consultant(s)". This consultant to be involved with any committee responsible for the design of any new public building at any governmental department in order to take into consideration the water saving parameters within the design of the buildings.

2. Using the water from the dialysis, burns & physiotherapy departments for irrigation purposes (irrigation of non-productive plants). This to be determined after analyzing the water and confirming that the quality of water is suitable for such usage.

   Catching and collecting rainwater at the roofs of al-Bashir's buildings. There are 80,000m^2 concrete roofs. This could be done easily by making inclinations on the roof of each building with drainage pipes that lead to a reservoir. The landscape of Al-Bashir is hilly which makes the flow of water into a reservoir easy, by gravity. The cost of this to be studied by Al-Basher as it involves building a reservoir and having a water treatment line then a pumping system from the rain water reservoir into the main water reservoir.

3. Installing water softnerat the outlets of each reservoir.

4. Installing water softeners at the inlets of water for the buildings that are directly supplied with water from the municipality.

   Installing water softeners would eliminate the impurities and solid particles existed in the water. This will eliminate the scaling and clogging problems within the sanitary ware fixtures.

7.2 maintenance:

7.2.1- a leak detection program to be performed.

7.2.2- sketching and documenting the layout of piping and instrumentation.

7.2.3- establishing a written maintenance program between the contractor responsible for the hospitals cleaning services "we care" and the maintenance company "ABC"

"We care" should be responsible for checking all sanitary utilities at the beginning of each shift in order to identify the functionality of each utility and the leakage's or break-downs.

A daily report to be submitted to the ward keeper or manager who will immediately send a copy to the maintenance contractor "ABC". This report to be sent to "ABC" regardless there is or there isn't any problem.

7.2.4- training the maintenance team on how to regularly check the WSD and other sanitary ware fixtures, and how to maintain them.

7.2.5- after installing WSD, there should be a special regular maintenance schedule for the WSD in order to insure functionablility.

7.2.6- design a new pipe network to be above the ground level in order to be easy to access and maintain.

7.3 socio economy:

1. An awareness program to be designed covering the following issues:

    a. The water situation in Jordan.
    b. The concept of water saving devices.

This program should be addressed to the employees of Al-Bashir rather than the patients.

2. Putting up posters for patients and visitors advising them to consume as minimum water as possible, and to turn off the fixtures once exiting from the utility.

7.4 sanitary ware fixtures:

7.4.1. Qualifying the right quality of sanitary ware fixtures and WSD

Qualifying the right quality of sanitary ware fixtures and WSD using the following criteria:

a. Reliability.
b. Long life guarantees.
c. Anti-vandalism device.
d. Easy to maintain.
e. Percentage of water saving.
f. Performance under various pressures and temperatures.
g. Prices.

The auditor found that it is not easy to install WSD on the already existed sanitary ware fixtures due to the bad quality and various types. Therefore, the best recommendation is to replace the whole sanitary ware fixtures.

7.4.1.1. Faucets to install:

The normal faucet with threaded nozzle with an aerator. The aerator should be the key-lock type (anti-vandalism).

The faucet should be heavy duty to withstand shocks and misuse. The inner parts of the faucet should be of high quality, high precision, flexible rubber gasket, smooth walls without deep pinholes, and no leakage.

7.4.1.2. Mixers:

All mixers to be single lever, heavy-duty mixer are most favorable, as it is easier and faster to give hot/cold water mix.

7.4.1.3. Flush systems:

Replacing into a new flush system, heavy duty, with container capacity is exceeding 6l.

7.4.1.4. Urinals:

Installing 50 waterless urinals at different departments in order to decrease the volume of usage of toilets thus decrease the consumption of water.

7.4.2. QUALIFYING THE RIGHT SUPPLIERS.

Qualifying the right suppliers of sanitary ware fixtures and WSD using the following criteria:

a. Reliability.
b. Reputation.
c. Fast delivery.
d. Ability to guarantee the quality.
e. Ability to guarantee the water saving as claimed.
f. Acceptance of payment after the fixture or WSD proven to be efficient.
g. After-sale service.

