

Project: **Reduction of infiltration at the sewerage network of the Kingdom of Bahrain**

Client: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH /  
Dornier Consulting /  
Ministry of Works Kingdom of Bahrain

Cost: -----  
Date: 2009

Project description:

High infiltration rates occur in the sewerage network of the Kingdom of Bahrain.

The rehabilitation of the total network would require extremely high expenses. For this reason, a method was developed to minimize the CCTV and rehabilitation costs along with maximum reduction of infiltration rates!

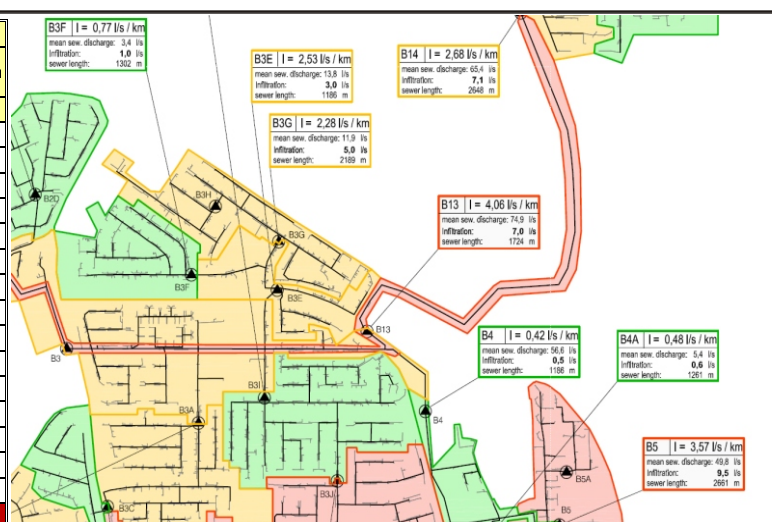
The total network was classified into small areas drained by pumping stations where the minimum discharges were measured during night time. The infiltration rates were divided by the connected sewer lengths. This leads to a specific infiltration rate/m sewer length for each area. As higher the specific infiltration rate, as lower are the cost to rehabilitate the area with a maximum reduction of infiltration.

Within this method a ranking list for all areas was posted as guideline for an effective CCTV and rehabilitation program.

Core works:

- Classification of the total sewerage networks into small areas
- Measuring of the infiltration rates in each area
- Determination of specific infiltration rates by dividing the flow by the connected sewer lengths
- Implementation of a ranking list starting with the highest specific infiltration rate ending with the lowest, which provides:
  - The lowest cost for CCTV Investigations and Rehabilitation with the highest reduction of infiltration

PS #	Data Input		Measurement		Ranking
	Length of Network	Q mean	Q min	Infiltration	
Network A	m	l/s	l/s	l/s/km	
PS1	936	15.5	11.8	12.6	
PS2	1966	43.4	26	11.7	
PS3	2750	57.8	31	11.3	
PS4	1436	18.4	11.6	8.1	
PS5	3087	62	23.5	7.6	
PS6	832	11.5	6	7.2	
PS7	1322	11.3	8.4	6.4	
PS8	473	2.8	2.5	5.3	
PS9	6926	68.6	32.7	4.7	
PS10	1318	11	5.9	4.5	
PS11	479	2.8	2.1	4.4	
PS12	2324	17.5	10	4.3	
PS13	3315	14.2	13.4	4.0	
PS14	3377	40.5	13	3.8	
PS15	2268	27.3	17.5	3.7	
<b>Total</b>	<b>32809</b>	<b>404.60</b>	<b>215.40</b>	<b>99.64</b>	



Ranking List