

TAJI MILITARY BASE
SANITARY SEWER NETWORK

STUDY PREPARED AND REPORTED BY:

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Purpose of the study

This study was conducted to identify Taji Military Base sewer system defects and provide recommendations for a rehabilitation project. These recommendations were then incorporated into construction plans that included the rehabilitation and replacement of approximately 210 feet of sanitary sewer pipeline, 9 submersible pumps, 4 electrical panels, cleaning 300 m pipelines and construction of 3 security fences and grease traps in addition to repair or replacement of other sewer segments.

The construction project was awarded to Ayon Al-Saba contractor in January 2010.

History of the network

The sanitary sewer network for the base was designed and renovated by different contractors and during different times:

- Yellow zone, grey zone, red zone and RTC networks were renovated by Rock Solid in 2007. Installed additional submersible pumps, backup generators, control panel and security fence around the stations. Manhole covers and pump station covers were replaced for most elements. Rock Solid replaced 1 submersible pumps for the water treatment plant.
- Blue zone, North and South Depot networks were renovated by AMEC between 2006 and 2007. Faulty submersible pumps were repaired or replaced.
- IASSI, BSU, MI, DTB and RTC and Engineering School networks were renovated by Washington Group in 2007. Faulty submersible pumps were repaired or replaced.
- Orange zone network was renovated by CH2MHILL in between 2007 and 2008.
- Pump Station No. 1 was renovated by UIC in 2007. UIC replaced and repaired submersible pumps.

In general, pump stations and sewer lines were replaced and repaired as problems came to light, but little was done to prevent system failures before they occurred.

GENERAL CONCEPT

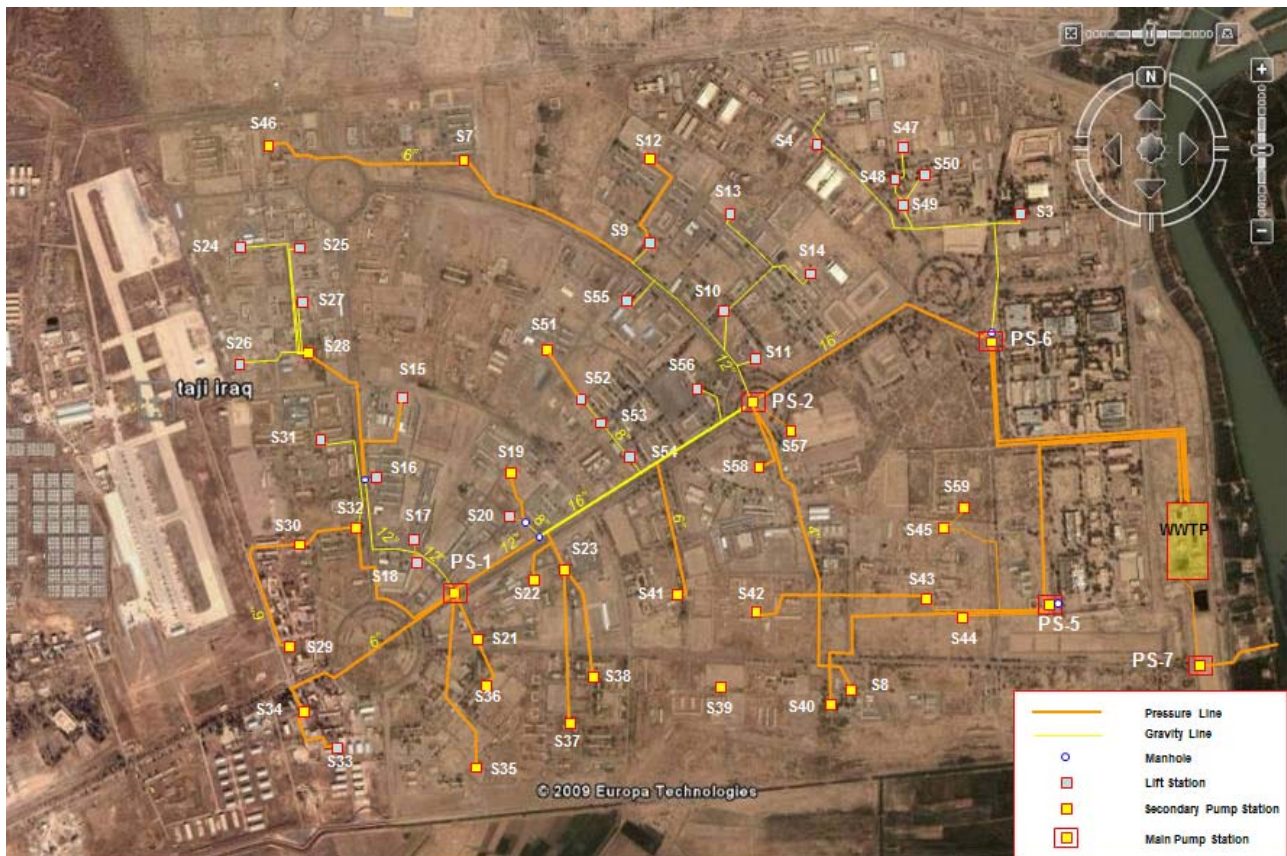
The sanitary sewer network in Taji Military Base is managed and maintained by IA DPW (Department of Public Works). Due to lack of funds and technical personnel Taji DPW has not been able to maintain the network as needed. Iraqi Army is depending on self-reliance funds to purchase parts and pay for labors to operate and maintain the infrastructure in the base. This fund is not sufficient for minimum requirements of managing and maintaining the network. The system in general suffers from pump station break down and pipe line blockage in addition to abuse to the system elements by Iraqi Army personnel.