The following table shows the qualified suppliers of each fixture that the auditor recommends:

LIST OF QUALIFIED SUPPLIERS:

SANITARY WARE FIXTURES	SUPPLIER	ORIGIN
FAUCET (THREADED)	AMERICAN STANDARD COUNET GROHE RST	U.S.A GERMANY GERMANY GERMANY
SHOWER HEADS	TELEDYNE BRASS CRAFT ANM CONSERVATION NRG RST	U.S.A U.S.A U.S.A U.S.A GERMANY
TOILETS	AMERICAN STANDARD CRANE TOTALL SAINT THOMAS	U.S.A U.S.A U.S.A U.S.A
URINALS	AMERICAN STANDARD	U.S.A

7.4.3 QUALIFYING CERTAIN SANITARY WARE FIXTURES:

Physical experiments were performed in order to qualify certain WSD and fixtures:

	BRAND NAME	PERFORMANCE UNDER PRESSURE			
		0.2 BAR	0.4BAR	0.65BAR	1.0BAR
FAUCET AERATOR	KK	BAD	BAD	GOOD	GOOD
	GROHE	BAD	AVERAGE	GOOD	V. GOOD
	RST	BAD	GOOD	V. GOOD	V. GOOD
	NGR	BAD	GOOD	GOOD	
	TURBULATOR	BAD	V. GOOD	V. GOOD	V. GOOD
	NO NAME	BAD	* BAD	* BAD	* BAD
FAUCET RESTRICTOR	KK	BAD	AVERAGE	GOOD	GOOD
	GROHE	BAD	GOOD	V. GOOD	V. GOOD
	NGR	AVERAGE	GOOD	GOOD	V. GOOD
	RST	GOOD	GOOD	V. GOOD	V. GOOD

BAD FLOW < 2 L/MIN
AVERAGE FLOW 2 - 2.5 L/MIN
GOOD FLOW > 2.5 < 3.5 L/MIN
V. GOOD FLOW = > 3.5 < 4 L/MIN
*** BAD** FLOW > 6 L/MIN

	BRAND NAME	PERFORMANCE		
		(5) LITER	(7) LITER	(13) LITER
FLUSH SYSTEM	ASTRA, BRAZIL (PLASTIC)	BAD	-	-
	AKROS, BRAZIL (PLASTIC)	AVERAGE	-	-
	SUPER SAXON, UK (PLASTIC)	-	GOOD	-
	CAST IRON	-	-	AVERAGE
	CERAMIC	-	-	GOOD

The Cartelle team was not able to check the showerheads as the threads of The stainless steel pipes (mixer's extenuation) were either damaged or broken.

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SECTION EIGHT:

COSTING:

8.1. Estimated daily water consumption per one in-patient after installation of new sanitary ware fixtures with WSD:

SANITARY WARE FIXTURE	FLOW RATE (L/min OR VOLUME)	DURATION OF USAGE (MINUTES)	CONSUMPTION PER USAGE (LITERS)	FREQUENCY OF DAILY USAGE (TIMES)	TOTAL DAILY CONSUMPTION PER PERSON (LITERS)
SHOWER	5L/MIN	5	25	1.5	37.5
FAUCET	3.5L/MIN	2	7	5	35
FLUSH	6(VOLUME)	2	6	2	12
URINALS*	NA				
TOTAL WATER CONSUMPTION PER IN-PATIENT PER DAY					**84.5L**

TABLE (26)

* 95% of urinals are out of service "broken down".

8.2. Estimated daily water consumption per one out-patient after installation of new sanitary ware fixtures with WSD:

SANITARY WARE FIXTURE	FLOW RATE (L/min OR VOLUME)	DURATION OF USAGE (MINUTES)	CONSUMPTION PER USAGE (LITERS)	FREQUENCY OF DAILY USAGE (TIMES)	TOTAL DAILY CONSUMPTION PER PERSON (LITERS)
FAUCET	3.5L/MIN	1	3.5	1	3.5
FLUSH	6(VOLUME)	1	6	1	6
TOTAL WATER CONSUMPTION PER OUT-PATIENT PER DAY					**9.5L**

TABLE (27)

8.3. Estimated daily Water consumption per employee after installation of new sanitary ware fixtures with WSD:

Sanitary ware fixture	Flow rate (L/min or Volume)	Duration of usage (Minutes)	Consumption per usage (Liters)	Frequency of daily usage (Times)	Total daily consumption per person (liters)
Faucet	3.5l/min	2	7	2	14
Flush	6(volume)	1	6	1.5	9
Total water consumption per employee per day					**23l**

