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Management of the Vital Lines of Water and Waste Water

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ABSTRACT

Natural disaster such as earthquakes cause severe damage to water and wastewater facilities, other water and wastewater infrastructure in a city or small community and or industrial complex. There are numerous statistics and reports from around the world about the severe damage caused by accidents on the lifelines of various facilities, including water, wastewater and gas, electricity and telecommunications after a high-intensity earthquake including severe damages and threats to public health and well-being in the kobe of Japan, Sommanra and Indonesia earthquakes and similar cases. In this article, we have tried to find ways to reduce the damage to the vital Lines.

Keywords: *vital Lines, water, wastewater, crisis management*

INTRODUCTION

Natural disasters such as earthquakes cause severe damage to infrastructure, including buildings and water and wastewater constructions. Severe damages resulting from damage on the life lines of various facilities, including water and wastewater facilities, occurs after an event such as high intensity earthquakes. Since the earthquake of 1906 in San Francisco, the U.S is the importance of damaging the vital Lines in the earthquake. In this earthquake, severe damage was caused by the fracture of a large number of pipelines and lack of water supply, and numerous fires were reported after earthquakes. In fact, due to the location of the city of San Francisco in an area with high intensity earthquake, fire was the main cause of the destruction. In another report, the issue of major Mexican earthquake in September 1985 has been raised. In this earthquake that led to extensive land displacement, the main lines of the drinking water pipe broke down, resulting in more than 4 Million people had no drinking water for three weeks. In 1994, in California's Northridge earthquake, several main pipelines for the transmission and distribution of water were fractured due to the permanent destruction of the earth. And in 1995, in the earthquake in the city of Kobe, in the city's water distribution network, due to the destruction of the land and the increase moisture in the holes that were artificially filled near the gulf, over 2000 repairs and reconstruction of pipes and city drinking water facilities has been reported. Tehran is located in a plain with an area of more than 1,000 square kilometers and a population of more than 10 million people located near the Alborz Mountains.

Due to the location of this city on numerous faults and due to historical records of seismicity in Tehran and the various events that have occurred as a result of the earthquake, this city is always exposed to earthquakes. In this article, describing the facilities of drinking water in Tehran and areas that are vulnerable due to the high intensity earthquake, as well as some of the actions necessary to reduce or prevent damage

to the facility before the incident in the event of an earthquake, recommendations for the design of water facilities should be considered in order to minimize the damage caused by earthquakes, and ultimately provide necessary and effective recommendations for prevention before earthquakes and measures which is necessary after occurrence and in crisis situations, is described and presented.

WATER SUPPLY NETWORKS CRISIS MANAGEMENT

In order to become familiar with the crisis of the water supply network, which is one of the most important vital Lines in any country, we must first describe what is happening in the direction of drinking water to a residential unit in the city.

Drinking water in Tehran can be supplied from three sources:

- Water stored behind dams (Karaj-Latian-Lar)
- The margin riverside
- Deep and semi-deep wells in the city

In order to explain the full path, we use the longest route from the dam to the city.

- The dam
- Valves and channels of dam facilities
- Pressure stations
- Downstream Water transfer tunnels
- Water transmission lines (open channels and pipelines)
- Pumping stations
- Drinking water refineries
- Chlorination units
- Main city transmission lines (king Pipes)
- Buried and semi-buried and air sources in the city
- Water supply lines to consumer units

This will only happen if the feeding line starts from the dam, if the water well is a source of water supply, you will be faced with other conditions, and we need water pumps to pump water to the surface, and these pumps will be supplied with electricity or fossil fuel and supply of this same issue defines another crisis, after water reaches the surface, the chlorination problem and its distribution is like the distribution of water in dams. It is clear that in all these directions, the disruption of the service provider unit to the distribution path will be disrupted, which means that for us, the king pipes buried at the level of the city can also be important as keeping a dam safe, so in order to keep this vital artery open, the distribution network of drinking water, which has the first priority in the Lines, you need to have a database that includes the contents of your network and or in some way it serves, and also show how to disperse those centers in the city to reopen and launch the network.

Information Layers Required for the Water Supply Network

A- Human information

Management side

Particular specialties (physician-nurse-rescuer-firefighter ...)

Executive skills (repairers of power lines, gas, telephone, water ...)