Most of the pump stations or lift stations are set to start manually, because power supply is not on 24 hours a day. Taji DPW do not have enough staff to start the pumps all on time; therefore, pump stations and lift stations fill up and back up sewage to upstream side of the network. DPW has only

five (°) sucker trucks to empty the stations that are not discharging sewage due to issues with submersible pumps or faulty electrical panels.

The most impacted areas are:

- Blue Zone
- IASSI
- Grey Zone
- Yellow Zone
- North and South Depots



CURRENT CONDITION

In general the sewer network structures and pipe lines are in moderate to good shape. There are two submersible pumps in each pump station except pump stations 5 and 6 which are supplied by 3

submersible pumps. Due to lack of maintenance by Iraqi Army, most of the submersible pumps are not working which in some cases resulted in flooding large areas and public health concerns. Pumps from one station are taken out to replace a broken one in another station.

Some of the manhole covers are damaged and the manholes are filled with trash and debris which causes blockage of the system.

The pipe line between lift station 16 and Pump Station 1 is clogged and has capacity issue. When pumps in blue zone and grey zone start, the line does not carry the discharge and causes back up to these zones. This line shall be resized to a larger diameter in order to catch up the discharge when all lift stations are pumping at the same time, or another pressure line to be installed between station 16 and station 20 to by-pass discharge to station 20 which pumps into the line between station 1 and station 2.

Both pumps in lift station 32 in IASSI are broken down and the electrical panel does not work properly. This impacts the area upstream and causes back up of sewage to station 31 and manholes along the line between them.

Pump Station 1 is receiving discharge from BSU, Location Command, IASSI, Blue Zone, Grey Zone and west side of Yellow Zone. One of the pumps in this station is broken down and the electrical board does not start automatically. IA DPW starts this station manually and in most cases this is not done properly on time. This situation impacts the entire zone and upstream lines that drain into this pump station.

Pump Station 2 which is receiving discharge from Pump Station 1 also has the same issue of submersible pump and electrical panel break down. This situation impacts all the zones that drain into this station, which most of the time causes sewage back up in yellow zone across Location Command.

It is recommended to separate orange zone, BSU and location command from this line and run a new line along the street between location command and orange zone, then to connect to pump station 2.

Lift station 3 has the same issues that impacts northwest area of North Depot which already has some other issues.

There are some more issues at different locations that are caused by pipe line blockage or manhole damages which require unclogging pipe lines and manhole repairs or clean up.

DATA COLLECTION

A team was assembled in January 2009 from Taji DPW technicians and two ITAM-A Engineers to survey and evaluate the sewer network in order to identify various deficiencies in the system and to plan and perform maintenance and improvement work.

Field investigation has produced an enormous amount of data that was used to make decisions related to sewer system improvement and maintenance plan.