Table (28)

8.4. Total daily water consumption by persons (patients and employees) after the installation of new sanitary ware fixtures with WSD:

	No. Of daily in-patient	**Daily water consumption per person**	**Total daily water consumption**
In-patient	170	84.5	14365l
Out-patient	1162	9.5	11039l
Employees (including the maintenance and cleaning people)	3700	32	85100l
Total daily consumption			**110504l**
			110.5m^3

Table (29)

8.5. Quantity of water saved before and after installing water saving fixtures:

SECTORS	WATER CONSUMPTION		DIFFERENCE (LITER)	QUANTITY OF PEOPLE	TOTAL WATER SAVED PER DAY
	BEFORE INSTALLATION OF NEW FIXTURES (LITER)	AFTER INSTALLATION OF NEW FIXTURES (LITER)			
IN-PATIENTS	158	84.5	73.5	170	12,495
OUT-PATIENTS	17.00	9.5	7.5	1162	8715
EMPLOYEES	45.50	23.00	22.50	3700	83250
TOTAL				**5032 PEOPLE**	**104,469 (104.46m^3)**

PERCENTAGE OF WATER SAVING FROM THE TOTAL DAILY WATER CONSUMPTION BY PATIENTS AND EMPLOYEES	104.46m^3/ 223.5	46.73%
PERCENTAGE OF WATER SAVING FROM THE HOSPIOTAL'S TOTAL DAILY CONSUMPTION	104.46m^3 / 480	21.76%

8.6. The annual savings of water after installing the new sanitary ware fixtures with WSD.

DAILY (m^3)	ANNUALLY (m^3)	COST PER (m^3)	TOTAL ANNUAL SAVINGS
104.46 m^3	**38,127 m^3**	**US$2.11(JD 1.5)**	**US$80,448**

TABLE (30)

Above savings is the direct kind of savings. The other kinds of savings are by eliminating the pipelines and sanitary ware fixture's leakage's, which are not calculated here.

8.7. Total cost of proposed replacements of sanitary ware fixtures:

FIXTURE	AVERAGE PRICE	INSTALLATION COST	TOTAL INSTALLED	NUMBEROF FIXTURE TO REPLACE	NUMBEROF FIXTURE
FAUCETS	$16.5	$1.65	$18.15	315	$5827.5
MIXERS	$60.00	$6.00	$66.00	398	$26268.0
SHOWER MIXERS	$150.00	$15.00	$165.00	148	$24420.0
COMPLETE TOILET SET	$300.00	$30.00	$330.00	434	$143220.0
URINALS	$120	$12.00	$132	50	$6.600
TOTAL					$206335.5

A 25% SPARE PART FIXTURES SHOULD BE STOCKED ON SITE	$51583.9
TOTAL COST	$257919.4

TABLE (31)

8.8. Cumulative savings over 10 years considering the average price of USS 2.11/M^3 (JD 1.50)

YEAR ONE		YEAR THREE		YEAR FOUR *		YEAR TEN	
m^3	$$	m^3	$$	m^3	$$	m^3	$$
38127	$80448	114381	$241344	152508	$321792	381270	$804480

* BREAK EVEN YEAR ON WHICH THE RETURN ON THE INVESTED CAPITAL.

TABLE (32)

SECTION NINE:

OBSTACLES AND CONSTRAINS:

- The time given for auditing and surveying is not sufficient; in order to audit accurately and to come out with proper recommendations, the duration of auditing must be longer.

- Lack of water meters at each building of Al-Bashir hospital caused difficulties in determining the actual water consumption of each building.

- Wide variation in the reassure due to the variety of levels, clogging problems and pipes leakage. Therefore, the auditor couldn't specify accurately the pressure at each location.

- No lay-outs of the piping & instrumentation is available or documented, neither available at the department of building nor at the maintenance contracting company (ABC)

- An up-dated inventory list of the total numbers of sanitary ware fixtures was not available.

CARTELLE

Section ten:

CONCLUSIONS

- We conclude from this audit that replacement of all sanitary ware fixtures at al-bashir hospital is still very profitable even though the cost of replacement is substantial.

- There are three factors in the equation of saving water:

  One. Human
  Two. W.s.d saving efficency
  Three. Quality of sanitary- ware fixtures.