Water refineries

Pipes Distribution network including (Steel, Cast Iron, Galvanized, Concrete, Asbestos, Ironize, Polyethylene Vinyl Chloride)

Accessories for Transmission and Distribution Pipes

Include

Transforms

Knees Valves

Valves include:

Control valves

On-line breaking pressure valves

Breaking pressure valves

Pressure stabilizer valves

Flow control valves

Information about Water Storage Tanks and Pumping Stations

Including ground and air tanks (metal type, concrete, volume, earthquake resistance)

Subscribers information

Storage tanks

Pumping stations

Sensitive Places

Sensitive places that should be put in water supply priority during an earthquake.

High risk vulnerability places.

Places of Water and Sewage Interactions with Other Urban Facilities

Information about Vital Water and Waste Water Lines Managers

Information about water network crisis managers includes: (address of residence, call phones, housing status in terms of earthquake safety)

Install Telemetry Devices

Also, in order to know the state of the telemetry devices network, it is suggested that the following information should be specified:

- Reservoirs altimeter
- Pressure gauge of pipes
- Flow meters of pipes
- Open and closed virtual tachometer
- Announcement News Systems Show Bugs

In other cases, new facilities and new technologies that are connected to smart systems must be individually evaluated and database prepare. In addition, many of the above cases are common in the water and sewage and industrial effluent Lines, and the data provided can be used in all cases.

MANAGING THE CRISIS OF THE COLLECTION AND TRANSFER OF WASTE WATER AND EFFLUENT

After an earthquake and only one day after the earthquake, managers will face a crisis in the distribution of industrial wastewater and human waste. The crisis will be a subset of health crises and contagious diseases and psychological crises caused by the smell of stink and turmoil in temporary accommodation sites. It is a crisis that can also trigger the emergence of social crises. Just keep in mind that at least every day, every person needs to use sanitary services twice and use at least 10 liters of water for personal care. In condition that we do not think about the bath, in a city of five million, this water is 50 million liters, which equals two thousand five hundred trailer with a volume of twenty thousand liters of wastewater that should be collected and repelled from the city. Now, if we want to face this problem professionally, we should first glance at the artery of collection and disposal of sewage in the cities, and then consider the changes resulting from the earthquake to these Lines and design a suitable program for it. The artery of collecting and transferring waste water runs the reverse of the distribution of water, so we start from residential units, after an earthquake, except for units that resist against earthquake and do not suffer serious structural damage, the remaining buildings due to type The traditional system of sewage collection pipes used cast iron pipes, the sanitary services cannot be used due to the failure of pipes. If we take 10 liters per capita per person in Tehran, we have about 50 million wastewater per day, which should be provided the health services to collect and disposal them, which means at least ten thousand sanitary fountains which will serve every 500 people every day in each spring, and if we consider every twenty springs as a public service, there are five hundred sanitary services designed for an earthquake that has a buried and anti-earthquake refinery system and capable of providing continuous service in condition absorbent wells.

KEY ISSUES OF SEWAGE ARTERY

With regard to the above mentioned and the various findings from the past crises, the following are of particular importance regarding the collection and transfer of waste water.

- The mere provision of a sanitary service is not enough to provide services, providing water to a sanitary service is also a major problem in providing its services.
- Relief workers, after attending their area, are advancing the problem of human sewage because they are not familiar with public sanitary services in the city.
- The sewage system is just enough to collapse at one point, so its location and fixation may have been a few weeks after the earthquake.
- Absorption wells in public and personal services in the event of a collapse cannot be rebuilt and triggered.
- The refineries should have the ability to exploit after the earthquake if they are still well maintained by the transmission networks.
- Industrial and chemical wastewater, as well as surface wastewaters that are caused by rain, can add to our problems and attention to them is necessary.
- The presence of specialized human resources along with the familiar manpower to the region, which can come to improvement, rehabilitate and opening the sewage network after a crisis such as an earthquake, and also these forces can use previously anticipated facilities that

include Items such as equipment and maps and vital information about what works in the city.

RESULTS AND SUGGESTIONS

Regarding the presented content and the experiences of events occurring in the past earthquakes, several issues are important:

- The need for coherent and sustainable management in decision making during the crisis
- The need for attention to vital infrastructure and Lines
- Implementing new methods and technologies in crisis management and improvement of vital Lines.

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