LOCATION COMMAND-RSU

Stations 32 and 33

- Stations do not have security fence
- One submersible pump is broken down
- One electrical panel does not work

LOCATION COMMAND

Station ٢٣

The electrical panel does not work.

IASSI

Station ٢٩, ٣٠, ٣١ and ٣٢

- Receives grease from the DFAC
- One submersible pump is broken down
- Missing hanging chains
- Two pumps are down and two others are missing.
- Both pumps are broken down.

In general none of the pump stations have security fence and most of the manhole covers and lids are damaged or missing.

BLUE ZONE

Stations ٢٤, ٢٥, ٢٧ and ٢٨.

- Power is not connected to the station.
- One submersible pump is broken down
- Lifting chains are missing.
- One electrical board does not function.
- Pumps in all stations are connected to the out let pipe via hose. The hose brakes after several times of raising the pump.

GREY ZONE

Station ١٦

- The pipe line between this station and pump station ١ does not have sufficient capacity to carry the load from upstream.
- There is a lot of debris inside the storage tank.
- Pumps in all stations are connected to the out let pipe via hose. The hose brakes after several times of raising the pump.

YELLOW ZONE

Station ١٨

Submersible pumps in the station are connected to the out let pipe via hose. The hose brakes after several times of raising the pump.

AQUA ZONE

Station ٥٥, ٥١, ٥٢ and ٥٣

- Stations do not start automatically.
- Two submersible pumps are broken down.
- None of the stations have security fence.

IMSS

Station ٤٦

The station do not have security fence around it.

ENGINEERING SCHOOL

Pump Station ٧

- This station does not have security fence.
- Submersible pumps are connected to the out let pipe via hose. The hose brakes after several times of raising the pumps for inspection and maintenance purposes.

RED ZONE

Station ١٢

- Security fence is damaged.
- Submersible pumps are connected to the out let pipe via hose. The hose brakes after several times of raising the pumps for inspection and maintenance purposes.

BROWN ZONE

Stations ١٠, ١١ and ١٤

- In all stations the submersible pumps are connected to the out let pipe via hose. The hose brakes after several times of raising the pumps for inspection and maintenance purposes.
- Station ١٤ is missing fence.

DPW (DEPARTMENT OF PUBLIC WORKS)

Pump Station ٥٤

- There is no fence around this station.
- Only one submersible pump out of two pumps works.
- The electrical board does not work and has many missing parts.

SIGNAL SCHOOL

Pump Station ٤١

- The station does not have security fence.
- The ventilation pips are missing the hooks due to rusting.
- Pumps on auto run continuously even the tank is empty.

RTC

Stations ٨, ٤٢, ٤٣, ٤٤ and ٤٥

The submersible pumps are connected to the out let pipe via hose. The hose brakes after several times of raising the pump.

- The submersible pumps in these stations do not have neither hose nor slide bars.
- None of the stations have security fence.

LOGISTIC BATTALION

Station ٥٦

One submersible pump is broken down.

٩th DIVISION

There is a pipe line and two manholes behind Commanding Head Quarter building that are clogged.

NORTH DEPOT

Stations ٣, ٤, ٤٧, ٤٨, ٤٩ and ٥٠.

- Pipe line from the station to manhole by the DFAC is clogged.
- Three pumps are broken down.
- Missing lifting chains.
- Units are dumping oil in sewer manholes and pump stations.
- All the stations are missing ventilation pipe.
- Electronic panel for all stations are not working automatically.
- All the stations do not have security fence.

SOUTH DEPOT

Pump Station ٥

- There is no fence around this station.
- Only one submersible pump out of two pumps works.
- The electrical board does not work and has so many missing parts.

ORANGE ZONE

Station ٣٦ and ٣٩

- Power cable has been taken from the electrical panel to the mosque.
- Generally all pump stations do not have security fence.
- Station S٣٩ is down because the power cable is damaged.
- The ٨" pvc line between manhole M.H.٢-٨ and M.H.٢-١٠ has been damaged.

TENT CITY MILVAN CITY

Issues

Pump station ٥٧ located outside this compound that serves Milvan's City, water treatment plant back wash as well. The electrical board has been abused by others.

PUMP STATION ١

- One of the pumps is broken down.
- Pumps do not start automatically.