- In order to achieve accurate data, an auditing report as such to be performed with each establishment that consumes >500m^3/quarter.

APPENDIX (II):

PERSONNEL WERE INTERVIEWED BY CARTELLE TEAM:

- **DEPARTMENT OF BUILDING:**

ENG. MOH'D OTOOM	MATERIALS ENGINEER
ENG. RATEB MAGNAM	MAINTENANCE ENGINEER

- **MAINTENANCE CONTRACTING CO.:**

ENG. RAMZI QUMSYEH	GENERAL MANAGER
ENG. MUNTASER QUMSYEH	SITE ENGINEER
ENG. RAMI HANOOM	ELECTRICAL ENGINEER

- **AL-BASHIR HOSPITAL**

ENG. SALEH NOFAL	SERVICE ENGINEER
DR. ZUHAIR TAEF	GENERAL MANAGER
ENG. BASEM QADIAH	MAINTENANCE ENGINEER
ENG. YOUSEF ATIAH	SERVICE ENGINEER (ACCOUNTING DEPARTMENT)
MR. ZAID HALASEH	ACCOUNTING DIRECTOR
MISS. NADIAH MOH'D	ACCOUNTANT

- **MEDICAL DEPARTMENT:**

DR. ZEYAD SOUPAIH	DIRECTOR OF REHABILITATION DEPARTMENT
DR. NABEEL MEHYAR	DIRECTOR OF UROLOGY & DIALYSIS
DR. MUNEIB AYOUB	DIRECTOR OF INTERNAL MEDECINE DEPARTMENT.
DR. AHMED MA'YTAH	DIRECTOR OF BURNS & PLASTIC SURGERY DEPRATMENT.

CARTELLE

APPENDIX(I)

ANALYSIS OF D.O.B

CARTELLE

APPENDIX(III)

SANITARY WARE INVENTORY LIST AVAILABLE AT AL-BASHIR.

SECTION ELEVEN

LAY-OUT SKITCH

SECTION ELEVEN

LAY-OUT SKITCH

APPENDIX(I)

PERSONNEL INVOLVED

APPENDIX (I):

PERSONNEL WERE INTERVIEWED BY CARTELLE TEAM:

- **DEPARTMENT OF BUILDING:**

ENG. MOH'D OTOOM	MATERIALS ENGINEER
ENG. RATEB MAGNAM	MAINTENANCE ENGINEER

- **MAINTENANCE CONTRACTING CO.:**

ENG. RAMZI QUMSYEH	GENERAL MANAGER
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MR. ZAID HALASEH	ACCOUNTING DIRECTOR
MISS. NADIAH MOH'D	ACCOUNTANT

- **MEDICAL DEPARTMENT:**

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DR. NABEEL MEHYAR	DIRECTOR OF UROLOGY & DIALYSIS
DR. MUNEIB AYOUB	DIRECTOR OF INTERNAL MEDECINE DEPARTMENT.
DR. AHMED MA'YTAH	DIRECTOR OF BURNS & PLASTIC SURGERY DEPRATMENT.

APPENDIX(II)

SANITARY WARE INVENTORY LIST AVAILABLE AT AL-BASHIR.

DIRECTORATE

WARD		DIRECTORATE		FLOOR					
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	FIRST FLOOR	PUBLIC	2	2				1	
2	SECOND FLOOR (FEMALES)	PRIVATE	3	2				1	
3	SECOND FLOOR (MALES)	PRIVATE	3	2		2			
4	SECOND FLOOR (CHIEF NURSE)	PRIVATE	1	1					
5	SECOND FLOOR	PRIVATE	1	1		2			
6	THIRD FLOOR (MALES)	PRIVATE	3	2					
7	THIRD FLOOR (FEMALES)	PRIVATE	3	2					
TOTAL			16	12		4		2	

BLOOD BANK

WARD		BLOOD BANK		FLOOR					
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	EMPLOYEE'S BATHROOM (MALES)	PRIVATE	1		1			1	
2	EMPLOYEE'S BATHROOM (FEMALES)	PRIVATE	1		1			1	
3	LABORATORY # (3)	PRIVATE	2						
4	MANAGEMENTS BATH	PRIVATE	2		2				
5	BLOOD INFUSION ROOM	PRIVATE	1						
6	LABORATORY # (2)	PRIVATE	2						
7	WAREHOUSE	PRIVATE	1						
8	LABORATORY # (1)	PRIVATE	2						
9	PUBLIC	PUBLIC	4		3				
TOTAL			16		7			2	

EMERGENCY B1

WARD		EMERGENCY		FLOOR			BI		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	PUBLIC UTILITY	PUBLIC	2		1			2	
TOTAL			2		1			3	

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EMERGENCY GROUND

WARD		EMERGENCY		FLOOR			GROUND		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	PUBLIC (FEMALE)	PUBLIC	1		2				
2	PUBLIC (MALE)	PUBLIC	1		1	1			
3	SURGERY	PUBLIC	4		1				
4	PLASTER ROOM	PUBLIC	1						
5	X-RAY	PRIVATE	3		1				
6	PUBLIC	PUBLIC	2		3				
7	INTERNAL	PRIVATE	2		1				
8	PUBLIC	PUBLIC	2						
9	PAEDIATRIC	PUBLIC	2		2				
10	NURSING	PRIVATE	2		1	2			
11	LABORATORY	PRIVATE	2						
12	EMPLOYEES	PRIVATE	1	1					
TOTAL			23	1	12	3			

SP

EMERGENCY FIRST

WARD		EMERGENCY	FLOOR			FIRST		
AVAILABLE PLUMBING FIXTURES								
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	ORTHOPEDIC	PRIVATE	2		2			2	
2	ICU	PUBLIC	2		1			1	
3	EMPLOYEES	PRIVATE	2		2				
4	PUBLIC	PUBLIC	1		1	1			
TOTAL			7		6	1		3	

EMERGENCY SECOND

WARD		EMERGENCY		FLOOR			SECOND		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	PUBLIC UTILITY	PUBLIC	1		1	1			
2	MCU	PUBLIC	2		1				
3	MCU	PUBLIC	2		2				
4	PRIVATE	PRIVATE	1		1				
5	DOCTOR'S OFFICE	PRIVATE	1						
6	PUBLIC	PUBLIC	2		2				
7	PUBLIC	PUBLIC	7		6				
TOTAL			16		13	1			

EMERGENCY THIRD

WARD		EMERGENCY	FLOOR				THIRD		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	PUBLIC	PUBLIC	1		1	1			
2	ORTHOPEDIC (FEMALES)	PUBLIC	6	4	1			2	
3	ORTHOPEDIC (MALES)	PUBLIC	6	2	5			2	
TOTAL			13	6	7	1		4	

SURGERY FIRST

WARD		Surgery		FLOOR			First		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	MEDICATION PREPARATION ROOM	PRIVATE	1						
2	NEUROSURGERY STATION	PRIVATE	1						
3	NEUROSURGERY	PUBLIC	3	2	1	3		1	
4	CHANGING ROOM (1)	PUBLIC	1	2	2				
5	CHANGING ROOM (2)	PRIVATE	1						
6	PATIENT WARD (MALE) # (5)	PRIVATE	1	1					
7	PATIENT WARD (MALE) # (6)	PUBLIC	1						
8	PATIENT WARD (MALE) # (4)	PUBLIC	1		1				
9	PATIENT WARD (MALE) # (7)	PUBLIC	1						
10	PATIENT WARD (MALE) # (3)	PUBLIC	1		1				
11	PATIENT WARD (MALE) # (2)	PUBLIC	1						
12	PATIENT WARD (MALE) # (1)	PUBLIC	1						
13	PATIENT WARD (MALE) # (13)	PUBLIC	3						
TOTAL			17	5	5	3		1	

SURGERY SECOND

WARD		Surgery		FLOOR			SECOND		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	NURSERY	PRIVATE	1	1				1	
2	ICU	PUBLIC	1						
3	CHANGING ROOM	PRIVATE	2	1				1	
4	PAEDIATRIC WARD # (1)	PUBLIC	1	1				1	
5	PAEDIATRIC WARD # (3)	PUBLIC	2	1					
6	PAEDIATRIC WARD # (5)	PRIVATE	1	1				1	
7	PAEDIATRIC WARD # (4)	PRIVATE	1	1				1	
8	PAEDIATRIC WARD # (6)	PRIVATE	1	1				1	
9	CHANGING ROOM	PRIVATE	1						
10	FEMALE WARD	PUBLIC	3	2	1	3		2	
11	FEMALE WARD # (7)	PRIVATE	1	1				1	
12	FEMALE WARD # (8)	PRIVATE	1	1				1	
13	CHANGING ROOM	PRIVATE	1						
14	FEMALE SURGERY STATION	PRIVATE	1		1				
15	FEMALE WARD	PUBLIC	3	2	2			2	
16	FEMALE WARD # (9)	PRIVATE	1	1				1	
17	FEMALE WARD # (10)	PRIVATE	1		1			1	
18	FEMALE WARD # (1)	PRIVATE	8						