In general most of manhole covers and lids in the network are damaged or missing.

Table of missing or damaged components in the network

Zone or Area	System Condition	Items to be replaced or installed					
		Pump	Fence	Manhole	Electrical Panel	Slide Bars	Screen Cell
Location Command		1	2	21	2	0	2
IASSI		0	4	08			4
Blue Zone		1		33	4	4	
Grey Zone		1		70	1	3	
Yellow Zone				68		3	
Aqua Zone		2	0	77	3		
IMSS			1	7			1
Engineering School		1	1	22		1	
Red Zone			1	31		3	
Brown Zone				27		3	1
DPW		1	1	26	1		1
Signal School			1	17	1		1
Engineering Battalion							1
RTC				13		0	4
Logistic Battalion		1		3	1		1
9th Division				19			
North Depot		2	7	18	7		0
South Depot		1	1	37	1		
Orange Zone		1	0	107			2
National Police							4
Tent City/Milvan City					1		1
Pump Station 1		1			1	1	1
Pump Station 2		1			1	1	1
Pump Station 0							
Pump Station 6							
Extra pumps for spare		10					
Total number of items		29	29	604	24	29	30

Good condition
 Fair condition
 Bad condition



RECOMMENDATIONS

ITAM-A Engineer Advisor presented a detailed study in a power point presentation in a meeting with DPW Engineers and USACE (US Army Corps of Engineers) Resident Engineer. The recommendations below were suggested to propose scope of requirements for a rehabilitation project:

١. Replace and install new submersible pumps where they are damaged or missing.
٢. Install new security fence for the stations that do not have one to avoid military personnel from abusing the stations and their components.
٣. Repair damaged manhole lids and install new cover and lids where they are missing.
٤. Repair faulty electrical panels and install new panels for damaged or missing ones.
٥. Install lifting chain for submersible pumps.
٦. Install guide bars for the stations that are missing one.
٧. Install new screen cells for the stations that do not have one in order to capture debris and trash before the run through the pumps and pipe lines.
٨. Install new pressure pipeline between pump stations ١٦ and ٢٠.
٩. Unclog all blocked pipes and cleanout all manholes from debris and trash.
١٠. Construct Grease trap for all the Dining Facilities (DFAC) to capture oil and grease prior to discharge to main sewer lines.
١١. Advise Vehicle Maintenance Facilities to collect and recycle used oil rather than dumping in manholes or pump stations.
١٢. Taji DPW to request from MoD (Ministry of Defense) to hire civilian technicians to work for and under DPW's supervision, because military personnel are frequently moved or relocated between different Military units, this causes discontinuity between the teams and technician members.
١٣. DPW to seek consistent resources of funds by coordination with MoD.
١٤. It is very essential for IA to dedicate funds and skilled staff, and set a dependable MOM (Management Operation and Maintenance) program to make sure that the network will be monitored and serviced on time. The sewer network in the base has been renovated more than once, but has not been taken care of by IA due to the reasons mentioned before.
١٥. Improved training and service programs were also recommended as part of the MOM assessment.

RESULTS

These recommendations incorporated into construction plans for a rehabilitation project that included replacement of submersible pumps, installation of electrical panels, security fences and a new pipeline between station S16 and S20 and other items. With funding in place, USACE awarded the project to Ayon Al-Saba (an Iraqi local contractor). Construction of the project developed in this assessment began in January 2010.

A team was assembled between USACE, ITAM-A and DPW to manage and oversee the project. The rehabilitation project was completed successfully in December 2010. The sewer system evaluation study and MOM assessment have provided the future plans for the sanitary sewer system. The MOM plan, completed in September 2010, describes all three parts of the MOM Program: management, operations, and maintenance of the

sanitary sewer system. In completing the MOM evaluation, DPW with the assistance from ITAM-A advisors developed numerous recommended action items, some of which have already been implemented.

DPW is now documenting its technical and skills training programs and has created tracking system to monitor MOM program and services.

The MOM assessment also led to recommendations for regular sewer cleaning. In response, DPW developed a new cleaning plan that divided the network into 24 areas as shown on the map. Per this plan nine areas will be cleaned each year, with the expectation that the entire system will be cleaned every three years.