PAEDIATRIC FIRST

WARD		PAEDIATRIC		FLOOR			FIRST		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	DOCTOR ON DUTY	PRIVATE	2	2					
2	DOCTORS STATION	PRIVATE	1						
TOTAL			3	2					

PAEDIATRIC SECOND

WARD		PAEDIATRIC		FLOOR			SECOND		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	ICU	PUBLIC	5		4			2	
2	CONTAGEOUS DISEASE	PUBLIC	5	4	3			1	
TOTAL			10	4	7			3	

PAEDIATRIC THIRD

WARD		PAEDIATRIC		FLOOR			THIRD		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	MILK KITCHEN	PRIVATE	1						
2	PUBLIC UTILITY	PUBLIC	3		5			3	
3	PUBLIC UTILITY		5		4			2	
4	SPECIAL TREATMENT WARD	PRIVATE	1						
5	NURSING	PUBLIC	2		4			4	
TOTAL			12		13			9	

HUDA DORMITORY

WARD		HUDA DORMITORY		FLOOR					
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	LAUNDRY	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	ROOM 401	PRIVATE	1		1			1	
2	ROOM 410	PRIVATE	1	1				1	
3	ROOM 407	PRIVATE	1	1				1	
4	PUBLIC	PUBLIC	8		5			4	
5	ROOM 1	PRIVATE	1	1				1	
6	ROOM 8	PRIVATE	1	1				1	
7	ROOM 7	PRIVATE	1		1			1	
8	PUBLIC	PUBLIC	7	4	1			4	
TOTAL			21	8	8			14	

NORTH SITE KITCHEN

WARD		NORTH SITE KITCHEN		FLOOR					
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1	MEN'S	PRIVATE	4		2	2			
2	LADIES	PRIVATE	5		2				
3			13						
TOTAL			21		4	2			

KITCHEN

WARD		KITCHEN		FLOOR			GROUND		
AVAILABLE PLUMBING FIXTURES									
NR. BATHROOM	LOCATION	USAGE	SINK	TOILET	TURKISH TOILET	URINAL	BATH	SHOWER	OTHERS
1			14		6	2			
	TOTAL		14		6	2			

1. A mother has a four-month-old baby and has not had her menstrual periods. She does the laundry for three hours and leaves the baby with his brothers and sisters. She breastfeeds her baby exclusively.

2. Mother with a three-month-old baby who fully breastfeeds and has already had her menstrual period.

3. Mother with a two-week-old baby; nearly fully breastfeeds, has vaginal bleeding.

4. Mother with a two-month-old baby; has not had a menstrual period; she breastfeeds him and gives him a bottle of sugar-water three times every day.

5. Mother with a four-month-old baby; she fully breastfeeds him and the baby sleeps from 12 midnight to 6 a.m. She has not had a menstrual period.

6. Mother with a three-month-old baby, she breastfeeds exclusively; she had her menstrual period last week.

7. Mother with a four-month-old baby; she breastfeeds exclusively day and night and has not had a menstrual period yet.

8. Mother who is nearly fully breastfeeding; her baby is four months old. She has seen a little spotting on one day last month.

Checklist for case studies

	Case 1	Case 2	Case 3	Case 4	Case 5
Amenorrhea					
Full or nearly full breastfeeding					
Baby is younger than six months					
Would you counsel on LAM use?					
What other family planning method would you counsel?					
Probing					
Other Counseling					

Checklist for case studies

	Case 6	Case 7	Case 8	Case 9	Case 10
Amenorrhea					
Full or nearly full breastfeeding					
Baby is younger than six months					
Would you counsel on LAM use?					
What other family planning method would you counsel?					
Probing					
Other Counseling					